Realising the Transformative Potential of the SDGs

Mark Elder and Peter King

IGES
Institute for Global Environmental Strategies

Realising the Transformative Potential of the SDGs

Mark Elder and Peter King, Editors

Institute for Global Environmental Strategies (IGES)

Realising the Transformative Potential of the SDGs

Mark Elder and Peter King, Editors

Institute for Global Environmental Strategies (IGES)
2108-11, Kamiyamaguchi, Hayama, Kanagawa, 240-0115, Japan
Tel: +81-46-855-3700 Fax: +81-46-855-3709
E-mail: iges@iges.or.jp
URL: http://www.iges.or.jp/

IGES is an international research institute conducting practical and innovative research for realising sustainable development in the Asia-Pacific region.

ISBN 978-4-88788-204-1

Printed in Japan

Realising the Transformative Potential of the SDGs

Table of Contents

Foreword

It is my pleasure to pen this foreword to one of IGES' most thoughtful and provocative publications on Agenda 2030 and the Sustainable Development Goals (SDGs). The year 2015 saw two of the most significant global agreements signed by almost all countries—Transforming our World: the 2030 Agenda for Sustainable Development and the Paris Agreement on Climate Change.

These two landmark agreements provide the twin anchors for IGES research over the next decade. Therefore, it is timely for this publication, *Realising the Transformative Potential of the SDGs*, to lay out the challenges for governments, cities, and the private sector to avoid the temptation of treating these agreements as just another simple reporting exercise, justifying existing policies, programmes and activities.

If the SDGs are really going to "transform our world" then the level of ambition of all actors needs to be elevated, and urgently, as our world is currently going in the opposite direction. While technological advances and financial innovation will play their part in helping all stakeholders to realise the transformative potential of the SDGs, at the heart of the challenge is a changed paradigm of what it means to be a global citizen in the 21st Century. Everyone will need to approach their specific role in life with optimism that we can do better, we can be better, and we can be much wiser stewards of planet Earth.

We also need to recognize that the SDGs are intended to be universal and indivisible, leaving no one behind. Hence, another important message from this publication is to break down sectoral silos and bridge across barriers between stakeholders with differing agendas. Business as usual cannot achieve the SDGs, so business "unusual" is needed, with innovation and creativity to find new business opportunities and sustainable technologies.

I commend this publication to you and hope that you will find the necessary inspiration to play your part in making the SDGs truly transformative.

Professor Kazuhiko Takeuchi
President, IGES
Institute for Global Environmental Strategies (IGES)

Preface

The SDGs will be at the heart of IGES research and outreach over the next few years, and *Realising the Transformative Potential of the SDGs* shows the way forward for all stakeholders to gradually come to grips with what achieving Agenda 2030 really means.

The introduction chapter points out that solutions to implement the SDGs, as well as key means of implementation including finance and technology, are readily available, and are not really new. What has changed is the sense of urgency as the global community realises that several of the planetary boundaries have already been exceeded and the trajectory is towards unsustainability.

Much of the global discussion on the SDGs is focusing on issues such as indicators, data development, and analysing linkages among goals, targets and indicators. These are certainly important, but it is urgent to move beyond these issues and consider concretely how to achieve this transformation. We do not need to wait for all of the data to be collected in order to take action. This publication is a wake-up call to focus on the big picture and the universality and indivisibility of the SDGs, rather than a narrow search for which part of the SDGs might accord with current activities.

National governments have unique powers to guide, regulate, and finance all the SDGs. Voluntary approaches are important, but they are not likely to be sufficient, and they need to be guided and enabled by governments. Silo approaches between sectors need to be broken down and possibly new institutional arrangements need to be considered, along with new and improved partnerships within and among countries.

As most of humanity is going to be living in urban areas in future, cities need to become the wellsprings and crucibles for the innovation and creativity needed to find new solutions in all aspects of urban living—energy, transport, food security, water, housing, employment, security, and good governance—all aspects covered by one or more SDGs.

Businesses also need to shift away from unsustainable activities, which undermine future prosperity, and recognise that Agenda 2030 raises multiple new business opportunities, which will amply reward frontrunners. Financial institutions will find new opportunities in green and blue bonds and investment in trailblazing companies, and they will increasingly understand the danger of stranded assets as old, unsustainable business models and technologies no longer fit the new paradigm. Boundless opportunities also exist in innovative technologies that will hasten the shift to sustainable development and disrupt older, unsustainable approaches.

I hope that readers of this publication will be inspired to find their own solutions and collectively contribute to realising the transformative potential of the SDGs.

Hideyuki Mori
Executive Director
Institute for Global Environmental Strategies (IGES)

Acknowledgments

The editors would like to express their sincere appreciation to the many people who contributed to the successful production of this book. First we would like to thank our co-authors for their valuable contributions to their respective chapters. Lewis Akenji was the lead author for chapter 2, and important contributions were also made by Magnus Bengtsson, and Simon Olsen. Important contributions were made by Toshizo Maeda and Shom Teoh, who contributed to chapter 4, and by Akiko Shigemoto to chapters 5 and 6. Especially, we would like to thank Hironori Hamanaka, Bindu Lohani, Robert Dobias, Kazuo Matsushita, Takashi Hoshiyama, Yukiko Furuya, and Norihiro Mizumura, who provided insightful and helpful comments on one or more of the chapters, which helped improve the contents considerably. Eiko Kitamura and Sayaka Yano provided crucial logistical and administrative support. Akiko Shigemoto played a key role in helping us to achieve timely production. Finally, we would like to thank IGES President Kazuhiko Takeuchi and Executive Director Hideyuki Mori for their support and encouragement of this project, and for helping us to keep on track.

Mark Elder and Peter King
Institute for Global Environmental Strategies

List of Tables and Figures

Tables

Figures

Abbreviations and Acronyms

3-D	three dimensional
3Rs	reduce, reuse, recycle
AAAA	Addis Ababa Action Agenda
AADMER	ASEAN Agreement on Disaster Management and Emergency Response
ACMF	ASEAN Capital Markets Forum
ADB	Asian Development Bank
ASEAN	Association of South East Asian Nations
CAI-Asia	Clean Air Asia
CBO	Congressional Budget Office, USA
CPEIR	Climate Public Expenditure and Institutional Review
CPI	City Prosperity Initiative
CRISPR	Clustered Regularly Interspaced Short Palindromic Repeats
CSR	corporate social responsibility
DESA	Department of Economic and Social Affairs
DGP	Development Guide Plan
DNA	deoxyribonucleic acid
EASAC	European Academies Science Advisory Council
ECOSOC	United Nations Economic and Social Council
EDB	Economic Development Board, Singapore
EIA	environmental impact assessment
ESCAP	Economic and Social Commission for Asia and the Pacific
ESG	environment, social, governance
EU	European Union
FDI	foreign direct investment
FfD	Forum on Financing for Development
FIT	feed-in-tariff
FSB	Financial Stability Board
G20 SFSG	Group of 20 Countries Sustainable Finance Study Group
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GEO	Global Environmental Outlook
GHG	greenhouse gas
GIZ	Gesellschaft für Internationale Zusammenarbeit (German Aid Agency)
GNH	Gross National Happiness
GNP	Gross National Product
GPFG	Norway Government Pension Fund
HDB	Housing Development Board, Singapore
HLPF	High-level Political Forum on sustainable development

IAEG-SDGs	Inter-Agency and Expert Group on SDGs indicators
ICETT	International Centre for Environmental Technology Transfer, Japan
ICT	information and communication technology
IEA	International Energy Agency
IETC	International Environmental Technology Centre
IFC	International Finance Corporation
IMF	International Monetary Fund
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
IRP	International Resource Panel
ITDP	Institute for Transportation and Development Policy
JETA	Environmental Technology Association, Japan
JPOI	Johannesburg Plan of Implementation
LCD	liquid-crystal display
MDB	multilateral development bank
MDGs	Millennium Development Goals
MEA	multilateral environment agreement
MEE	Ministry of Ecology and Environment, China
MEP	Ministry of Environmental Protection, China
METI	Ministry of Economy, Trade and Industry, Japan
MOI	means of implementation
NAFTA	North American Free Trade Agreement
NAP	National Adaptation Plan
NAPA	National Adaptation Programme of Action
NDC	Nationally Determined Contribution (to UNFCCC's Paris Agreement)
NDRC	National Development and Reform Commission, China
NESDP	National Economic and Social Development Plan, Thailand
NGO	nongovernmental organisation
OECD	Organisation for Economic Cooperation and Development
PES	payment for ecosystem services
PRI	principles for responsible investment
QOL	quality of life
R&D	research and development
RPS	renewable portfolio standard
SATREPS	Science and Technology Research Partnership for Sustainable Development
SCBD	Secretariat of the Convention on Biological Diversity
SCP	sustainable consumption and production; State and City Planning Project; Singapore Cooperation Programme
SDGs	Sustainable Development Goals
SDSN	Sustainable Development Solutions Network
SEA	strategic environmental assessment
SEAS	Sustainable Energy Association of Singapore
SECOE	Sustainable Energy Centre of Excellence, Singapore

SEPA	State Environmental Protection Administration, China
SIA	sustainability impact assessment
SIDS	small island developing states
SME	small and medium size enterprises
SPP	sustainable public procurement
TCFD	Task Force on Climate-Related Financial Disclosures
TEEB	The Economics of Ecosystems and Biodiversity
TOD	transit-oriented development
UNDP	United Nations Development Programme
UNEA	UN Environmental Assembly
UNEP	United Nations Environment Programme
UNEP FI	UNEP Finance Initiative
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
UNRISD	United Nations Research Institute for Social Development
UNSSEI	United Nations Sustainable Stock Exchanges Initiative
URA	Urban Redevelopment Authority, Singapore
VAT	value added tax

Executive Summary

Introduction

The 2030 Agenda, with its 17 Sustainable Development Goals (SDGs), 169 targets, and 232 indicators, agreed by all countries, are intended to "transform the world". This report examines the ability of the SDGs to actually trigger this transformation and to suggest some key actions to make the SDGs more transformative. It examines the roles of key actors—governments, cities, and the private sector—and two key means of implementation—finance and technology. The extent to which the SDGs will be truly transformational, however, remains an open question, which depends on how they are implemented.

There is much enthusiasm in initiating plans to implement the SDGs by many governments at all levels, and to some extent in the private sector. Many national governments have set up SDG implementation structures and are taking steps to integrate SDGs into national planning. Despite considerable hope and enthusiasm raised by the SDGs, and some quick initial efforts, many governments and stakeholders are uncertain about how to proceed with concrete actions.

The report concludes that solutions to implement the SDGs, as well as key means of implementation including finance and technology, are readily available, and have been discussed many times in the past. The issues addressed by the SDGs are not new. There is a danger, however, the key actors will focus on collecting and reporting on the indicators and/or cherry picking individual SDGs which already conform to business as usual, rather than using them as an opportunity to achieve transformational change and treating the SDGs as indivisible and comprehensively linked. As the attention shifts from the overall vision of the SDGs to the details of the targets and indicators, there is some risk that an intensive focus on data, monitoring and measurement may shift attention away from the big picture and concrete and ambitious transformative actions. It is important to ensure that implementing the SDGs is not just about record keeping or only chasing small wins; it is essential to have broad strategies that are ambitious enough to achieve multiple goals. A key message is that it is not necessary to wait to take action until all of the indicators have been developed and all the data has been collected.

National Governments

Many are sceptical about the ability and willingness of national governments to take very ambitious actions to implement the SDGs, much less to achieve their transformative

potential. The current emphasis on voluntary approaches may not be sufficient to achieve the transformative potential of the SDGs. Picking a few SDGs, which are already part of national strategies, and maintaining the silo approach and institutional "turf" battles will not achieve the vision of the 2030 Agenda.

It is important to keep the focus on the big picture of how to achieve the transformative potential of SDGs. To do so, more ambitious, cross-cutting and strategic policies and related comprehensive institutional reforms are needed at the national level. National governments can, and should, raise their level of ambition and take stronger actions to implement the SDGs.

National governments have unique, powerful tools including taxation and spending, allocation and enforcement of property rights, regulation and its enforcement, and coercive dispute settlement, but are often reluctant to use them to promote sustainable development. These tools should be harnessed to promote SDGs. Overall, governments need to set mandatory requirements and specify clear directions for implementing the SDGs, not just "enabling" those who are already persuaded to take action.

The SDGs also provide an opportunity for national governments to re-define progress. Developing a new "progress" scorecard to replace GDP, preferably based on the SDGs, needs leadership from national governments to institutionalize it into national statistical agencies and throughout all government departments.

Too often, the responsibility for sustainability initiatives has been allocated to generally weak environmental ministries. For the SDGs to be truly indivisible, national governments need to mainstream sustainability and environmental considerations in other policies and programmes, including government budgets. They also need to support SDG-related initiatives at the sub-national level, especially in cities. A comprehensive whole-of-government approach is needed, to coordinate both horizontally and vertically between different policy areas and sectors, as well as between the various levels of government and governance (local, national, global).

Cities

Cities already contain half of the world's population, and this proportion is continuing to grow, especially in developing countries of Asia. Many cities face a backlog of enormous sustainability challenges, partly due to rapid development and migration, compounded by natural disasters and climate change.

Transformation to a sustainable future will depend on disruptive solutions to food security, water conservation, low-carbon energy supplies, energy efficiency, mass transit and pedestrian access, affordable housing, decent, safe employment, and social and cultural cohesion.

We have seen glimpses of sustainable solutions for cities, and some larger, more

developed cities have been working on a sustainability agenda well before the SDGs were agreed. Model cities and eco-cities reflect the need for innovative experiments to find the best approaches to developing sustainable cities. The challenge is to scale up effective measures from these models at a pace that has never been achieved before.

Virtually all the SDGs and about two thirds of targets are relevant to cities, but they need to be localized to enable effective implementation. There is insufficient evidence to date that the SDGs will have a major transformational impact in cities.

Although local governments do not have the same powers of taxation as national governments, they do have limited revenue sources to help promote sustainable development, such as land taxes, license fees, permits, and charges. These can direct private investment towards environmentally sound activities and punish polluters.

Strengthening cities' management capacity may be the highest priority, especially in developing countries. Otherwise, it will be difficult to implement any other recommendations, even with sufficient funding. Also, central governments should contribute more to creating sustainable cities.

Business

Agenda 2030 calls upon "all businesses to apply their creativity and innovation to solving sustainable development challenges". If a majority of total global annual business investments was directed towards the SDGs, then their achievement would not be difficult. Directing investments away from unsustainable activities, often subsidised by governments, is equally important.

Most efforts to promote business involvement in the SDGs have relied on voluntary approaches rather than regulation. Given the profit incentive of most companies, however, and the easy option of cherry picking a few SDGs that align with their existing business model, reliance on voluntary approaches is unlikely to be transformative.

Few companies have systematically examined their contribution to the SDGs or the implications of the SDGs for their business operations. For submission of voluntary national reviews, comprehensive reporting on local company contributions to the SDGs should form a significant portion of national reporting. Also, companies should use corporate sustainability reporting to demonstrate their willingness to adopt the SDGs.

Governments can create winners and losers through regulation, providing incentives and disincentives to motivate companies to focus on the SDGs and turn away from unsustainable activities. Public-private partnerships directed towards implementation of the SDGs could combine the best of both worlds. In the long run, however, if companies do not adopt a more transformative approach, then their current business model could be at risk, their assets stranded, and the SDGs will not be achieved.

Finance

Making the financial system more sustainable is a key to realizing the transformative potential of the SDGs. Many initiatives are attempting to build a sustainable financial system, but progress is still limited. Current approaches mainly focus on voluntary efforts by the private sector. Most solutions currently under discussion are indirect, slow, voluntary, and politically feasible, but seem unlikely to be transformative.

By looking at the big picture globally, there is no shortage of funding or resources. The needed annual investments to achieve SDGs are only a modest share of global GDP, and a small share of global wealth. As there is already a large amount of infrastructure investment planned every year in key sectors like energy, transport, and buildings, the key is to shift existing planned investments from unsustainable to sustainable, and, if necessary, supplement these investments with some additional funds.

Voluntary approaches may not be sufficient to achieve this shift in the focus of investments and are not likely to be transformative, so a more regulatory approach may be needed. Governments, investors, and stock exchanges could strengthen existing initiatives by requiring disclosure, especially where current investment priorities could lead to maladaptation, stranded assets, or regulatory risks. Indeed, investments in non-sustainable activities could be restricted by regulation instead of asking companies to do so voluntarily. Ethical investors, pension funds, and stockholder activists can use their leverage to ensure that funding is directed to sustainable activities.

National governments have plenty of legal authority to raise revenues to fund sustainable development, without needing to rely on voluntary contributions or loans by private companies. Simply eliminating subsidies for unsustainable development would free up massive amounts of funding. Overall, there is no need to implore private companies and lenders to finance sustainable development based on ethical considerations. Governments have the power to raise funds and direct investment flows, if they think it is important enough.

Technology

Accelerating the adoption and use of "sustainable" technology (i.e. technology that contributes to sustainable development) in all countries is necessary to achieve a transformation to sustainability. Technology is prominently highlighted in the SDGs as a means of implementation, but its proposed measures are mostly general and weak. There is already a great deal of available technology to solve sustainability problems, but it has not been sufficiently adopted.

In both public and private sectors, technological solutions are often preferred to more difficult ones such as governance reforms, but technology is unlikely to be a "silver bullet". Regulation may be needed to ensure that specific technology contributes to rather than undermines SDGs and to address synergies and trade-offs. "Exnovation" to eliminate

unsustainable technology is also important.

Expanded investment in research and development (R&D) of new, innovative technologies could accelerate transformation, but, these should focus on sustainable uses. Life cycle assessment of new technologies should be implemented before their adoption to avoid unexpected sustainability problems.

Globally, the rate of technological change is high, and Asian countries are accelerating R&D investment, but not always in a sustainable direction. China is massively increasing its R&D spending, Japan controls many niche markets, and Singapore has invested heavily in smart city technologies.

In relation to technology transfer, appropriate technology (less advanced is better) vs. leapfrogging (more advanced is better) is not always an obvious choice. Matching sellers and buyers is often difficult; cheapest is often not best, and financing is not necessarily the most important problem. Patent waiving for sustainable technologies, with appropriate compensation for developers, may help overcome cost/transfer barriers. Technology matching platforms need ground-level demonstration and capacity building, not only online information dissemination.

Conclusions

The 2030 Agenda will be pivotal in achieving the goals of the Paris Agreement on climate change, as well as other multilateral environment agreements, which will also be crucial to achieving transformation. The UN's Sustainable Development Goals Report 2017 concluded that "while considerable progress has been made over the past decade across all areas of development, the pace of progress observed in previous years is insufficient to fully meet the SDGs and targets by 2030". Moreover, "faster and more inclusive progress is needed to accomplish the bold vision articulated in the 2030 Agenda".

When approved in 2015, the year 2030 seemed rather distant, but time is running out to avoid catastrophic climate change. Several planetary boundaries, which provide the foundation for the Earth's life support system for humanity, have been crossed, and several more are at risk of being crossed. Voluntary approaches favoured by most governments and businesses will not be sufficient to achieve the accelerated pace of change facing all countries.

Asia will not be starting from scratch to implement the SDGs. Existing innovative strategies show an emerging understanding of the risks to long-term development associated with a deteriorating natural environment. For example, Japan's national development strategy includes a vision of a Sound Material Cycle Society, interpreted in practice through the 3Rs: reduce, reuse, and recycle. China intends to build an Ecological Civilisation, one which is "frugal in their use of energy and resources and protects the environment". Thailand has developed the Sufficiency Economy approach to guide its development, with a vision to build "a happy society with equity, fairness and resilience". Bhutan measures national

development progress through a Gross National Happiness Index, rather than GDP. Nevertheless, the level of current efforts, despite good intentions, do not seem sufficient to realize the transformational potential of the SDGs.

Solutions to implement the SDGs, as well as key means of implementation including finance and technology are readily available. Data and indicators are important and work on these should continue. Nevertheless, it is important now to shift the global focus to transformative, action-oriented solutions and not to wait until all indicators have been developed and/or monitoring programmes have been put in place.

Chapter 1

Introduction: Raising the Level of Ambition

Mark Elder and Peter King

Chapter 1

Introduction: Raising the Level of Ambition

Mark Elder and Peter King

Main messages

- The 2030 Agenda, with its 17 SDGs, 169 targets, and more than 230 indicators are intended to "transform the world".
- There is considerable enthusiasm to initiate SDG implementation plans by a wide range of governments, businesses, and other stakeholders.
- Many national governments have set up SDG implementation structures and are taking steps to integrate SDGs into national planning.
- The extent to which the SDGs will be truly transformational remains an open question, which depends on how they are implemented.
- This report considers how the implementation of SDGs could be made more ambitious and transformative.
- Solutions to implement the SDGs, as well as key means of implementation including finance and technology, are readily available, and have been discussed in the past. The issues addressed by the SDGs are not new.
- It is not necessary to wait to take action until all of the indicators have been developed and all the data has been collected.

1. TRANSFORMING OUR WORLD

"Transforming our world" is the title of the 2030 Agenda. The Sustainable Development Goals (SDGs), which are at the core of the 2030 Agenda, constitute a highly ambitious global agenda, linking the social, economic, and environmental dimensions of sustainable development. The SDGs aim to end poverty, promote prosperity, and conserve the world's ecosystems, recognizing that a healthy environment is a prerequisite and foundation of human well-being. All the world's governments agreed to the SDGs, which were also

supported by a historic global, multi-stakeholder process. In contrast to the Millennium Development Goals (MDGs), the SDGs are intended to be universal and fully integrated.

The SDGs may also be key to addressing climate change. The Paris Agreement on climate change was adopted soon after the SDGs, although global efforts to address climate change have been agreed since 1992. Climate change is mentioned only in one SDG (Goal 13), but many of the SDGs outside of SDG13 could play key roles in addressing climate change, particularly SDG 7 (renewable energy and energy efficiency), SDG 12 (sustainable consumption and production), Target 8.4 (on decoupling), Target 9.4 (on sustainability upgrading and resource efficiency), Target 2.4 (on sustainable agriculture), Target 15.2 (on forests), etc. Thus, SDGs and the Paris Agreement are (or should be) mutually reinforcing.

The target setting, reporting, and ratcheting up ambitions mechanisms of the Paris Agreement indicate that implementation plans of all the SDGs, not only those related to climate change, need to be considerably more concrete and detailed. Despite the elaborate and painstaking negotiations surrounding the Paris Agreement, there is abundant evidence that the current level of "pledges" through the nationally determined contributions (NDCs) is woefully inadequate and the chances of keeping global temperature increases below 2 degrees Celsius (which should have been included as a core target of SDG 13) are vanishing fast, let alone the aspiration of keeping climate change below 1.5 degrees (UNEP, 2017). Implementation of the SDGs, including achievement of climate-related targets, will require implementation arrangements for the other 16 SDGs which are even more detailed than those in the Paris Agreement.

Despite the SDGs' high level of ambition, at the time of their adoption, nobody was sure whether they would really be implemented, or whether the experience of Agenda 21 would be repeated. Many were sceptical about what difference the SDGs would actually make, and that scepticism persists (Easterly, 2015; Economist, 2015). The SDGs are voluntary and non-binding. Means of implementation were extensively discussed in a general sense in the text of the goals and targets, but concrete means of implementation were not clearly identified nor were sources of finance. To many, the 17 goals and 169 targets seemed to be an excessive number, and even overwhelming, especially for small developing countries like the small island developing states (SIDS). They would be too costly and difficult to measure and monitor due to a lack of data in many cases (Reuters, 2015). Overall, the SDGs seemed nearly comprehensive and therefore lacked any prioritization or connection to differing national contexts (Kenny, 2015; Lomberg, 2015). The SDGs promised an integrated agenda, but many wondered where to start; for many, it was not clear how 169 targets could be integrated, or even how traditional "silos" in government (as well as in research and NGO communities) could be made to effectively cooperate. An easy first step was to re-label existing plans and initiatives in terms of SDGs – itself no easy task – but it was not clear to what extent SDGs would encourage greater levels of ambition. Moreover, the initial concept to have a small number of concrete, measurable targets was not realized; too many targets were broad, diffuse, and difficult to measure, and as of 2018, some of the indicators were still being defined.

2. INITIAL FOLLOW-UP EFFORTS

At various global and regional intergovernmental meetings, national governments have reaffirmed the importance of, and expressed their continued support for, the SDGs, reviewed the progress of the SDGs to some extent, and expressed their intention to continue efforts to implement SDGs. These meetings have included the UN General Assembly, the UN Economic and Social Council (ECOSOC), the High Level Political Forum, the Global Environmental Facility (GEF), UN Habitat, the UN Environmental Assembly (UNEA), the ECOSOC Forum on Financing for Development Follow-up, and meetings of the UN regional commissions.

In March 2017, the UN Statistical Commission recommended that ECOSOC adopt the global indicator framework for the SDGs and targets of the 2030 Agenda developed by the Inter-Agency and Expert Group on SDGs indicators (IAEG-SDGs). In June 2017, ECOSOC adopted the indicator framework developed by the IAEG-SDGs, which was subsequently transmitted to the General Assembly for adoption.

At the 72nd General Assembly in September 2017, the UN SDG Action Campaign provided forums on cutting-edge technologies and innovations to enable individuals to take action on the SDGs and highlighted existing actions and innovations. The Global People's Summit for Sustainable Development facilitated calls to action by reaching 84 million people in 160 countries. There was also a Global Day of Action for the SDGs on 25 September 2017.

Finance for SDGs is addressed by the ECOSOC Forum on Financing for Development follow-up (FfD Forum), which is in charge of implementing the Addis Ababa Action Agenda (AAAA). Its first annual meeting was in 2016. Its third meeting, held in New York from 23-26 April 2018, reviewed the Addis Ababa Action Agenda and other financing for development outcomes and the means of implementation of the SDGs. Bretton Woods financial institutions and other key international financing institutions are expected to contribute to this process. The UN Secretary-General has called for a new Funding Compact, in his report on Repositioning the UN Development System, saying that "Ultimately, the Funding Compact is about increasing the likelihood of universal achievement of the SDGs and eradicating poverty from the face of the earth. In other words, it is about determining whether we can deliver on our ambition to make the world a more prosperous, peaceful and sustainable place by 2030" (UN Secretary General, 2017).

The High-level Political Forum on sustainable development (HLPF), convened by ECOSOC, is the main platform for follow-up and review of the SDGs. Its first meeting was convened in 2016. Its third meeting will be held from 9-18 July 2018 under the theme of "transformation towards sustainable and resilient societies", with emphasis on SDG6 (water and sanitation); SDG7 (energy); SDG11 (cities); SDG12 (SCP); SDG15 (terrestrial ecosystems), as well as SDG 17 (means of implementation). Asia-Pacific's regional preparatory meeting was held in Bangkok from 28-30 March 2018. In 2018, 48 countries

will be conducting voluntary national reviews (VNRs) at the HLPF, including Australia, Bhutan, Kiribati, Lao PDR, Singapore, Sri Lanka, and Vietnam from the Asia-Pacific region.

These meetings have indicated significant interest and enthusiasm in SDGs by governments and other stakeholders, and many actions to implement SDGs have been highlighted. However, these meetings have not produced substantial new implementation programmes or provided major new means of implementation.

The implementation of SDGs appears to have begun reasonably well in the two years since the SDGs were adopted, with considerable enthusiasm and efforts by actors at all levels – national governments, cities and other local governments, international organizations, businesses, and ordinary citizens. Since the SDGs are so comprehensive and complex, naturally, initial activities tended to focus on simply understanding the SDGs and taking stock of their existing programmes and activities. Many national governments quickly set up SDG implementation structures and took steps to integrate SDGs into national planning (DESA, 2016, 2017).

Nevertheless, as of early 2018, it was still rather early to see just how transformative the implementation of SDGs would be. The UN's Sustainable Development Goals Report 2017 concluded that "while considerable progress has been made over the past decade across all areas of development, the pace of progress observed in previous years is insufficient to fully meet the Sustainable Development Goals (SDGs) and targets by 2030". Moreover, "faster and more inclusive progress is needed to accomplish the bold vision articulated in the 2030 Agenda" (United Nations, 2017).

Despite the enthusiasm and activity, there was not a large amount of major concrete solution-oriented actions or substantial transformation, especially by national governments and international institutions. National governments mainly focused on preparatory activities such as setting up their institutional frameworks to promote implementation, linking SDGs with existing national plans and programmes, and preparing national statistical agencies for developing systems to monitor progress and develop new data where necessary. For cities, other local governments, businesses, and other stakeholders, it was a major challenge simply to understand the SDGS and figure out how the SDGs were linked to their activities (Ueno *et al.*, 2017; Teoh, Olsen and Gilby, 2018).

Similarly, many activities of international organisations, the research community, and NGOs have focused on practical, management approaches such as overall capacity building and further development of the indicators and data, and other small projects rather than promoting transformative or more ambitious approaches. The United Nations Development Programme (UNDP) and many other organisations have been making plans to conduct many kinds of capacity building at multiple levels. The IAEG-SDGs was still working on developing the indicators in 2017 (especially Tier 3 indicators), which remained a work in progress. Expectations are high, however, that the SDGs will usher in a "data revolution". The World Bank launched a major initiative to support the data revolution (World Bank, 2018). The United Nations Environment Programme's (UNEP) new

Science Strategy for 2030 notes that "high-quality Big Data –any voluminous amount of complex, structured, semi-structured and unstructured data that has the potential to be mined for information– vital for science-based decision-making will fundamentally change the way the world works and people behave". There was a variety of research efforts to analyse the interlinkages between SDGs and between the SDGs and other global agenda such as the multilateral environment agreements (MEAs), and explore how integrated approaches could be applied to SDG implementation (Le Blanc, 2015; Elder and Zusman, 2016; Elder, Bengtsson and Akenji, 2016; Nilsson, Griggs and Visback, 2016; Zhou and Moinuddin, 2017).

Certainly, all these activities are very important and necessary prerequisites for implementing the SDGs. Moreover, since the SDGs are so comprehensive and complex, it may be unrealistic to expect substantial solution-oriented or transformative actions after only two years. Still, two years after the SDGs were agreed, it is reasonable to expect that the preparatory phase should be coming to an end, and it is now time to consider how the implementation of SDGs could be made more ambitious and transformative.

3. OBJECTIVES AND SCOPE

This report aims to raise the level of ambition and encourage a greater global focus on how to fulfil the transformative promise of the SDGs, moving beyond simply encouraging their implementation. While current efforts focusing on development of data and indicators and analysing the complex interlinkages among the SDGs are very important, useful, and should continue, this emphasis alone will not lead to transformation. Many of the targets are very ambitious and transformative, although they are not necessarily very specific or measurable. Moreover, many of the indicators water down the goals, narrow their focus, and reduce the level of ambition, leading away from transformation. There is a danger, therefore, that the emphasis on targets and indicators may lead to more of an accounting approach in the Voluntary National Reviews (VNRs) and less emphasis on substantial actions. Major efforts are necessary to leverage current megatrends and redirect already planned investments towards sustainable development.

Therefore, this report argues that there is a need to refocus on the transformative promise of the goals and targets. It is not necessary to delay concrete actions while waiting for all the indicators to be decided or detailed data to be completely developed. Moreover, the issues taken up by SDGs are not new. There are already broad policy directions available that can address broad areas simultaneously, without waiting to analyse their linkage to narrow indicators. The longer we delay starting transformative actions, the greater the likelihood that Agenda 2030 will sink into the sunset like Agenda 21.

Agenda 2030 does not have a clear definition of what is meant by transformation. In this report, transformation has three main elements: 1) significant change and progress from current actions; 2) in the direction of greater sustainability in general; and specifically, 3) full or extensive achievement of the SDGs. Overall, transformation is intended to be

ambitious, challenging, and leapfrogging rather than cautious, easy, and incremental. This definition is in the spirit of the intention of the SDGs. It is also possible to have transformation involving significant change, but not in the direction of sustainability; naturally, that is not the intention of this report.

This report mainly focuses on the environmental aspects of sustainability, keeping in mind the interlinkages between the environmental and the other aspects, since the environment is the foundation of sustainability. Nevertheless, the points made in this report are also generally valid for the other aspects of sustainability.

This report targets a broad audience in the sustainable development community. It includes policymakers at all levels, the business community, as well as experts at research institutes and universities. In particular, this report targets key actors who have been tasked to implement SDGs or facilitate implementation by others. This report considers how concerned stakeholders could be encouraged to consider SDGs from a broader perspective to promote more transformative actions.

4. STRUCTURE OF THIS REPORT

The report is divided into three parts. The first part makes the case for why a more transformational approach to the SDGs is both necessary and still possible. The second part discusses the roles of three main types of key actors: national governments, businesses, and cities. The third part focuses on two of the key means of implementation, finance and technology, without which good intentions will falter.

4.1 Part 1: Transformation

The need for transformation is, of course, not new. Human societies have been through multiple transformations since the development of sedentary agriculture, the industrial revolution, and now the Anthropocene. Likewise, broad and transformative policy directions are also not particularly new, and many have been suggested in the past. However, movement in a coordinated, coherent, transformative direction by governments, businesses, and other actors is not visible yet, anywhere on the planet. Tantalising glimpses of what is possible have emerged, for example in the renewable energy sphere, but this is yet to have reached its potential in that one sector, let alone in all the economic and social sectors.

However, the global discussions on SDGs have come to focus more on issues such as indicators, data development, and analysing linkages among goals, targets and indicators, rather than how to achieve transformation. Discussions on concrete actions have tended to focus more on practical and incremental ones rather than ones with significant transformative potential. For example, the Green Climate Fund has a "paradigm shift" as its overarching objective, but examination of approved projects suggest that transformative change has different meanings in different countries. Therefore, it seems

worthwhile to reiterate the need for more transformative action and to remember overlooked proposals for more transformative actions.

Part one outlines a range of broad policy directions which could be more transformative. It is important to note that these are not really new. Many have been often recommended in the past. Nevertheless, it is important to remind everyone that the problems addressed by the SDGs are not new, and there are already many ideas for how to address them. The fundamental nature of these problems has not been changed by packaging them into the SDGs. It is not necessary to wait to take action until all of the indicators have been developed and agreed, and all of the data has been collected.

4.2 Part 2: Actors

Part two discusses the roles of three key actors: national governments, cities, and businesses. Of course, other actors are also very important. Nevertheless, these three groups of actors are the best positioned to take more potentially ambitious and transformative actions.

National governments decided on the SDGs and have the overall responsibility to implement them. It is fashionable to question the capacities of national governments, especially in the context of large multilateral agreements which, in recent years, have centred on general principles and small-scale activities rather than transformative action. Nevertheless, national governments have significant latent transformative potential. Legal sovereignty is still located in the Earth's nation-states, which alone have the power to tax, regulate, and enforce laws/regulations. Nation-states may also choose to delegate these powers to others. National governments also have considerable agenda setting powers and in principle can determine the allocation of external funds from official development assistance.

Expectations are very high for the role of cities in implementing the SDGs. A majority of the world's people now lives in cities, which are the economic centres of many countries. Cities have fewer powers compared to national governments, and their power to regulate or tax is determined by national governments. Nevertheless, cities often have jurisdiction over key areas for sustainability such as land use, transportation, and waste management. Their administrations are closer to, and generally answerable to, the city populations, so there is considerable scope for multi-stakeholder engagement in planning and implementation. Many cities, including large megacities, are often much more ambitious and quicker than national governments to take actions to support sustainability.

Ultimately, the success of the SDGs may depend on actions taken by businesses. Businesses make key decisions which influence production, consumption, and their environmental impacts. Many businesses are working hard to understand the SDGs and are considering how to contribute to their achievement. Much existing discussion focuses on voluntary engagement of business, including CSR, but the core incentives of profit making by whatever means remain. The extent to which voluntary actions can be

transformative is not clear, therefore, and regulatory regimes and enabling environments managed by governments also should be considered.

4.3 Part 3: Means of Implementation

Part three discusses two of the key means of implementation, finance and technology. Certainly there are several other important means of implementation (Elder, Bengtsson and Akenji, 2016), although these two are traditionally emphasised in related global discussions, and are highlighted in Agenda 2030 and the AAAA. Finance is often considered the first priority and is a prerequisite for the others. Technology may be the most popular means of implementation, and there are many readily available technologies to address sustainability issues, but how to diffuse these technologies remains a major challenge. Technological megatrends such as artificial intelligence, nanotechnology, genetic modification etc. also hold promise as well as peril if they are not directed towards the need for sustainable development.

5. CONCLUSION

The conclusion emphasizes that solutions to implement the SDGs, as well as key means of implementation including finance and technology, are readily available. The issues addressed by the SDGs are not new. More than two years have passed since the SDGs were agreed, and now it is time to focus attention on solutions and means of implementation. Data and indicators are very important, of course, and work on these should continue, as this is very important for accountability. Nevertheless, it is important now to shift the global focus to action-oriented solutions. Transformative action should not wait until all the indicators have been developed and new data has been collected.

References

Le Blanc, D. (2015) 'Towards Integration at Last? The Sustainable Development Goals as a Network of Targets', *Sustainable Development*, 187(April), pp. 176–187. doi: 10.1002/sd.1582.

DESA (2016) *2016 Synthesis of Voluntary National Reviews*. New York: Division for Sustainable Development, Department of Economic and Social Affairs, United Nations. Available at: https://sustainabledevelopment.un.org/content/documents/126002016_VNR_Synthesis_Report.pdf (Accessed: 22 June 2018).

DESA (2017) *2017 Voluntary National Reviews: Synthesis Report*. New York: High Level Political Forum on Sustainable Development. Available at: https://sustainabledevelopment.un.org/content/documents/17109Synthesis_Report_VNRs_2017.pdf (Accessed: 22 June 2018).

Easterly, W. (2015) 'The SDGs Should Stand for Senseless, Dreamy, Garbled', *Foreign Policy*, 28 September. Available at: http://foreignpolicy.com/2015/09/28/the-sdgs-are-utopian-and-worthless-mdgs-development-rise-of-the-rest/?wp_login_redirect=0 (Accessed: 22 June 2018).

Economist (2015) 'The 169 Commandments: The Proposed Sustainable Development Goals Would Be Worse than Useless', *Economist*. Available at: http://www.economist.com/news/leaders/21647286-proposed-sustainable-development-goals-would-be-worse-useless-169-commandments (Accessed: 22 June 2018).

Elder, M., Bengtsson, M. and Akenji, L. (2016) 'An Optimistic Analysis of the Means of Implementation for Sustainable Development Goals: Thinking about Goals as Means', *Sustainability*, 8(9), pp. 962–986. doi: 10.3390/su8090962.

Elder, M. and Zusman, E. (2016) 'Strengthening The Linkages Between Air Pollution And The Sustainable Development Goals', *IGES Policy Brief*, July. Available at: http://pub.iges.or.jp/modules/envirolib/view.php?docid=6678 (Accessed: 22 June 2018).

Kenny, C. (2015) 'From MDGs to SDGs: Have We Lost the Plot?', *Center for Global Development*, 27 May. Available at: http://www.cgdev.org/publication/mdgs-sdgs-have-we-lost-plot (Accessed: 22 June 2018).

Lomberg, B. (2015) 'The UN Chose Way Too Many New Development Goals: Prioritizing a Few Would Make a Bigger Impact', *Time*. Available at: http://time.com/4052109/un-sustainable-development-goals/ (Accessed: 22 June 2018).

Nilsson, M., Griggs, D. and Visback, M. (2016) 'Map the interactions between Sustainable Development Goa', *Nature*, 534(15), pp. 320–322. doi: 10.1038/534320a.

Reuters (2015) 'Long list of sustainable development goals likely to stay, UNDP says', *Reuters.com*, 19 January. Available at: http://www.reuters.com/article/us-un-development-goals-idUSKBN0KS1UC20150119 (Accessed: 22 June 2018).

Teoh, S., Olsen, S. H. and Gilby, S. (2018) 'Early Views of ASEAN's "Frontrunner Cities" on the Sustainable Development Goals (SDGs) and Local Data Management', *IGES Policy Report*, April. Available at: https://pub.iges.or.jp/pub/early-views-asean's-'frontrunner-cities' (Accessed: 22 June 2018).

Ueno, A. *et al.* (2017) *SDGs and Business in Practice: Early Actions by Japanese Private Companies*. UN Global Compact Network Japan, and Institute for Global Environmental Strategies. Available at: https://pub.iges.or.jp/system/files/publication_documents/pub/policyreport/6009/SDGs and Business_rev_final.pdf (Accessed: 22 June 2018).

UN Secretary General (2017) 'Repositioning the United Nations development system to deliver on the 2030 Agenda: our promise for dignity, prosperity and peace on a healthy planet (advance unedited version)', *Report of the Secretary General, 72nd Session*, December. Available at: https://www.un.org/ecosoc/sites/www.un.org.ecosoc/files/files/en/2018doc/Advance copy of the Report of the Secretary-General on the UNDS repositioning %2B Annex %2821 December 2017rev%29.pdf (Accessed: 22 June 2018).

UNEP (2017) *The Emissions Gap Report 2017: A UN Environment Synthesis Report*. Nairobi, Kenya: United Nations Environment Programme. Available at: https://wedocs.unep.org/bitstream/handle/20.500.11822/22070/EGR_2017.pdf.

United Nations (2017) *The Sustainable Development Goals Report 2017*. New York: United Nations. Available at: https://unstats.un.org/sdgs/files/report/2017/TheSustainableDevelopmentGoalsReport2017.pdf (Accessed: 22 June 2018).

World Bank (2018) *Harnessing the Data Revolution for Sustainable Development*, *www.worldbank.org*. Available at: http://www.worldbank.org/en/data/statistical-capacity-building/data-revolution (Accessed: 7 May 2018).

Zhou, X. and Moinuddin, M. (eds) (2017) *Sustainable Development Goals Interlinkages and Network Analysis: A Practical Tool for SDG Integration and Policy Coherence*. Hayama, Japan: Institute for

Global Environmental Strategies. Available at: https://pub.iges.or.jp/pub/sustainable-development-goals-interlinkages (Accessed: 22 June 2018).

Chapter 2

Transformative Policy Approaches to Implement the Sustainable Development Goals in the Asia-Pacific Region

Lewis Akenji, Mark Elder, Magnus Bengtsson, Simon Høiberg Olsen and Peter King

Chapter 2

Transformative Policy Approaches to Implement the Sustainable Development Goals in the Asia-Pacific Region

Lewis Akenji, Mark Elder, Magnus Bengtsson, Simon Olsen, and Peter King

Main Messages

- Despite considerable hope and enthusiasm raised by the Sustainable Development Goals (SDGs), and some quick initial efforts, many governments and stakeholders are uncertain about how to proceed with concrete actions.
- The 2030 development agenda is intended to be transformative, and the goals seem comprehensive, but they also are very complex - with 17 goals, 169 targets, and more than 230 indicators.
- As the attention shifts from the overall vision of the SDGs to the details of the targets and indicators, there is some risk that an intensive focus on data, monitoring and measurement may shift attention away from the big picture and concrete transformative actions.
- It is important to ensure that implementing the sustainable development goals is not just about record keeping or only chasing small wins; it is essential to have broad strategies that are ambitious enough to achieve multiple goals.
- Cherry-picking a few SDGs, which are already part of national strategies, and maintaining the silo approach and institutional "turf" battles will not achieve the vision of the 2030 Agenda.
- It is important to keep the focus on the big picture of how to achieve the transformative potential of SDGs. In order to do so, more ambitious, cross-cutting and strategic policies and related comprehensive institutional reforms are needed at the national level.
- It is not necessary to wait until the data and indicators are fully developed in order to take action.

1. INTRODUCTION: GOALS FOR A SUSTAINABLE ASIA-PACIFIC

Despite considerable hope and enthusiasm raised by the Sustainable Development Goals (SDGs), and some quick initial efforts, many governments and stakeholders are uncertain about how to proceed with concrete actions. The 2030 development agenda is intended to be transformative, and the goals seem comprehensive, but they also are very complex - with 17 goals, 169 targets, and more than 230 indicators. As the attention shifts from the overall vision of the SDGs to the details of the targets and indicators, there is some risk that an intensive focus on data, monitoring, and measurement may shift attention away from the big picture and concrete transformative actions. It is important to ensure that scoring the sustainable development goals is not just about record keeping or only chasing small wins; it is essential to have broad strategies that are ambitious enough to score the winning goals. Such broad strategies will need ambitious and potentially transformative policies and comprehensive institutional reform if the potential of the SDGs is to be realized. Cherry-picking a few SDGs, which are already part of national strategies, and maintaining the silo approach and institutional "turf" battles will not achieve the vision of the 2030 Agenda.

This chapter aims to highlight the importance of keeping the focus on the big picture of how to achieve the transformative potential of SDGs. In order to do so, significantly more ambitious and strategic policies and comprehensive institutional reform are needed at the national level.

The need for transformative policies for sustainable development is not new. Many previous plans have been proposed before, such as Agenda 21,[1] the Johannesburg Plan of Implementation, and the Millennium Development Goals[2], although they have not been well-implemented, and progress has not matched expectations (Tollefson and Gilbert, 2012; Sachs, 2015). Many decision makers, as well as ordinary citizens, seem not to have been persuaded about the necessity or urgency of adopting more transformative approaches, and instead, have opted to continue the conventional approach of dirty growth and wealth first and clean up later (if at all). Also, many companies and business lobbies have actively intervened to impede any real progress that would disrupt business as usual, particularly in sectors such as electricity generation, manufacturing, and mining.

However, it has become clear that the conventional approach has reached its limit, as escalating economic and health damages from climate change and environmental pollution, increasingly fierce competition over dwindling natural resources, and growing inequality are undermining the foundations of human wellbeing and prosperity, and even economic growth itself, making the need for a different approach more urgent than ever. Planetary boundaries have been breached or are in danger of being breached, with uncertain prospects for reversibility (Rockström et al., 2009; Steffen et al., 2011, 2015)[3].

Many have argued that every nation in the region needs to adopt new development pathways which do not systematically harm the planet's climatic, atmospheric, geophysical and ecological processes, while supporting human life and wellbeing. A few

countries have made some progress in making this transition, but the vast majority have not. No country currently meets humanity's basic needs at a globally sustainable level of resource use (O'Neill et al., 2018). The global Agenda 2030 and its associated SDGs provide a once-in-a-generation opportunity to mobilise additional resources to start shifting to a sustainable form of development – one that can achieve social wellbeing in Asia-Pacific while ensuring the environmental integrity necessary to support it.

This chapter highlights a range of policies and approaches that could increase the level of ambition and enhance the transformative potential of the SDGs. Moreover, the highlighted approaches are intended to focus on more strategic issues that are closely linked with a range of SDG areas. Therefore, implementing these policies and approaches will influence a range of areas simultaneously without any particular need for coordination (although coordination would certainly enhance the effectiveness).

These policies and approaches are not particularly new. Also, although some of them are heightened in severity, the problems addressed by the SDGs are not new, and many solutions have already been proposed in the past. However, in the enthusiasm to generate data and indicators and to analyse linkages among the SDGs, there is a risk that action may be unnecessarily delayed, when potential solutions are already available and are known. It is not necessary to wait until the data and indicators are fully developed in order to take action.

The rest of this chapter is organised as follows. Section 2 observes that current discussions on SDGs may be putting too much emphasis on data and measurement of narrowly focused indicators and makes the case for quickly shifting the discussion to the policies and action that should be adopted by governments to fulfil the transformative promise of SDGs. Section 3 outlines a range of policy approaches that could bring about transformation, pursuing prosperity and development on a resilient ecological basis. Each of these strategies address multiple SDG targets and cut across conventional policy domains. In doing so, they illustrate what an integrated approach to implementation could look like in practice. Section 4 discusses how governance and institutions can be strengthened to implement more transformative policy approaches, while Section 5 concludes.

2. FROM INDICATORS TO ACTION: REALIZING THE TRANSFORMATIVE PROMISE OF SDGS

While many countries in the region have embraced the SDGs and have quickly begun efforts to establish implementation structures and link SDGs with their national planning processes, there is still some uncertainty about how to proceed concretely, partly due to the complexity of the SDGs framework. A database of the Voluntary National Reviews (VNRs) submitted to date is available online.[4] The 2017 Synthesis Report of the VNRs submitted concludes that only one-third of the reporting countries addressed all of the SDGs (DESA, 2017). "Several countries included sections on the challenges they are facing

with the implementation of the SDGs". Moreover, the attention of many governments, as well as policy research institutes and NGOs, is now shifting from the broad overall direction of the goals and targets to the narrow focus of the indicators.

The current 232 indicators to measure progress on the SDGs resulted from an open-ended process led by the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs), which was mandated by the UN to develop indicators that could capture the multi-dimensional nature of the 2030 Agenda and its goals and targets. This is a complex task, and the current indicators are at various stages of development and usefulness (Zhou and Moinuddin, 2016). Some indicators are clear and already have related data being widely collected; others may be clear conceptually, but data may be unavailable or non-existent. Several indicators are both unclear and lacking available data. So-called "tier-3" indicators are still under development by the IAEG-SDGs. There have been calls for a "data revolution", declarations of the "era of big data", and significant political, human and financial resources are being directed towards data-related initiatives (IAEG-SDGs, 2014).

In this context, there is a risk that SDG implementation could become primarily a data development and statistical exercise, a kind of development-by-numbers approach. Some countries may spend a disproportionate effort on collecting numbers to report on their VNR score cards rather than taking concrete measures to score real goals to achieve meaningful improvements in human wellbeing. In addition, the complexity of reporting on the multi-dimensional SDGs may become a significant reporting burden, especially least developed countries and small island developing states, which in turn could divert resources from implementation. If these concerns are not addressed, some countries might end up with not only poor report cards but literally poorer societies – economically, socially and environmentally.

Undoubtedly, efforts should continue to develop the indicators and related data. However, many of the indicators only focus on narrow aspects of the goals and targets and may actually water down the objectives. For example, Target 11.b includes integrated policies on inclusion, resource efficiency, resilience, climate mitigation and adaptation, and disaster risk management. However, the selected indicator only includes disaster risk management. Target 3.9. has a broad focus on death and illness from pollution, but the indicator (3.9.1) includes only one very specific type of pollution (household ambient air pollution), excluding others, and only includes mortality, excluding non-lethal disease caused by pollution. Data development for many indicators will take a long time if it can be achieved at all. It may be a case of forgetting about the forest ecosystem while counting the trees.

Further distracting from an implementation-focus, on the ground, many officials responsible for implementing the SDGs are not necessarily persuaded that environment and development can be pursued synergistically and in a fully integrated manner rather than in the traditional 3-pillar silo approach (treating the environmental, economic, and social aspects of development separately), even though countries agreed to do so. Moreover, even if they could be persuaded, many of them may not have the mandate, resources, or capacity to coordinate their actions in both vertical and horizontal

dimensions.

There are four major risks for the future of SDG implementation in this situation that would obstruct their transformative potential.

i. measures adopted to implement the SDGs may focus too narrowly on specific indicators, thereby continuing the predominant sector-based silo approach, and missing the opportunity to adopt more transformative measures.
ii. there is a risk that the environment continues to be side-lined in favour of conventional economic and social goals, as these tend to be easier to monitor on a consistent basis.
iii. many governments tend to be risk averse and may take a wait-and-see attitude for others to adopt transformative policies for various reasons, including concerns about possible negative effects on international economic competitiveness.
iv. governments and the private sector may pick one or two SDGs to focus on that reflect their narrow interests and conclude that they are sufficiently engaged in implementing the SDGs.

In response to these risks, it is important to ensure SDG implementation focuses on the big picture. This big picture focus suggests the case for an inclusive, integrated approach with strong synergistic linkages to the environment, and a set of broad measures that can help promote the SDGs in a more transformative manner. Bangladesh is an example of a country making efforts in this direction. In the country's VNR, the SDGs have been integrated into the 7th Five Year Plan (2016-2020) and Bangladesh has "adopted a "Whole of Society" approach to ensure wider participation of NGOs, development partners, private sector, media and CSOs in the process of formulation of the Action Plan and implementation of the SDGs".[5]

3. TOWARDS TRANSFORMATIVE POLICIES: SCORING THE WINNING GOALS

This section outlines a range of priority policy domains and promising policy instruments that could lead to more transformative results within those domains. In principle, the SDGs were not intended to prescribe specific means for implementing particular goals. Rather, the SDGs aimed to establish an integrated set of broad goals or norms instead of specific solutions, thereby avoiding a debate about the relative merits of various alternative means. Therefore, countries agreed that each could implement the SDGs according to their specific national circumstances, allowing a range of possible ways to achieve the SDGs.

Nevertheless, SDGs also included general means of implementation (MOI) in Goal 17 as well as some specific MOI targets listed under the other goals. These were generally about capacity such as finance, technology, and trade, and not about detailed ways to achieve specific goals or targets. For example, it is estimated that USD 2.5 trillion per year is the

investment gap for delivering the SDGs in developing countries (OECD, 2018), but the SDGs do not indicate how this finance should be mobilized. In some SDGs, more specific means of implementation were indicated, such as integrated water resource management. Overall, some SDGs themselves can be broadly thought of as means to achieve other goals, through clear inter-linkages. Access to sustainable energy for all is a key example, since it is a key means of implementation for addressing goals such as climate change, poverty reduction, access to water and sanitation, and growth/jobs (Elder, Bengtsson and Akenji, 2016).

Asia-Pacific countries will not be starting from scratch to implement the SDGs. Many already have developed innovative strategies that show an emerging understanding of the risks to long-term development associated with a deteriorating natural environment. These efforts can be seen through efforts to limit pollution, increase resource and energy efficiency, and to reflect less materially driven human aspirations, such as happiness, in national policy. Japan's national development strategy includes a vision of a Sound Material Cycle Society, interpreted in practice through the 3Rs: reduce, reuse, and recycle. For the vast and still rapidly expanding economy of China, the leaders have expressed their intention to build an Ecological Civilisation, one which is "frugal in their use of energy and resources and protects the environment". Thailand has developed the Sufficiency Economy approach to guide its development, with a vision to build "a happy society with equity, fairness and resilience". Reflecting this principle, Thailand's National Economic and Social Development Plan (NESDP), the nation's strategic framework for addressing its medium-term development challenges, promotes "balanced development" and has shifted emphasis from economic to people-centred development. The Kingdom of Bhutan has declared that the purpose of development is to create the enabling conditions for happiness of individuals and society. Gross National Happiness as a development approach seeks to "achieve a harmonious balance between material wellbeing and the spiritual, emotional and cultural needs of an individual and society" (UNEP, 2012a).

However, these efforts are just a beginning. They need to be expanded, extended, and scaled up, rapidly. Despite the serious environmental challenges facing the region, countries in the Asia-Pacific region have ample opportunities to move towards more sustainable development paths with minimized adjustment costs if they act sooner rather than later. Many countries still require very substantial investments in new infrastructure over the next few decades. Investing in more sustainable infrastructure at this stage will avoid the economic and social costs of environmental damage later. Sustainable infrastructure, if appropriately designed, would use fewer resources and provide greater benefits for disadvantaged populations.

Without seriously rethinking investment priorities, countries risk being locked into costly, high-polluting, resource-intensive, and high-carbon pathways for several decades. Leapfrogging to smarter solutions than even those commonly found in wealthy countries is necessary for resilient development and lasting prosperity. However, given the current speed of urbanisation and infrastructure construction in the region, realising such opportunities requires an urgent shift away from business-as-usual practices and a complete change in mind-set.

The next part of this section identifies a set of policy options which, approached as integrated elements of a framework for sustainability, could help to accelerate the transition to sustainable development in Asia-Pacific. Note, however, that transformative policies can rarely be discerned ex ante, and coherent policy mixes are generally more effective than standalone policies. Furthermore, mainly the environmental dimensions of the needed transformation are addressed, albeit in the context of the environment's interlinkages with other areas.

3.1 Strengthen resilience to disasters and environmental shocks

3.1.1 Resilience and SDGs

All the SDGs relate to resilience in a broad sense, as can be seen in Figure 2-1 below Five Goals have resilience targets, including poverty elimination (SDG 1), water and sanitation (SDG 6), sustainable industrialization (SDG 9), sustainable cities (SDG 11), and climate (SDG 13). Seven goals have a variety of targets, which achieved, would contribute to enhancing resilience, and therefore could be considered as means to achieve resilience. Likewise, the achievement of four other goals (SDGs 3, 5, 8, and 10) would be furthered by the achievement of the five SDGs with resilience-related targets. For example, reducing hunger, enhancing the sustainability of agriculture, increasing energy efficiency, increasing renewable energy, and making production and consumption sustainable all contribute to enhanced resilience. Likewise, efforts to enhance resilience can promote economic growth and jobs (SDG 8) while reducing inequality (SDGs 5 and 10). This is just a rough illustration, and the direction of causality can run in various directions both between and within goals. For example, in the water goal (SDG 6), the target indicating resilience (target 6.6. on the protection and restoration of water-related ecosystems) can be considered as a means to achieving target 6.1. on universal access to safe water.

3.1.2 Integrative Policy Options for Resilience

The Asia-Pacific region is prone to natural disasters and highly vulnerable to the adverse impacts of climate change. A transformative change would be to protect people's lives, livelihoods, and wellbeing, and to safeguard development progress, by giving much higher priority to climate change adaptation and disaster prevention and preparedness (Prabhakar, 2014). The ultimate extent of adaptation to climate change that will be required, of course, depends on the success or failure of the Paris Agreement and the aspirational goal of remaining with 1.5 ℃ temperature increase post-industrialization.

Protecting communities across the region from the adverse effects of climate change requires multi-pronged approaches and measures to ensure the safety of citizens, the security of livelihood assets, as well as the health of ecosystems and their services. Also, it is necessary to enhance the resilience of key economic sectors and infrastructure, including erosion and flood protection, irrigation, drainage, and beach nourishment, as well as to promote alternative livelihoods and develop markets for new adaptation products and services. For example, cities in vulnerable locations should upgrade existing

infrastructure and ensure that new construction is more resilient. Slum areas are generally at significant risk, so it is quite urgent to improve home construction quality, waste collection, and drainage canals in vulnerable areas. Rural areas, which are home to many low-income people, are also at risk and need to enhance their resilience. Stricter building codes and regulations on land use and infrastructure construction may be necessary. Introduction of more adaptable crop varieties considering traditional agricultural knowledge is another possible measure.

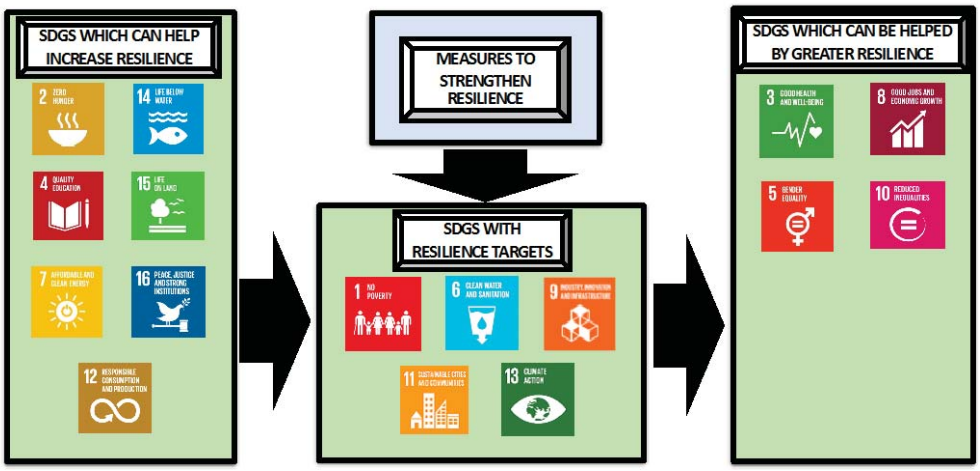


Figure 2-1 Enhanced Resilience and SDGs

Revitalizing and protecting ecosystems is especially important. Ecosystem-based adaptation measures, particularly for coastal ecosystems, would help to protect against potentially catastrophic damage. Many National Adaptation Programmes of Actions (NAPAs) developed by least developed countries have recognized the value of ecosystem services, and more than 20 percent of their national initiatives have mobilised ecosystem services in support of other adaptation activities, including infrastructure, soil conservation, and water regulation[6]. A wide range of adaptation measures are also included in the new round of National Adaptation Plans[7] and Nationally Determined Contributions[8] to the Paris Agreement. Understanding ecosystem services and formulating development strategies around maintenance or enhancement of those services is key to building resilience.

Early warning systems and the ability to implement mass evacuations can significantly reduce the effects of disasters, so establishing or strengthening these systems needs more attention by policymakers. Experience shows that there is a limit to what can be achieved through improved technical infrastructure and that public awareness and knowledge and

regular evacuation drills can be critical to limiting impacts. Still, disasters will occur, even with good preparation, so capacity for longer-term recovery and rebuilding is also needed, not just prepositioning of emergency supplies and emergency relief. Insurance schemes can help ease the burdens of affected households, businesses and communities. However, many low-income households do not currently have their homes and livelihood assets insured. Most government assets are not sufficiently insured, either. Making insurance more accessible and affordable for such groups is a complementary action that can significantly improve post-disaster recovery efforts. There are elements of a regional support system in place already to support such multi-pronged disaster resilience, but with the expected increase in natural disasters, there is a need to reinforce these regional frameworks (Sivapuram et al., 2015).

Countries' overall development strategies need to incorporate measures to strengthen resilience to climate change and extreme weather events. There are major synergies between disaster resilience, climate adaptation, healthy ecosystems, and sustainable development. Resilience and climate adaptation measures can yield positive synergies or co-benefits for sustainable development, including alleviating poverty, provided resilience and climate adaptation considerations are taken into account in the initial design of development plans and projects. Likewise, aspects of sustainable development which can facilitate resilience include policies to improve food security, education and health. Climate adaptation strategies can yield welfare benefits, including more efficient use of water and more robust crop varieties. To capitalize on these synergies, resilience and climate adaptation thinking should be mainstreamed into strategic planning and policy making at all levels of society.

3.2 Full decarbonization

3.2.1 Decarbonization and SDGs

Climate-related linkages among all the SDGs are indicated below in Figure 2-2 The climate goal (SDG 13) is not the main goal with measures to decarbonize economies. Much larger roles are played by other goals, particularly the energy goal (SDG 7) which increases energy efficiency and promotes renewable energy, sustainable industrialization (SDG 9), and sustainable consumption and production (SDG 12). The most notable observation is that most of the other goals (9 goals out of 17) will benefit from decarbonisation efforts, including poverty reduction (SDG 1), food security (SDG 2), better health (SDG 3), access to clean water (SDG 6), and others.

A key role is played by SDG 8, the main so-called "economic" goal. SDG 8 could easily be classified as contributing to decarbonisation or as a goal with a decarbonisation target, because target 8.4. calls for decoupling economic growth from environmental degradation. This is arguably one of the most important environmental targets in all the SDGs. SDG 8 will benefit from decarbonisation because measures to decarbonize economies (including renewable energy, energy efficiency, sustainable industrialization, biomass sequestration, and sustainable consumption and production measures) will make a major contribution to the creation of decent jobs.

Finally, based on the discussion in the previous section, Figure 2-2 notes that decarbonisation measures also make a major contribution to resilience. Even though resilience is not specifically listed as an SDG, it is directly included as an "objective" in several other goals, as discussed in the previous section. Resilience can be bolstered through the construction of low-carbon societies, powered mainly by renewable energy. Energy generated from wind and sunlight is more widely distributed in contrast to fossil fuels. Renewable energy sources, therefore, are especially suited for powering localised systems of production and consumption. Countries at earlier stages of development have opportunities to build new infrastructure and power systems which are already optimized to use renewable energy sources. Building societies around the characteristics of fossil fuels and later trying to convert those to run on renewable energy is likely to be costly. Electrification in rural areas and small island developing states is a priority development objective which should use renewable energy sources, often off-grid, as much as possible.

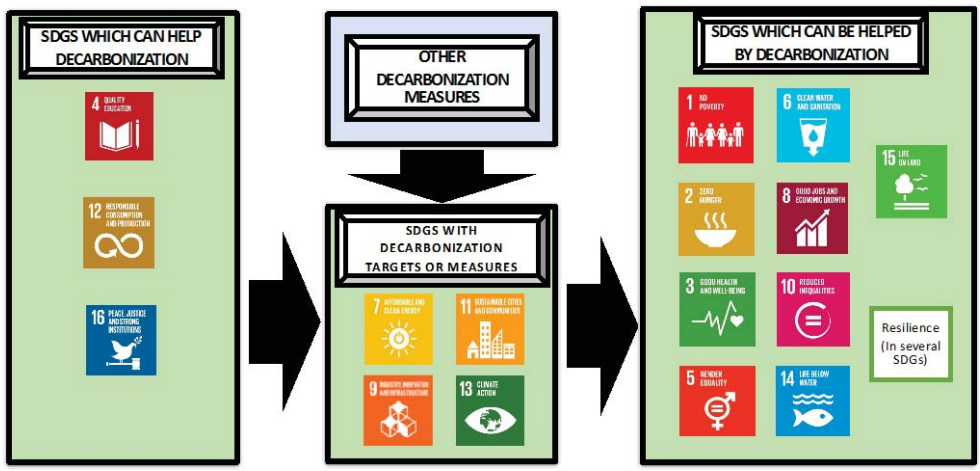


Figure 2-2 Decarbonisation and SDGs

3.2.2 Integrative Policy Options for Decarbonisation

The Asia-Pacific region's current development path is carbon-intensive. Many countries in the region still have low average per-capita emissions, but the middle-income countries have already reached emission levels that are incompatible with a safe global climate. A true transformation would be for the entire region to become net-carbon neutral. Stabilising per-capita emissions of GHGs at significantly lower levels offers a great leapfrogging opportunity for the region, which would bring multiple benefits, including

enhanced energy security, improved air quality, reduced water demand, and green jobs (due to the labour needed for constructing climate-smart buildings and other infrastructure, and to install and maintain renewable energy facilities) (Asian Co-benefits Partnership, 2016b).

Such transformations are fully possible and require progress mainly in three areas: increasing energy efficiency, shifting to renewable energy sources, and sequestering carbon in forests and other biomass (Van Vuuren et al., 2018).

Despite many private sector initiatives, government support and innovative policies play a key role for accelerating the adoption of renewable energy and energy efficiency. Complementary economic incentives and regulations are needed to accelerate the introduction of energy efficiency measures. Europe's experience demonstrates the importance of institutional arrangements and innovative business models for accelerating the adoption of renewable energy (European Commission, n.d.). Notable examples include separating the ownership of power generation facilities from the transmission grid and facilitating the establishment of small to medium-scale energy generation co-operatives.

Increasing energy efficiency should be obvious since the investments provide a basically guaranteed return, but up-front costs may need government support. There is a large potential for energy efficiency, in many cases at low or even negative cost. According to the International Energy Agency, "70 percent of global energy consumption is not subject to mandatory efficiency standards targets" (IEA, 2016).

In many countries, buildings account for a large share of energy consumption. Simple policies, such as requiring that large buildings must have an energy manager and regular energy audits or requiring the best achievable energy standards to be incorporated into building codes, can make a significant difference. Stronger building codes with strict energy efficiency requirements and government subsidies for building refits, could be powerful incentives to significantly upgrade the energy efficiency of all buildings. Promotion of new business models that encourage energy saving, such as energy service companies that provide up-front capital costs and charge customers for services such as cooling, heating, or lighting rather than for energy itself, can be both environmentally and economically beneficial. In a recent example in Adelaide, Australia, some 50,000 households will be provided with rooftop solar panels free of charge, and only pay a minimal electricity bill, thus creating a virtual power station[9] in combination with Tesla's 100 MW big battery, a wind farm, and household level Powerwall batteries.

Nearly all pathways that allow the Paris Agreement targets to be reached include technological breakthroughs that will facilitate carbon capture and storage and preferably turn the captured carbon into useable products at economically viable prices (EASAC, 2018). It is possible, however, to sequester carbon in sufficient volume by converting unproductive land into agroforestry, with multiple layers of plants with useful products, and sequestering carbon in productive agricultural soil. This will meet food security requirements and elimination of hunger (SDG2), as well as keeping the climate in check (Van Vuuren et al., 2018). The Asia-Pacific region has large areas of degraded and

unproductive land which could be converted given the necessary political will and policies creating the right incentives. At the same time, however, lifestyle changes (SDG12) will also be necessary, as shown below.

However, significantly accelerating transformation would require stronger government intervention and regulation, not just incentives and encouragement. It would be even more transformative to require upgraded energy efficiency in all sectors of the economy, including manufacturing, agriculture, transportation, etc. and perhaps rely less on voluntary efforts. Why allow a product with low energy efficiency to be produced at all, if it can be easily produced with a higher energy efficiency?

Regarding renewable energy, its cost has declined dramatically in recent years, and it is now cost competitive with fossil fuels in many areas. According to IRENA, "by 2020, all mainstream renewable power generation technologies can be expected to provide average costs at the lower end of the fossil-fuel cost range" (IRENA, 2017). The cost advantage of renewable energy is expected to increase in the near future due to advances in technology and increased scale of production. Various policies have helped to drive the price of renewable energy well below the fossil fuel alternatives in several countries. Still, government interventions can further accelerate these trends. Additional government intervention may be needed to strengthen and connect electricity grids, for example across state or national borders.

For the power sector, a more transformative move would be stronger regulation to require power companies to increase the share of renewable energy and reduce the share of fossil fuel use. There are two main ways to do this. The first is a renewable portfolio standard (RPS), which gives the power company flexibility to choose among renewable fuel sources. The second is a feed-in-tariff (FIT) which usually supports specific technologies by requiring power companies to purchase electricity produced by third parties using that technology. California recently issued a regulation to require most new homes to have solar panels (Gearino, 2018).

Broader, more ambitious policies include carbon pricing. The two main types are a carbon tax and emissions trading. Emissions trading may be less effective because it tends to be highly complex and easily weakened by the political influence of carbon polluting industries. In contrast, carbon taxes are usually less complex and easier to enforce. Perhaps most ambitious would be policies to restrict the extraction of fossil fuels, for example, by placing certain areas off-limits, particularly the most ecologically sensitive areas. This is already done to some extent in national parks and nature reserves, but could be expanded, including ocean areas. Additional benefits of restricting fossil fuel extraction would include not only healthier land and water ecosystems and reduced pollution, but also improved human health.

Elimination of subsidies for electricity and fossil fuels, which encourages unnecessary and wasteful use and large unnecessary costs, is a high priority. It is one of the easiest and most effective ways to strengthen the incentives to invest in energy efficiency, shift consumption away from fossil fuels towards renewable energy, and generate revenue for

other sustainability investments. Such policy reforms may require complementary measures, probably using part of the revenue savings, to protect low-income groups from being negatively affected.

Energy infrastructure investment is long-term, so it is important to shift to more ambitious and transformative policies as soon as possible. It is also important to maintain the continuity of the policy in order to stabilise the financial condition of energy related companies. Shifts away from sustainable energy policies will put at risk investments already made in renewable energy. If voluntary policies continue to be emphasized, then it will also be important to maintain investor confidence. Governments should send clear signals that they will not suddenly reverse energy policies.

Finally, while fossil energy is still being used during the process of transition to renewable energy, it is important to ensure that it is used as efficiently as possible. Also, fossil fuels with relatively lower carbon intensity, such as natural gas, should be prioritised over more polluting ones, wherever possible.

3.3 Ensure Sustainable Consumption and Production

3.3.1 SCP and SDGs

Several SDGs have targets involving measures to promote SCP besides just SDG 12, including under the water goal (SDG 6), target 6.4. on water use efficiency and target 6.5. on integrated water resource management, the energy goal's target 7.3. on energy efficiency, SDG 8's target 8.4. on resource efficiency and decoupling economic growth from environmental degradation, SDG 9's target 9.2. on sustainable industrialization and target 9.4. on resource use efficiency and clean production technologies. It is notable that a variety of other goals will be helped by enhanced sustainable consumption and production, including reduced poverty, greater food security, better health, greater equality, as well as land, water, and air environments, and climate change. SDG 8 could also have been put in the category of SDGs helped by SCP, because SCP will make a major contribution to employment and decent work. (See Figure 2-3.)

3.3.2 Integrative Policy Options for Sustainable Consumption and Production

The Asia-Pacific region is rich in natural resources, but this wealth is rapidly decreasing. This region now consumes more resources, including minerals and ores, fossil fuels and biomass, than the rest of the world. This is partly due to the region's huge population and the large volumes of goods that are produced and traded. The region's high trade dependence exposes it to geopolitical risks and volatile global markets.

This massive mobilisation of materials contributes to a range of serious environmental problems, including climate change, loss of biodiversity and ecosystem functions, and pollution (UNEP, 2011, 2016). In addition, freshwater reserves and fertile topsoil – both of key importance for meeting basic needs as well as for supporting economic prosperity – are under severe pressure. Trade can alleviate the pressure on the region's own

ecosystems and resources somewhat, but then the pressure and related problems are shifted to other regions, damaging ecosystems and harming human health.

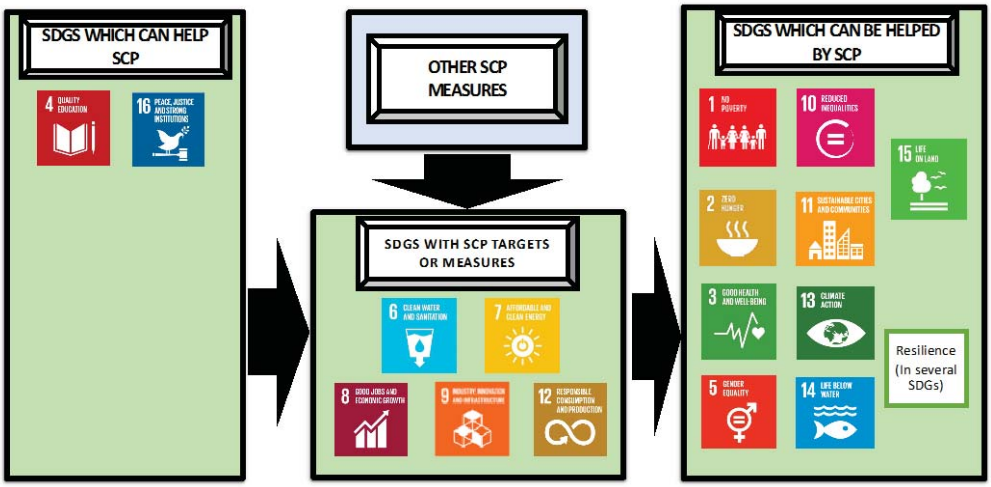


Figure 2-3 Sustainable Consumption and Production

Shifting to SCP would not only help secure the environment for human welfare, but it would also help to address many of the region's social priorities: poverty eradication, sustainable livelihoods, equity, thriving small and medium size enterprises (SMEs), energy security, etc. In fact, an aggressive push towards SCP is highly suited to the circumstances of this region, the "world's factory", and the booming consumption of its emerging middle-class (Akenji, 2012; Akenji and Bengtsson, 2014). Therefore, the region needs to use its natural wealth more wisely, not only considering short-term economic gains but also to secure sustainable, long-term wellbeing and prosperity.

SCP can be promoted through a variety of broad approaches. These include: (i) promotion of less materialistic lifestyles focused more on wellbeing; (ii) shifting emphasis to social relations and work-life balance and away from material possessions; (iii) education that provides life skills for self-provisioning, such as do-it-yourself, gardening, craft-work and sewing; (iv) regulation of consumer loan schemes and advertising that contribute to consumerist mind-sets; (v) business models based on leasing and sharing, which can limit the need for private ownership of products; (vi) requirements for long product warranties, reparability, and take-back provisions for end-of-life treatment; and (vii) multi-purpose and shared buildings, which can limit the overall demand for floor-space. Many of these areas resonate with traditional Asian practices and values but go against the dominant development model with its emphasis on economic expansion, consumerism, and

individualism.

A transition to SCP needs to influence culture and social norms and should engage existing traditional values and practices. Therefore, it is necessary to mobilize religious, cultural, academic and political organisations. Working with the media, including not only the news media but also the broader entertainment industry, to influence the images it conveys of desirable lifestyles and consumption patterns is another important avenue. Such a transition also involves protecting traditional practices, such as community-based forest management, product repair and reuse, and social economic customs, such as trade by barter. Regulations that allow and facilitate such activities would contribute to wellbeing and livelihoods while also reducing environmental impacts. Micro-SMEs are an important source of economic activity and employment in the region.[10] Such small-scale businesses are usually less competitive than larger ones, but due to their social value, it can be important for local governments to support them, for example licensing for crafts and farmers markets in attractive city locations, setting up innovation centres, micro-credit schemes, etc.

These approaches are very helpful and important to pursue. However, they are long term efforts which mainly rely on voluntary actions, so they may not be able to achieve transformation in the short run.

The conventional way of approaching SCP in developed countries – mainly relying on eco-labels, consumer information and voluntary change – has been found to have limited potential and needs to be supported by complementary measures (Akenji, 2014). Production systems need to be pushed to be more sustainable; nudging consumers to buy fewer goods or more sustainable products will not achieve the necessary urgent transformation. Regulation of unsustainable products and services also needs to be strengthened to restrict their availability in the market. Then it would be less necessary to rely on voluntary consumer choice. Governments have traditionally used criteria such as health, public safety, and security to develop such regulations; with new knowledge of the risks of unsustainable production and consumption it is now necessary to use sustainability criteria to set minimum product/production standards, establish licensing/permit systems to control unsustainable business practices and ensure strict compliance and enforcement. Policies specifically requiring product design for the environment, cleaner production processes, recyclability, repairability, and consideration of end-of-life disposability can go a long way towards making production systems more sustainable. Still, if more environmentally friendly versions of a product are readily available, then there may not be a good reason to allow less environmentally friendly versions to be sold.

One of the most ambitious and effective approaches to addressing issues relating to the consumption-production system is to change the indicator by which the contemporary economic system is measured – the gross national product (GDP). Already, there is clear evidence that current industrialised countries are struggling with the model of economic growth that has been pursued in the name of development. While Asia-Pacific countries still have opportunities to develop their economies, and understand the consequences of

unsustainable economic growth, the region could should leadership by developing a new measure of accounting for development that is less reliant on damaging the environment and that is more targeted towards wellbeing of citizens. In keeping with this, introducing green tax reforms would refocus economies to internalise the spirit of the SDGs and shift taxes away from income to resource consumption and pollution. This could include not only a carbon tax, but also taxes on other pollutants or products with high environmental footprints.

It should be emphasized that much of the population in the Asia-Pacific region is already living within ecologically sustainable limits. These are mainly traditional communities in rural areas. Since urban living in general requires higher levels of consumption and is associated with higher environmental impacts, it is important to explore ways to limit further urbanisation. This requires providing incentives for people in rural areas to stay, including improved opportunities for education, health care, decent living standards, and secure livelihoods. As countries develop, there is a need to seek ways to protect low-impact lifestyles, and to enhance the wellbeing of people and communities in ways that are possible within the earth's environmental boundaries.

3.4 Safeguard and enhance ecosystem services and biodiversity

3.4.1 Ecosystems, biodiversity, and SDGs

There are four SDGs which are directly related to protecting biodiversity and ecosystems. (See Figure 2-4.) Target 2.5. narrowly focuses on the genetic diversity of seeds. SDGs 6 and 15, on water and land, call for the protection of a broad range of ecosystems, and SDG 14 calls for the protection of oceans. No SDG target mentions protecting biodiversity in general, but SDGs 6, 14, and 15 call for protecting a very broad range of ecosystems, and if these are effectively implemented, it would make a significant contribution to protecting biodiversity. Thus, SDGs 6, 14, and 15 can be considered as means to protect biodiversity. In turn, the actual, specific, means to protect ecosystems are mainly contained in various other SDGs, particularly the so-called "economic" ones. The key targets may be 8.4. on decoupling economic growth from environmental degradation, and various targets under Goal 9 which aim to make industrialization sustainable. These, in turn, would be implemented through the measures contained in the targets under SDG 12 on sustainable consumption and production. Of course, important contributions to protecting ecosystems would also be made by the sustainable transport (11.2.) and pollution reduction targets (11.5. and 11.6.) under the cities goal (11), the promotion of renewable energy, energy efficiency (SDG 7), education for sustainable development (SDG 4), and peaceful societies (SDG 16).

SDGs on poverty reduction, health, and reduction of inequalities will receive a major boost from ecosystem protection. In addition, some aspects of the SDGs which contain measures to protect ecosystems would also see major benefits from enhanced ecosystem protection, which a) will create many decent jobs (SDG 8), b) may reduce conflict and foster more peaceful societies, c) will enhance the resilience of cities to natural disasters. The total

value of ecosystem services globally has been estimated to be USD 125 trillion (Costanza et al., 2014).

A good example of a goal which includes its means as well as important effects is SDG 6 on water, which could be included in all three categories in the figure. Sometimes ends and means are even included together in the same target. Target 6.6. on protecting ecosystems is a major objective. The means to achieve it are included in target 6.3. (on reducing pollution, increasing wastewater treatment and recycling), target 6.4. (on increasing water use efficiency), and target 6.5. (on integrated water resources management). Then, the results of better ecosystem protection include target 6.1. (universal and equitable access to safe and affordable drinking water), target 6.3. (improving water quality), and target 6.4. (reduce water scarcity).

Finally, some missing elements become apparent in this kind of figure showing chains of means and ends. The environmental media of land and water are highlighted in the SDGs, as is climate change, which relates to the air, but the air environment overall is less emphasized, included as part of the health and cities SDGs (SDG 3 and 11) (Elder and Zusman, 2016). Air is not really an ecosystem, but certainly reduction of air pollution would make a significant contribution to improving the health of land and water ecosystems. Likewise, as mentioned earlier, resilience was not highlighted as a headline goal, but ecosystem protection and biodiversity form major pillars of strengthening resilience.

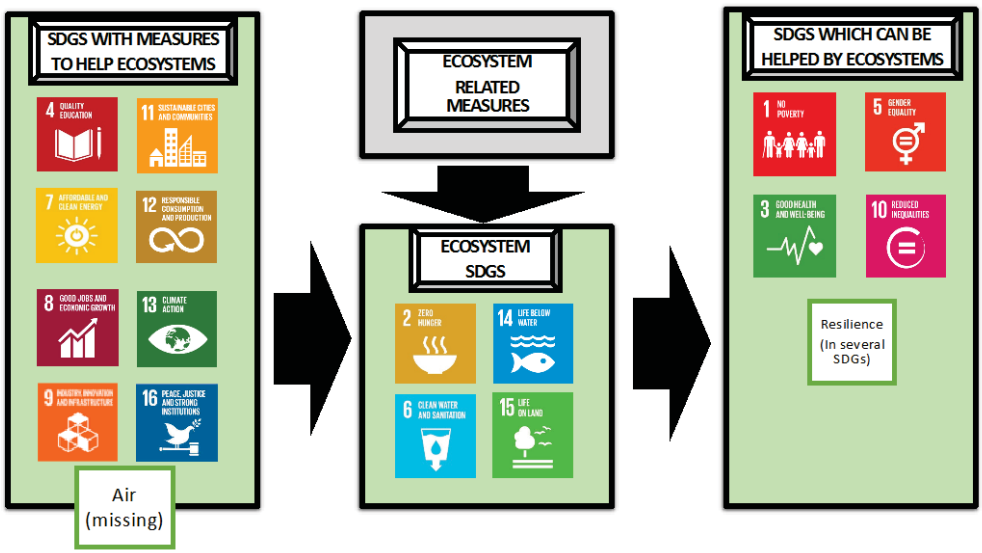


Figure 2-4 Biodiversity and Ecosystem Protection and SDGs

3.4.2 Integrative Policy Options for Protecting ecosystem services and biodiversity

Current development patterns are harming the region's rich natural heritage and its great diversity in ecosystems and habitats (SCBD, 2014). Natural ecosystems perform various functions that are of great value to society, including regulating hydrological flows, purifying water, protecting human settlements against natural disasters, limiting climate change by storing carbon, and providing food. The integrity of natural ecosystems is especially important for indigenous groups and many rural communities, where households often depend on services and materials directly from nature for their livelihoods. Fully protected ecosystems and biodiversity in the Asia-Pacific region would be truly transformative, including at the global level.

Many of the services provided by nature are currently taken for granted, and their value to society is insufficiently recognised in decisions by businesses and governments. As a result, many ecosystems of vital importance to local communities and of great value for society in general are gradually being degraded, damaged, or lost. Reversing these trends would have many benefits.

Land use changes, mainly for agricultural expansion (including oil palm plantations) and infrastructure development, nitrogen deposition, climate change, and invasive species are among the key drivers of biodiversity loss in the Asia-Pacific region (Braimoh et al., 2010). Therefore, national and local strategies for sustainable land use can play an important role. To implement such strategies, both regulation and economic incentives may be needed. Land use plans can prohibit activities that are known to cause environmental degradation in vulnerable areas, such as watersheds, but as for other command and control policies, compliance and enforcement are keys.

Protected areas, such as national parks, exist in most countries in the region. They can be effective for protecting species and ecosystem functions; to be fully effective, they need to be connected to larger networks with corridors that allow animal migration, such as in the Chitwan National Park in Nepal (Ministry of Forests and Soil Conservation, 2015). Effective protection against logging, poaching, and other destructive practices is also necessary, with lengthy jail terms for transgressors. When establishing new protected areas, or expanding existing ones, agreements with local communities may need to be worked out to allow for traditional uses that cause little harm or co-management arrangements.

There are good experiences of allowing local communities to look after and manage natural areas, for example in India, Nepal, Viet Nam, and the Philippines. Since the lifestyles of these communities depend directly on ecosystem functions, they have incentives to ensure that such functions are sustainably maintained. It is also possible to strengthen such incentives, for example by paying communities for the ecosystem services provided by the land they are managing – payment for ecosystem services (PES). Promotion of eco-tourism can also provide incomes for communities and strengthen incentives for sustainable management. Community-based management typically

requires that the government provides support to the communities involved, strengthening their capacity for sustainable use and management. Looking beyond protected areas, it is important to promote land use that allows certain economic activities while also protecting vital ecosystem functions. For example, this can involve low-impact agriculture, such as agroforestry, as indicated above.

3.5 Effective pollution prevention and control

3.5.1 Pollution control and SDGs

The major SDGs with pollution control targets are SDG 6 on water, SDG 14 on oceans, and SDG 15 on land, similar to the goals related to ecosystem protection. In addition, SDG 11 on cities also calls for pollution reduction. And the SDGs which provide the main means of reducing pollution are also similar to those which provide the means for ecosystem restoration, particularly the so-called "economic" SDGs. Again, the key targets may be target 8.4. on decoupling economic growth from environmental degradation, and various targets under SDG 9 which aim to make industrialization sustainable, as well as SDG 7 which includes renewable energy and energy conservation. These, in turn, would be implemented through the measures contained in the targets under SDG 12 on Sustainable Consumption and Production. SDG 11 on cities also contains important means – sustainable transport (target 11.2.) - to help achieve its pollution reduction target (target 11.6.). SDG 4 (education) and SDG 16 (peaceful societies) may also contribute to pollution reduction. (See Figure 2-5.)

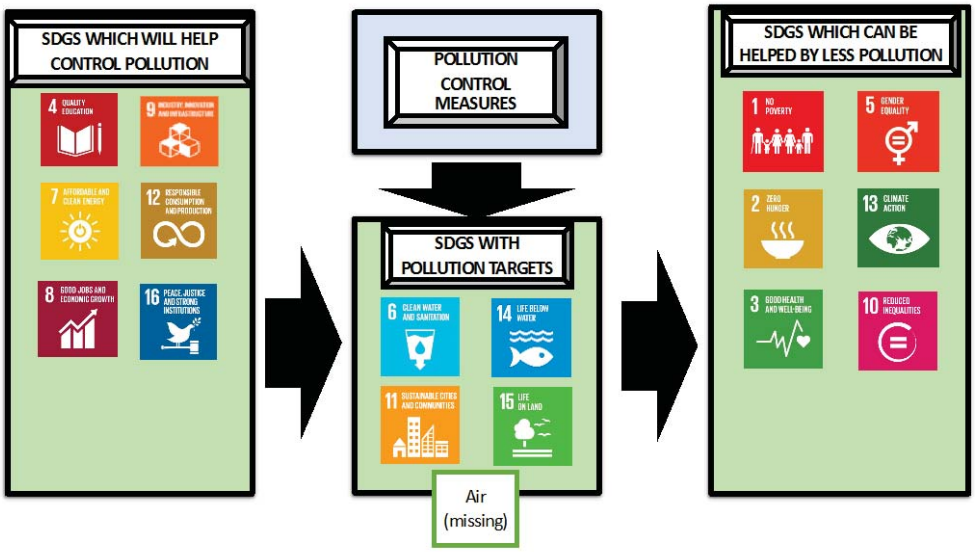


Figure 2-5 Air, Water, and Soil Pollution Control and SDGs

Pollution control is also an important means to achieve the so-called "social" goals including poverty reduction (SDG 1), food security (SDG 2), health (SDG 3), and inequality (SDGs 5 and 10). Climate change (SDG 13) can be mitigated to some extent through reduced pollution, especially air pollution, although some air pollutants have cooling effects, so climate and air pollution should be managed together to maximize synergies and minimize trade-offs (Asian Co-benefits Partnership, 2016a).

3.5.2 Integrative Policy Options for Pollution Prevention and Control

Clean air, water, and land throughout the Asia-Pacific region, at all levels, would be another key transformation. Pollution of air, water, and soil has reached alarming levels in many places in the region and poses serious threats to human health and ecosystems. According to WHO estimates, in 2012, more than five million deaths in this region were attributable to air pollution, with indoor and outdoor air pollution causing approximately equal number of casualties (WHO, 2014). Pollution is also having a significant negative impact on economic activities. For example, many countries are experiencing large losses in crops production as a result of pollution. Hazardous air pollution is causing some cities to restrict ordinary outdoor activities, especially for school age children, creating difficulties in attracting and keeping foreign investment and skilled foreign and domestic labour. The media has helped to increase public awareness of these serious challenges, especially pollution episodes in cities, and citizens in many countries are now demanding quick and effective actions by their governments. In rural areas, indoor air pollution caused by the burning of fuels for cooking and heating remains a severe health hazard that requires more attention.

For all types of pollution, the first step is to strengthen pollution standards and regulations, and the second step is to enforce them effectively. For example, WHO has established guidelines for a range of air pollutants, but many countries in the Asia-Pacific region have adopted weaker standards (CAI-Asia, 2010; Elder, 2015). Surprisingly, no ASEAN country had fuel economy standards as of 2010 despite obvious cost savings and energy security benefits (50by50 and CAI-Asia, 2010). Developing countries may need capacity building assistance to strengthen standards, improve monitoring and reporting, and compliance and enforcement.

For reducing pollution, effective economic policies are also critical. Energy and resource efficiency, renewable energy, and sustainable transport are keys for reducing pollution, especially air pollution. The 3Rs (reduce, reuse, recycle) offer a hierarchy for reducing waste and resource use, which in turn reduces pollution. Some countries in the region have broader economic policies or concepts with the potential to promote cleaner production and minimize pollution such as (i) Green Growth in Korea (Statistics Korea, 2012); (ii) China's Circular Economy[11], (iii) China's concept of Green Development, and its Blue Sky Science and Technology Project[12], and (iv) Japan's Sound Material Cycle Society[13].

The policies and approaches related to the promotion of SCP, as mentioned above, are critical for combatting pollution. Much pollution derives from consumption and production, as well as the waste generated by them.

Cleaner production is a business strategy that can increase profits by reducing waste in the production process to cut costs or finding an economic use for the waste to generate revenue. Governments can provide regulatory advantages to companies with cleaner production processes, such as increasing the costs of waste collection and treatment or imposing high waste discharge fees. Subsidies for cleaner production innovations and favourable loans or tax breaks for cleaner production investments, especially for SMEs, can also be considered. Land use plans can consider the co-location of industries, so that waste from one is used as an input to the other.

For cities, establishing more effective systems for collection and treatment of sewage can help authorities achieve their objective of protecting residents' health. Decentralised sanitation systems and ecological treatment systems, where nutrients are returned to agriculture, turning a waste problem into a resource, can play important roles as complements to large-scale conventional wastewater treatment plants. Waste to energy systems may also reduce landfill requirements and reduce the need for fossil fuel-based energy systems that contribute to climate change. Sponge cities that absorb rainfall (instead of hard surfaces) are also important for reducing contaminated runoff from non-point sources (Li *et al.*, 2017).

A co-benefits approach can reduce the costs of reducing pollution since different kinds of pollution often have common sources. The Climate and Clean Air Coalition and the Asian Co-benefits Partnership (Asian Co-benefits Partnership, 2016a) already promote specific measures to reduce short-lived climate pollutants (SLCPs) which are also important air pollutants (UNEP, 2011). The co-benefits approach can also be applied to other areas such as transport, waste, and buildings (Puppim De Oliveira et al., 2013). Policy design should incorporate these co-benefits in ex ante cost benefit analyses.

Policies that promote integrated land-water management strategies and improved governance and capacity building are necessary to reduce pollution of land and water resources while simultaneously fostering sustainable development (Scheyvens et al., 2017). Governance strategies should include multi-stakeholder participation and community-based resource management as well as market-based strategies (UNEP, 2012b). Reducing leakage of nutrients from agriculture requires awareness raising and capacity building of farming communities, and support for adopting improved farming techniques. Intensive livestock farms, where manure needs to be collected and turned into bio-gas used in running the operation, need special attention. Other approaches that have potential for realising multiple benefits include low-input and organic farming, integrated agriculture using animal manure as fertilizer, non-till farming, agroforestry and permaculture.

A range of policies and approaches (similar to SCP) is necessary to control pollution. There is no silver bullet. None of the policies and approaches mentioned here is particularly new. But what would be new and potentially more transformative would be to devote considerably more resources to implementation and enforcement, particularly for the pollution and emission standards.

3.6 Sound management of chemicals and wastes

3.6.1 Chemicals, wastes, and SDGs

Sound management of chemicals is the focus of target 12.4., while waste management and sanitation are included in SDG 6 on water and SDG 11 on cities. The SDGs which provide the means for chemicals management are similar to those for protection of ecosystems and pollution control, particularly SDGs 7, 8, and 9. The goals which are helped by improved management of chemicals are also similar, especially the social goals of poverty reduction, improved food security, improved health, and reduced inequality. Of course, improved chemicals management also is a major factor helping to conserve land and water ecosystems. (See Figure 2-6.)

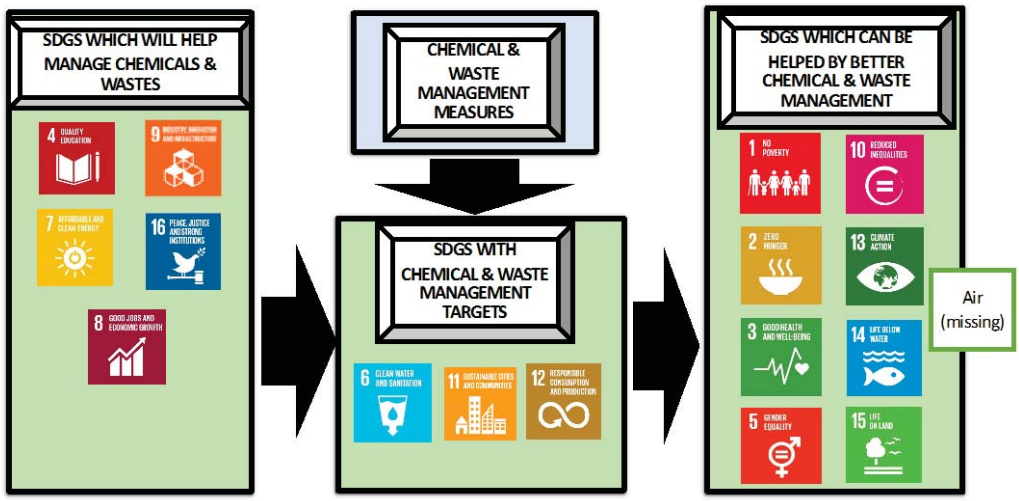


Figure 2-6 Sound Management of Chemicals and Waste

3.6.2 Integrative Policy Options for Management of Chemicals and Waste

In most of the Asia-Pacific region, inappropriate management of waste and chemicals is a serious threat to human health and ecosystems. Large and growing volumes of uncollected waste, waste dumping with little or no environmental protection, open waste burning, and release of untreated sewage to watercourses are part of the reality in many cities (UN-Habitat, 2010). At the same time, the generation of varieties of complex and hazardous waste that require special care and treatment, such as electronic waste, medical waste, and industrial waste is also on the rise. In addition, recycling – which has potential environmental benefits in many cases – is often carried out with primitive techniques and

inadequate protection, causing pollution and exposing workers to hazards (Tsydenova and Bengtsson, 2011).

Technologies for dealing with these challenges are readily available. For example, biodegradable waste, by far the largest share of municipal solid waste, can be composted or used to produce biogas. Investments in such low-cost options can drastically improve sanitary conditions, reduce GHG emissions, save money for local governments as a result of the reduced need for transportation and disposal, and also generate green jobs. It is estimated that the amount of organic waste produced annually in the Asia-Pacific region has a potential economic value of more than USD 700 million, if used for either compost or biogas generation (ADB, 2011). Additionally, establishment of collection systems and safe treatment facilities for hazardous waste would have significant health benefits. Materials recycling, which is currently to a large extent done by the informal sector, can gradually be upgraded and formalised. Training of informal recycling workers may be needed in order to avoid unintended negative impacts on livelihoods. Policies based on the principle of extended producer responsibility can help to mobilise financial resources for such upgrading.

Product repair and reuse are common in most countries in the Asia-Pacific region. These practices can reduce both the demand for natural resources and the generation of waste, and they also offer livelihood opportunities. However, as countries go through the process of modernisation, these practices tend to lose ground. There are strong reasons to support these sectors to protect the valuable functions they perform to rationalise society's use of materials. While beyond this region, an example of policy supporting a trend towards product repair and re-use comes from Sweden. The government submitted a proposal to parliament suggesting that products that receive a repair should only be taxed with 12 percent Value added Tax (VAT) instead of the usual 25 percent. Such clear fiscal policy in support of sustainable consumption exemplifies how governments can steer consumption patterns in society. In Sweden, refrigerators, bicycles, and other common household items will now be repaired rather than thrown away (Orange, 2016).

Similarly, agricultural, pharmaceutical, cosmetics and industrial chemicals are increasingly used in the region (UNEP, 2012b). More than 80,000 chemicals are registered for use in the US, increasing by about 30 percent since 1979, and most of these have never been tested for their potential damage to humans or the environment (for details see https://www.epa.gov/tsca-inventory/about-tsca-chemical-substance-inventory). Many of these substances have known or suspected hazardous properties, and for most of them there is insufficient information available to properly assess hazards and risk. The monitoring systems for how chemical substances are dispersed, transformed or accumulated are under-developed and provide insufficient information for safe management.

Ensuring safer management of chemicals requires a range of government interventions, including for example: (i) stricter requirements for corporations to conduct testing and to disclose information; (ii) expanded bans of especially problematic substances; (iii) proper inspections and enforcement of regulations; (iv) education and awareness raising among

key stakeholders, such as farmers and workers in chemicals-intensive industries; (v) promotion of effective substitutes, such as biological pest control methods; and (vi) expanded monitoring systems for tracking the environmental fate and impacts of chemical substances. Above all, the precautionary principle should be applied, with no chemical approved for use, until it is demonstrated to be safe.

3.7 Strengthen scientific understanding of environmental problems and links with sustainable development policies

3.7.1 Environment-related science and SDGs

Basic science, particularly for the environment, is not highlighted well in the SDGs themselves, in contrast to technology, which is strongly mentioned in several SDGs (e.g. targets 3.b., 5.b., 9.a.) and has its own section in SDG 17 on the means of implementation (targets 17.6.-17.8.). The main one related to environmental science is target 14.a. which calls for increased scientific knowledge about oceans. However, there are no targets on research relating to land ecosystems, air pollution, or climate change. Moreover, there are no targets on health impacts of pollution or other environmental factors such as climate change. Target 9.5., if interpreted literally, could include basic science (it states, "enhance scientific research", not specifying what kind of research, so it could be interpreted to include environment-related research), but it is under SDG 9 which focuses on infrastructure and industrialization, and the rest of the target discusses "research and development" as well as industrial technology. Target 7.a. is on clean energy research and technology.

3.7.2 Integrative Policy Options for Science and Environmentally Sustainable Development

The need to strengthen scientific understanding of environmental problems is not new, but transformation demands innovation and expanded effort. Environmental issues, and their linkages with sustainable development, are very complex. Scientific knowledge is needed to understand and effectively address environmental problems, to formulate effective policy responses and create synergies with human development. Certainly, natural science research is necessary, but contributions from the social sciences and humanities are also necessary, since a transition to sustainability needs changes in behaviour, social norms, and institutions.

The Asia-Pacific region needs better data generation systems and capacity for environmental monitoring and data analysis. Regional efforts are also needed, since many environmental problems are trans-national. Regional and national and regional efforts need to be well-coordinated in order to be more effective.

Broader understanding of existing scientific knowledge is also important, not just new scientific results. Business and government leaders should understand the interlinkages between the environment and development, and how they affect each other. Decision makers need the latest scientific knowledge; they also should learn how to communicate what they want to know from the research community. Therefore, institutional

arrangements to link decision makers, including political as well as administrative officials, with the research community, should be enhanced.

Several global scientific advisory panels have been established to synthesize the state of scientific knowledge and suggest possible solutions and policy responses in various areas. These include the Intergovernmental Panel on Climate Change (IPCC), the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), and the International Resource Panel (IRP), and the Global Environmental Outlook (GEO). The results and suggestions of these assessments should be more effectively and persuasively communicated to all levels of government, key stakeholders, and the general public.

It is becoming a necessity for Asia-Pacific or its sub-regions (e.g. ASEAN, Asia) establish regional resources panels, modelled after the successful International Resources Panel and bringing together leading scientists in the region to support governments by conducting detailed analysis to sustainability issues in the region and its countries. In addition to just conducting analysis, (sub-)regional and national resources panels would need to be supported by policy analysts who can develop policies and strategies from the scientific analysis, showing governments viable options and effective instrument that can be deployed to supported transformation towards sustainable society. Examples could include: ASEAN Resources Panel, Asian Resources Panel, etc.

For the SDGs, some efforts have been made to incorporate scientific input to the High Level Political Forum. There is also a plan to develop a global report on the progress of sustainable development with scientific input similar to other global scientific assessments. While a global report is certainly important, it will be necessary to mobilize scientific input on a much larger scale to fully implement the SDGs. The Sustainable Development Solutions Network promotes the engagement of the research community in SDG implementation, although this kind of effort needs greater support to scale up. One major challenge of the SDGs that needs scientific support is the complexity of the interlinkages among the SDGs, with major opportunities for synergies as well as potential trade-offs (Elder, Bengtsson and Akenji, 2016; Nilsson, Griggs and Visback, 2016; Zhou and Moinuddin, 2017). The scientific community has traditionally worked mainly in academic silos, similar to the traditional sector silos of the policy world.

Again, similar to the other areas, these recommendations are not very new, and results may be achieved gradually over the long term. To make them more transformative would require considerably more resources to be devoted to science. In addition, greater institutionalization of science input into decision-making processes would also be important. For example, in most countries, government budgets and policies are all reviewed by finance ministries and/or budget offices. In addition, governments could establish a chief scientists office to review budgets and programs, and conduct sustainability assessments.

4. STRENGTHENING GOVERNANCE AND INSTITUTIONS FOR EFFECTIVE IMPLEMENTATION OF TRANSFORMATIVE POLICIES

The solution areas identified in the previous section require a new approach to development. The SDGs provide an opportunity for governments to reconsider their ways of working, their routines for planning and target setting, resource allocation, policy development, implementation, and monitoring.

The old development paradigm, which held that environmental protection is too expensive for developing countries, that environmental destruction is an unfortunate but unavoidable consequence of poverty alleviation, and that a country can grow its economy first and clean up its environment later, is now threatening future prosperity. Thus, a new way of thinking about environment and development needs to be shared widely, across government ministries as well as among political leaders, in the private sector, and in society more broadly. This new thinking can take inspiration from the early-phase innovative examples being implemented in some countries of the region.

Governments also need to organise themselves differently, not only to address the negative consequences of the old development model but also to adopt an integrated approach to harness the synergies between ecosystem protection and the other elements of sustainable development. UNRISD (2016) notes "the 2030 Agenda for Sustainable Development can only be realized if the implementation process leads to transformative change addressing the root causes of inequitable and unsustainable outcomes.

"Transformative change therefore requires fundamental changes in social relations and institutions to make them more inclusive and equitable, as well as the redistribution of power and economic resources" (UNRISD, 2016). Some important aspects of such institutional reforms are highlighted below.

4.1 Develop relevant capacity to meet existing commitments and responsibilities

All countries in the region have environment-related legislation, and they have all signed multilateral environmental agreements with other countries, under regional frameworks or the United Nations. The first priority, therefore, is to ensure fulfilment of such environmental commitments and enforcement of existing laws and regulations. For this, environment-related functions that most countries should generally be able to manage, include:

- Assessment, monitoring and data
- Policies, laws, regulations, standards, economic instruments
- Inspections and issuance of licences, and compliance enforcement
- Judiciary system capable of investigating and prosecuting violations of environmental laws and regulations

- Environmental impact assessment (EIA) of projects, and strategic environmental assessment (SEA) of sectoral and cross-cutting policies, plans and programmes
- Capacity-building, promotion of formal and non-formal education
- Public awareness, outreach, advocacy, promotion of CSR to encourage behavioural change
- Networking and partnerships with civil society
- Coordination of environment-related issues within the government
- International environmental cooperation (MEAs, multilateral and bilateral cooperation, technology transfer, etc.)
- Research

Assessment of government mandates and capacities to carry out these functions is needed. In countries where the above functions are weak or missing entirely, they need to be developed, along with the required human and financial resources. In some cases, more staff is urgently needed (quantity), and in many cases the existing staff do not have sufficient capabilities (quality). Adequate capacity is needed at all levels of government, not least at local levels where much of implementation takes place. Strengthening the capacity to mainstream environmental concerns into development planning and policies is necessary.

However, while strengthening such capacities is essential for shifting to more sustainable development paths, it is important to consider also other factors that may hamper reform efforts. Weak capacity is not always the most critical factor. Flawed incentive structures can be in conflict with the need to reflect environmental concerns in planning, policy-making and implementation. Transformative policies are not easy to impose from the top, but governments can create the incentives and enabling environment to encourage policy-experimentation and learning, so that creative destruction or destructive creation can find receptive space.

One example of such potentially influential incentive structures is the systems used for performance evaluation and promotion of civil servants. If such systems do not reflect environmental aspects but focus on short-term economic outcomes, they can encourage a continuation of unsustainable development patterns.

4.2 Mainstream sustainability into all policy areas and mobilise stakeholders

Much stronger coordination between sectors will be necessary to implement the SDGs, since they are all interlinked. Environment ministries have been often perceived as mainly responsible for sustainable development, while development ministries were perceived as mainly responsible for MDGs. In contrast, a whole-government approach is needed for SDGs. Full involvement of ministries or departments with a mandate for overall coordination, such as finance and planning ministries, is essential. Development planning should be guided by the idea that environmental protection is an essential precondition for human wellbeing, including poverty elimination, and long-term prosperity. The SDGs

can be used as a tool to help to mainstream sustainability considerations into all policy areas. Moreover, the SDGs can also be used to mobilize and coordinate various stakeholders to implement the SDGs. In the VNRs to date, "all countries reported progress in establishing and/or strengthening existing institutional frameworks, inter-ministerial coordinating offices, committees, or commissions" (DESA, 2017). This is a good start, but to what extent they are empowered to act and how effective they will be remains to be seen.

At the same time, the role of environment ministries should be greatly strengthened. With environmental concerns often seen as a threat to national development strategies and economic growth plans, the present institutional arrangements tend to constrain the role of environment ministries. Governments should revise their institutional arrangements in alignment with the new integrative understanding of alternative development pathways, and that would better enable environment ministries to harness the SDGs framework in support of national objectives. This can include renaming environment ministries to a more suitable reflection of their elevated coordinating function, increasing their capacities to reflect their expanded responsibilities and workload, and repositioning them within the government with higher authority to ensure critical environmental concerns are appropriately reflected in other policy areas in an integrated manner. Three examples below from the Asian region provide early lessons:

- Mongolia created one ministry combining both environment and green development– the Ministry of Environment and Green Development. This ministry was given a coordinating function, together with the Ministry of Finance. The ministry also chaired a permanent coordination committee. This structure has since been reorganized and renamed, but it is still a useful example.
- Sri Lanka placed the responsibility for coordinating the SDGs directly under the President, who is the Chair of the National Council for Sustainable Development (UNEP, 2012a).
- Bhutan established cross-cutting indicators spanning all government agencies in charge of planning and development. These indicators direct their work. The Constitution directs the State "to promote those conditions that will enable the pursuit of Gross National Happiness", ensuring that improving the GNH index is the basis for decision making by all government agencies (UNEP, 2012a).

4.3 Access to justice and information

Strengthening the judicial system to enhance environmental justice is an important institutional measure to leverage the other measures described above. Courts that are independent from the government, that work on a sound legal basis, and that are appropriately resourced can help keep society on a more sustainable track. In recent years, green courts have played important roles in many countries as arenas for citizens and communities to take action against severe environmental pollution and urge reforms in government policies. An interesting example in Asia is the Indian National Green Tribunal,

which was established to handle cases related to the environment. One of the Green Tribunal's legal foundations is in India's constitution, which ensures the right of all citizens to a healthy environment. Strengthening judiciary institutions and equipping them with the legal tools and capacity needed to enable all citizens to defend their right to a healthy environment is an important element of new development model for the Asia-Pacific region.

Access to information is a key means to ensure access to justice, for example, as provided for by the Aarhus Convention. India has also developed important legislation and institutional arrangements to guarantee access to information. If these principles were adopted globally and well-implemented, it could leverage significant progress towards transformation.

4.4 Adopt new measures of measuring progress that reflect social and environmental health

GDP should be replaced as the core indicator of national development. There are a variety of problems in its treatment of the environment (World Bank, 2010). Overall, it does not lead to the achievement of human wellbeing and prosperity within planetary boundaries, so it is not suitable for tracking overall progress on SDGs. China's Green GDP project is one example illustrating the gap between GDP and human wellbeing.

Bhutan has actually moved away from using GDP as a scorecard for development. Instead, the country is using Gross National Happiness (GNH) which incorporates social and environmental dimensions of sustainability. Bhutan's GNH has four key strategies, called pillars: sustainable and equitable socioeconomic development, environmental conservation, preservation and promotion of culture, and good governance. GNH uses 33 indicators, both quantitative and qualitative, in nine different clusters, highlighting various factors that influence wellbeing.

Other alternatives to GDP include the Genuine Progress Indicator,[14] the Human Development Index,[15] and the Human Wellbeing Index[16] (McLean, 2017). The Human Development Index uses a comparative measure of life expectancy, standards of living, education, and literacy. The Gini Coefficient and the Palma ratio measure income inequality. The Ecological Footprint and various resource consumption indicators capture the environmental and resource effects of consumption as well as potential future resources. Natural capital indices assess endowments of natural resources.

4.5 Align national taxation and budgeting, and the broader financial system with sustainable development objectives

The UNEP Inquiry into the Design of a Sustainable Financial System has identified potential options in the Asia-Pacific region to promote a more sustainable financial system (http://unepinquiry.org/). Ministries of Environment can potentially play an advocacy and advisory role in partnership with Central Banks, Ministries of Finance, National Planning

Commissions, other ministries, and the private sector to achieve the following reforms:

i. Sustainable public procurement (SPP) programmes are a well-known approach to aligning government budgets with sustainable development objectives. Many countries in the region already have or are now developing related basic policies. While SPP can boost the competitive advantage of more sustainable products and services, it does not necessarily require structural changes in government procedures.
ii. Sustainable banking: 'green credit' risk management and reporting requirements are an important way to enhance the environmental sustainability of the banking sector. Indonesia, China, and Bangladesh have launched related initiatives demonstrating their feasibility to provide green financial incentives. These initiatives considered various capital weights to reflect mispriced environmental risks and broader policy objectives.
iii. Green bonds: this region can be a leader in green bonds. Already, bond markets have been developing rapidly. The proceeds from green bonds could be used to fund green infrastructure and green business.
iv. Stock exchanges: listed companies are now required to provide information about social and environmental corporate responsibility by the stock exchanges of some countries like Singapore, Thailand, and others.
v. Green budget tax reform allows governments to influence market prices through public policy and internalise the costs of environmental degradation. This can be done either directly, through the national accounts, or indirectly, through fiscal policy (ESCAP, 2005). One way to internalise environmental costs is to shift the tax base from penalising economic "goods" (e.g. income earned or jobs created) to penalising "bads" (e.g. pollution and virgin resource extraction). This could pay a double dividend, simultaneously supporting economic development and reducing impact on the environment.
vi. Participatory budgeting. Especially at the local level, involving citizens in the budgeting process can help ensure that spending priorities are aligned with locally recognised needs. Experience from Brazil has shown that cities that involve citizens in the budgeting process have achieved better development outcomes than comparable cities with conventional budget routines (Gonçalves, 2014). At the national level, increased transparency around budget allocations and the rationales behind priority setting can enhance accountability.
vii. Fossil fuel subsidy reduction/elimination. Substantial funding could be raised by eliminating these subsidies and shifting them to more sustainable uses (Merrill and Chung, 2014). Fossil-fuel subsidies for consumers across emerging and developing Asia totalled USD 104 billion in 2011 (IISD, 2014). Subsidies often introduce economic, environmental and social distortions with unintended consequences. They are expensive for governments and may not achieve their objectives, while also inducing harmful environmental and social outcomes. For example, fuel tax rebates and low energy prices can encourage overuse of fossil fuels and increase greenhouse gas emissions. Agricultural subsidies can lead to the overuse of pesticides and fertilizers with harmful consequences for natural resources and human health (OECD, 2007). The

government of Indonesia has already started to reduce its energy subsidies. Consumer energy subsidies alone have amounted to around a 3.1 per cent of Indonesia's GDP since fiscal year 2010 (IISD, 2014). The subsidies were intended to help the poor, but mainly they benefit those with higher incomes.

viii. Mainstreaming environment into national budgets. Climate change and environment should be mainstreamed into national budgets during the budgeting process. Spending could be reallocated to support environmental and climate policies. Mainstreaming would also help to identify and take advantage of co-benefits between environmental spending and other areas. One method of mainstreaming is sustainable public procurement. Indonesia's Ministry of Finance has introduced carbon emissions tagging systems in the national budget, and Nepal has included climate related expenditures into its national budget code. Nepal also introduced Climate Public Expenditure and Institutional Reviews (CPEIRs) of environment related expenditures and institutional arrangements.

Some governments may also have concerns about the costs of implementing the SDGs, which have been estimated at about USD 2-3 trillion per year (Schmidt-Traub, 2015). This may sound expensive, especially in the context of the Addis Ababa Action Agenda (AAAA) which emphasizes the importance of financing by national governments and the private sector. However, this sounds more feasible if it is put in the overall context of global GDP, savings, and financial assets (USD 78, 17, and 278 trillion, respectively, in 2014). Moreover, in terms of infrastructure investment, much of it involves not special investment just for SDGs, but rather making already planned investments more sustainable. Finally, it is important to note the positive synergies and interlinkages between SDGs will lead to large cost synergies. For example, investments to reduce pollution, shift to renewable energy, and enhance energy efficiency will improve health and reduce health costs. Progress on one SDG in many cases also helps other SDGs (Elder, Bengtsson and Akenji, 2016).

5. CONCLUSIONS

Key themes of this chapter are, a) the need to stay focused on the big picture and think hard about how to achieve real transformation, b) the need to avoid becoming overwhelmed by the complexity of SDGs, and c) the need to avoid getting too side tracked by the exercise of developing ever narrower and disaggregated data and indicators. To be sure, the work on indicators and data is very important, especially for monitoring and review. However, this is a very long-term effort, while the problems and challenges of environment and development in the Asia-Pacific region are large scale and quite urgent. Therefore, it is important not to put all the effort into developing and collecting data without actually working on the problems. A lot is already known about many of these problems even though the data may be not very well developed. Many countries and officials are quite concerned about the complexity of the SDGs and its many targets and indicators. This chapter tries to help to step aside from this complexity.

This chapter recommends a number of overall directions and broad-focused policies that can used to support a variety of goals simultaneously. To be sure, this chapter does not argue that detailed and focused policies should not be adopted for individual indicators. However, it is important to make sure that this does not preclude the development of broader, more comprehensive and transformative policies, especially ones which may help to promote sustainable development in a more integrated manner.

At the global level, the crucial contribution of the environment to economic prosperity and social wellbeing is increasingly recognised, but it is not necessarily fully understood or accepted yet, especially at the national and local levels. This chapter highlights several key areas where traditional economic development is undermining the environmental basis for human wellbeing, including vulnerability to climate change and its costs; food, energy, and water insecurity; unsustainable production and consumption; and deteriorating health and rising costs from air and other pollution. Moreover, resource scarcity resulting from environmental degradation and unsustainable consumption and production is also generating traditional security concerns.

To move forward, broader and more comprehensive policies are needed to promote low carbon societies, sustainable consumption and production, resilience, biodiversity conservation, and ecosystem services. The energy transformation needed for low carbon development and measures to promote sustainable consumption and production are core policy directions to bring about economic transformation. This will simultaneously promote economic prosperity as well as support the earth's capacity to support human society. In addition, stronger policies are needed to control and prevent pollution of air, water, and soil, especially the sound management of chemicals and waste. This needs to be supported by improved scientific understanding.

Strengthening governance and institutions is also necessary for effective implementation of the SDGs. Basic governmental capacity may be the first priority in many cases. It is also important to use the SDGs to mainstream sustainability into all relevant policy areas and mobilize the support of stakeholders. New institutional arrangements to coordinate an integrated approach to SDGs are probably necessary in many countries. This should be supported by new measures of progress, going beyond GDP. Finally, national tax and budgeting systems should be aligned with sustainable development objectives and SDGs. These broad measures and directions will help to keep the focus on transformation, without needing to set separate policies for each indicator.

Now should be the ideal time for the countries in the Asia-Pacific region to shift to more transformative sustainable development policies. Huge infrastructure investments are expected in the region in the next 2 or 3 decades, and it will be much more cost effective to make sure these investments are made in sustainable infrastructure rather than unsustainable infrastructure. This will enable the countries in the region to leapfrog over the dirty stage of development experienced by the existing developed countries, thereby minimizing the environmental costs associated with traditional development while accelerating the benefits of clean development. Otherwise, the region risks not only suffering from the costs of traditional development, but also of exceeding the planet's

capacity to support human wellbeing.

Acknowledgements

This chapter is a revised and modified version of a chapter published by the authors entitled "Scoring the Sustainable Development Goals: Pathways for Asia and the Pacific" (Akenji et al., 2018). This chapter, in turn, is a substantially revised, updated, and extended version of a paper originally commissioned to the authors at the Institute for Global Environmental Strategies by the United Nations Environment Programme Regional Office for Asia and the Pacific (UNEP/ROAP) as a background document for a science-policy dialogue at the first Forum of Ministers and Environment Authorities of Asia and the Pacific, 19-20 May 2015 in Bangkok, Thailand. This chapter has been published with the permission of UNEP/ ROAP, and it includes material from the commissioned chapter that was submitted by the authors to UNEP/ROAP. Nevertheless, the views expressed in this chapter are those of the authors, and do not represent the views of IGES or UN Environment.

Notes

1The original document can be accessed at: https://sustainabledevelopment.un.org/outcomedocuments/agenda21.

2 The original document can be accessed at: http://www.un.org/millenniumgoals/.

3 This idea is developed at: http://www.stockholmresilience.org/research/planetary-boundaries/planetary-boundaries/about-the-research/the-nine-planetary-boundaries.html.

4 See: https://sustainabledevelopment.un.org/vnrs/.

5 See: https://sustainabledevelopment.un.org/content/documents/15826Bangladesh.pdf.

6 For example, see: http://unfccc.int/adaptation/workstreams/national_adaptation_plans/items/6057.php.

7 For example, see: http://unfccc.int/adaptation/workstreams/national_adaptation_plans/items/6057.php.

8 NDCs are available at: http://unfccc.int/focus/ndc_registry/items/9433.php.

9 The Plan is available at: http://ourenergyplan.sa.gov.au/virtual-power-plant.

10 See: https://asia.nikkei.com/Features/FT-Confidential-Research/Informal-jobs-sector-both-a-blessing-and-curse-in-Southeast-Asia.

11 Available at: https://ppp.worldbank.org/public-private-partnership/library/china-circular-economy-promotion-law.

12 A summary is available at: http://www.china-un.org/eng/chinaandun/economicdevelopment/kj/t1009102.htm.

13 A summary is available at: http://nett21.gec.jp/Ecotowns/data/et_c-02.html.

14 See: http://rprogress.org/sustainability_indicators/genuine_progress_indicator.htm.

15 See: http://hdr.undp.org/en/content/human-development-index-hdi.

16 See: http://measuring-progress.eu/human-wellbeing-index.

References

50by50 and CAI-Asia (2010) 'Improving Vehicle Fuel Economy in the ASEAN Region', *Working Paper 1/10*, July. Available at: http://cleanairinitiative.org/portal/sites/default/files/documents/ASEAN-fueleconomy.pdf (Accessed: 22 June 2018).

ADB (2011) *Toward sustainable municipal organic waste management in South Asia: A guidebook for policy makers and practitioners*. Asian Development Bank. Available at: https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/ppp_testdumb/documents/ADB_sustainable-waste-management-south-asia.pdf (Accessed: 22 June 2018).

Akenji, L. (2012) *Global Outlook on SCP Policies: Asia-Pacific*, *Global Outlook on SCP Policies: taking action together*. Edited by UNEP. United Nations Environment Programme. Available at: https://pub.iges.or.jp/pub/global-outlook-scp-policies-asia-pacific (Accessed: 22 June 2018).

Akenji, L. (2014) 'Consumer scapegoatism and limits to green consumerism', *Journal of Cleaner Production*. Elsevier Ltd, 63, pp. 13–23. doi: 10.1016/j.jclepro.2013.05.022.

Akenji, L. *et al.* (2018) *Scoring the Sustainable Development Goals: Pathways for Asia and the Pacific*. Hayama, Japan: Institute for Global Environmental Strategies Policy Report. Available at: https://pub.iges.or.jp/pub/scoring-sustainable-development-goals-pathways (Accessed: 22 June 2018).

Akenji, L. and Bengtsson, M. (2014) 'Making Sustainable Consumption and Production the Core of Sustainable Development Goals', *Sustainability*, 6(2), pp. 513–529. doi: 10.3390/su6020513.

Asian Co-benefits Partnership (2016a) *Asian Co-benefits Partnership (ACP) White Paper 2016: Putting Co-benefits into Practice -- Case Studies from Asia*.

Asian Co-benefits Partnership (2016b) *Putting Co-benefits into Practice: Case Studies from Asia*, *Asian Co-benefits Partnership White Paper 2016*. Tokyo. Available at: http://ccacoalition.org/en/resources/asian-co-benefits-partnership-white-paper-2016-putting-co-benefits-practice-case-studies (Accessed: 22 June 2018).

Braimoh, A. K. *et al.* (2010) *Climate and Human-Related Drivers of Biodiversity Decline in Southeast Asia*. Yokohama, Japan: United Nations University. Available at: http://archive.unu.edu/climate/files/2010_Climate-and-Human-Related-Drivers-of-Biodiversity-Decli.pdf (Accessed: 22 June 2018).

CAI-Asia (2010) *Air Quality in Asia: Status and Trends 2010 Edition*. Pasig City, Philippines. Available at: http://cleanairinitiative.org/portal/node/3869 (Accessed: 22 June 2018).

Costanza, R. *et al.* (2014) 'Changes in the global value of ecosystem services', *Global Environmental Change - Human and Policy Dimensions*, 26, pp. 152–158. doi: 10.1016/j.gloenvcha.2014.04.002.

DESA (2017) *2017 Voluntary National Reviews: Synthesis Report*. New York: High Level Political Forum on Sustainable Development. Available at: https://sustainabledevelopment.un.org/content/documents/17109Synthesis_Report_VNRs_2017.pdf (Accessed: 22 June 2018).

EASAC (2018) *Negative emission technologies: What role in meeting Paris Agreement targets?* Halle, Germany: European Academies Science Advisory Council. Available at:https://easac.eu/fileadmin/PDF_s/reports_statements/Negative_Carbon/EASAC_Report_on_Negative_Emission_Technologies.pdf (Accessed: 22 June 2018).

EC (no date) 'Progress in Accelerating Clean Energy Innovation 2017'. European Commission. Available at: https://ec.europa.eu/research/energy/pdf/accelerating_clean_energy_innovation_progress_report.pdf (Accessed: 22 June 2018).

Elder, M. (2015) *Air Pollution and Regional Economic Integration in East Asia: Implications and Recommendations*, *Greening Integration in Asia: How Regional Integration Can Benefit People and the Environment*. Edited by IGES. Hayama, Japan: Institute for Global Environmental Strategies. Available at: http://pub.iges.or.jp/modules/envirolib/upload/6054/attach/IGESWhitePaperV2015_C07.pdf (Accessed: 22 June 2018).

Elder, M., Bengtsson, M. and Akenji, L. (2016) 'An Optimistic Analysis of the Means of Implementation for Sustainable Development Goals: Thinking about Goals as Means', *Sustainability*, 8(9), pp. 962–986. doi: 10.3390/su8090962.

Elder, M. and Zusman, E. (2016) 'Strengthening The Linkages Between Air Pollution And The Sustainable Development Goals', *IGES Policy Brief*, July. Available at: http://pub.iges.or.jp/modules/envirolib/view.php?docid=6678 (Accessed: 22 June 2018).

ESCAP (2005) *State of the Environment in Asia and the Pacific 2005: Economic Growth and Sustainability*. Bangkok: United Nations Economic and Social Commission for Asia and the Pacific. Available

at: http://www.unescap.org/resources/state-environment-asia-and-pacific-2005 (Accessed: 22 June 2018).

Gearino, D. (2018) 'California Just Became First State to Mandate Solar Panels on New Homes', *Inside Climate News*, 9 May. Available at: https://insideclimatenews.org/news/09052018/california-solar-panel-mandate-new-homes-energy-standards-efficiency-climate-change-impact (Accessed: 22 June 2018).

Gonçalves, S. (2014) 'The Effects of Participatory Budgeting on Municipal Expenditures and Infant Mortality in Brazil', *World Development*, 53, pp. 94–110. doi: 10.1016/j.worlddev.2013.01.009.

IAEG-SDGs (2014) *A World that Counts: Mobilising the Data Revolution for Sustainable Development*. Available at: http://www.undatarevolution.org/wp-content/uploads/2014/11/A-World-That-Counts.pdf (Accessed: 22 June 2018).

IEA (2016) *Energy Efficiency Market Report 2016*. Paris: International Energy Agency. Available at: http://www.iea.org/eemr16/files/medium-term-energy-efficiency-2016_WEB.PDF (Accessed: 22 June 2018).

IISD (2014) *Indonesia Energy Subsidy Review: A Biannual Survey of Energy Subsidy Policies*. International Institute for Sustainable Development.

IRENA (2017) *Renewable Energy and Jobs: Annual Review 2017*. Abu Dhabi: International Renewable Energy Agency. Available at: file:///C:/Users/elder/Downloads/IRENA_RE_Jobs_Annual_Review_2017.pdf (Accessed: 22 June 2018).

Li, H. *et al.* (2017) 'Sponge city construction in China: A survey of the challenges and opportunities', *Water (Switzerland)*. doi: 10.3390/w9090594.

McLean, D. (2017) 'National and International Indices of Well-being: A Critical Analysis', *Journal of Indiana Academy of Social Sciences*, 17(1), pp. 39–55.

Merrill, L. and Chung, V. (2014) *Financing the Sustainable Development Goals Through Fossil-fuel Subsidy Reform: Opportunities in Southeast Asia, India and China*.

Ministry of Forests and Soil Conservation (2015) *Strategy and Action Plan 2016-2025, Chitwan-Annapurna Landscape, Nepal*. Kathmandu, Nepal: Ministry of Forests and Soil Conservation. Available at: http://d2ouvy59p0dg6k.cloudfront.net/downloads/strategy_and_action_plan_2016_2025__chitwan_annapurna_landscape__nepal.pdf (Accessed: 22 June 2018).

Nilsson, M., Griggs, D. and Visback, M. (2016) 'Map the interactions between Sustainable Development Goa', *Nature*, 534(15), pp. 320–322. doi: 10.1038/534320a.

O'Neill, D. W. *et al.* (2018) 'A good life for all within planetary boundaries', *Nature Sustainability*, 1(2), pp. 88–95. doi: 10.1038/s41893-018-0021-4.

OECD (2007) *Subsidy Reform and Sustainable Development: Political Economy Aspects*. Paris: Organisation for Economic Co-operation and Development. Available at: https://www.oecd-ilibrary.org/environment/subsidy-reform-and-sustainable-development_9789264019379-en (Accessed: 22 June 2018).

OECD (2018) *Making Blended Finance Work for the Sustainable Development Goals*. doi: http://dx.doi.org/10.1787/9789264288768-en.

Orange, R. (2016) 'Waste not want not: Sweden to give tax breaks for repairs', *The Guardian*, 19 September. Available at: https://www.theguardian.com/world/2016/sep/19/waste-not-want-not-sweden-tax-breaks-repairs (Accessed: 22 June 2018).

Prabhakar, S. V. R. K. (ed.) (2014) *Adaptation Decision Making Frameworks and Tools: Employing Multi-criteria Decision Making Tools for Prioritizing Adaptation Actions at Community Level*. Hayama, Japan: Institute for Global Environmental Strategies. Available at: https://pub.iges.or.jp/system/files/publication_documents/pub/researchreport/3883/IGES_Research_Report_Multi-criteria_decision_making_for_Adaptation_2013_Final.pdf (Accessed: 22 June 2018).

Puppim De Oliveira, J. A. *et al.* (2013) 'Promoting win-win situations in climate change mitigation, local environmental quality and development in Asian cities through co-benefits', *Journal of Cleaner Production*, 58, pp. 1–6. doi: 10.1016/j.jclepro.2013.08.011.

Rockström, J. *et al.* (2009) 'Planetary boundaries: Exploring the safe operating space for humanity', *Ecology and Society*, 14(2), pp. 472–475. doi: 10.1038/461472a.

Sachs, J. D. (2015) *The Age of Sustainable Development*. New York: Columbia University Press.

SCBD (2014) *Global Biodiversity Outlook 4*. Montreal: Secretariat of the Convention on Biological Diversity. Available at: https://www.cbd.int/gbo4/ (Accessed: 22 June 2018).

Scheyvens, H. *et al.* (2017) 'Promoting the Landscape Approach in Asia-Pacific Developing Countries: Key Concepts and Ways Forward', *IGES Policy Brief*, May. Available at: https://pub.iges.or.jp/pub/promoting-landscape-approach-asia-pacific (Accessed: 22 June 2018).

Schmidt-Traub, G. (2015) 'Investment Needs to Achieve the Sustainable Development Goals Understanding the Billions and Trillions', *SDSN Working Paper*, Version 2(Sustainable Develpment Solutions Network). Available at: http://www.unsdsn.org/wp-content/uploads/2015/09/151112-SDG-Financing-Needs.pdf.

Sivapuram, P. V. R. K. *et al.* (2015) *Effectiveness of Insurance for Disaster Risk Reduction and Climate Change Adaptation: Challenges and Opportunities*. Hayama, Japan: Institute for Global Environmental Strategies Research Report. Available at: https://pub.iges.or.jp/pub/effectiveness-insurance-disaster-risk (Accessed: 22 June 2018).

Statistics Korea (2012) *Korea's Green Growth Based on OECD Green Growth Indicators*. Daejon, Korea: Statistics Korea. Available at: https://www.oecd.org/greengrowth/Korea's GG report with OECD indicators.pdf (Accessed: 22 June 2018).

Steffen, W. *et al.* (2011) 'The anthropocene: From global change to planetary stewardship', in *Ambio*, pp. 739–761. doi: 10.1007/s13280-011-0185-x.

Steffen, W. *et al.* (2015) 'Planetary Boundaries: Guiding Human Development on a Changing Planet', *Science*, 347(6223), pp. 1259855–1259855. doi: 10.1126/science.1259855.

Tollefson, J. and Gilbert, N. (2012) 'Earth Summit: Rio Report Card', *Nature*, 486(7401), pp. 20–23. doi: 10.1038/486020a.

Tsydenova, O. and Bengtsson, M. (2011) 'Chemical Hazards Associated With Treatment Of Waste Electrical And Electronic Equipment', *Waste Management*, 31(1), pp. 45–48. Available at: https://www.sciencedirect.com/science/article/pii/S0956053X10004393 (Accessed: 22 June 2018).

UN-Habitat (2010) *Solid Waste Management in the Worl's Cities*. United Nations Human Settlements Programme.

UNEP (2011) *Resource Efficiency: Economics and Outlook for Asia and the Pacific*. United Nations Environment Programme. Available at: https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=301&menu=35 (Accessed: 22 June 2018).

UNEP (2012a) *Capacity Building and Policy Needs Assessment for Sustainable Consumption and Production: A Technical Report to the SWITCH-Asia Regional Policy Support Component*. Nairobi, Kenya: United Nations Environment Programme. Available at: http://www.switch-asia.eu/fileadmin/user_upload/RPSC/policy-assessment/Needs-Analysis-Final-report.pdf (Accessed: 22 June 2018).

UNEP (2012b) *GEO5 GLobal Environmental Outlook*. Nairobi, Kenya: United Nations Environment Programme and the International Institute for Sustainable Development. Available at: http://web.unep.org/geo/assessments/global-assessments/global-environment-outlook-5 (Accessed: 22 June 2018).

UNEP (2016) *Global Environment Outlook GEO-6: Regional Assessment for Asia and the Pacific*. Nairobi, Kenya: United Nations Environment Programme. Available at:

https://uneplive.unep.org/media/docs/assessments/GEO_ASSESSMENT_REPORT_ASIA_Wam.pdf (Accessed: 22 June 2018).

UNRISD (2016) *Policy Innovations for Transformative Change: Implementing the 2030 Agenda for Sustainable Development*. Geneva, Switzerland: United Nations Research Institute for Social Development. Available at: http://www.unrisd.org/UNRISD/website/document.nsf/(httpPublications)/92AF5072673F924DC125804C0044F396?OpenDocument (Accessed: 22 June 2018).

Van Vuuren, D. P. *et al.* (2018) 'Alternative pathways to the 1.5 °c target reduce the need for negative emission technologies', *Nature Climate Change*, 8(5), pp. 391–397. doi: 10.1038/s41558-018-0119-8.

WHO (2014) 'Burden of disease from Household Air Pollution for 2012', 35(February), p. 17. doi: 10.1016/S0140-6736(12)61766-8.Smith.

World Bank (2010) *Environmental Valuation and Greening the National Accounts: Challenges and Initial Practical Steps*. Washington, D.C.: World Bank. Available at: http://siteresources.worldbank.org/EXTEEI/Resources/GreeningNationalAccountsDec19.pdf (Accessed: 22 June 2018).

Zhou, X. and Moinuddin, M. (2016) *Review of the SDG Index and Dashboards: An example of Japan's global ranking results*. Hayama: Institute for Global Environmental Strategies. Available at: https://pub.iges.or.jp/pub/review-sdg-index-and-dashboards-example-japan (Accessed: 22 June 2018).

Zhou, X. and Moinuddin, M. (eds) (2017) *Sustainable Development Goals Interlinkages and Network Analysis: A Practical Tool for SDG Integration and Policy Coherence*. Hayama, Japan: Institute for Global Environmental Strategies. Available at: https://pub.iges.or.jp/pub/sustainable-development-goals-interlinkages (Accessed: 22 June 2018).

Chapter 3

Raising the Level of Ambition of National Governments in Implementing the SDGs

Mark Elder and Peter King

Chapter 3

Raising the Level of Ambition of National Governments in Implementing the SDGs

Mark Elder and Peter King

Main messages

- Many are sceptical about the ability and willingness of national governments to take very ambitious actions to implement the SDGs, much less to achieve their transformative potential.
- However, the current emphasis on voluntary approaches also may not be sufficient to achieve the transformative potential of the SDGs.
- Therefore, national governments can and should raise their level of ambition and take stronger actions to implement the SDGs.
- National governments have unique, powerful tools including taxation and spending, allocation and enforcement of property rights, regulation and its enforcement, and coercive dispute settlement, but are often reluctant to use them to promote sustainable development. These tools should be harnessed to promote SDGs.
- Overall, governments need to set mandatory requirements and specify clear directions for implementing the SDGs, not just "enabling" those who are already persuaded to take action.
- Developing a new "progress" scorecard to replace GDP needs leadership from national governments to institutionalize it into national statistical agencies and throughout all government departments.
- Governments also need to mainstream sustainability and environmental considerations in other policies, including government budgets.

1. INTRODUCTION

This chapter argues that national governments can and should play a much stronger role in implementing SDGs and achieving their transformative potential, particularly with respect to their environmental foundations. National governments can and should raise

their level of ambition and take stronger actions. Many agree that governments should provide more "enabling" environments. This chapter argues that this should include more regulatory approaches as well as institutional frameworks to mainstream and prioritize sustainability criteria into an integrated policy framework. This goes beyond the more traditional means of implementation (e.g. finance and technology) that are still expected from national governments.

Recently, attention has focused away from national governments, and towards voluntary approaches to be taken by other actors and stakeholders, especially the private sector, local governments, NGOs, and ordinary citizens at the grass roots. Multi-stakeholder participation is a key current emphasis of groups promoting SDG implementation. Of course, multi-stakeholder participation is certainly very important, but it shifts attention away from national governments, and much of this discussion is not very specific about how national governments should promote it.

Many are sceptical about the ability and willingness of national governments to take very ambitious actions to implement the SDGs, much less to achieve their transformative potential. The SDGs themselves are voluntary and provide few concrete means of implementation. The High Level Political Forum (HLPF) review process is also not very strong or demanding. Much research has argued that the capabilities of national governments have been eroded by globalization, technology, and other factors for about a half-century (Loughlin, 2017). Extreme inequality with the rise of the one percent (Piketty, 2014; Oxfam, 2016), new social media technology, and various factors fostering political instability, are said to have further weakened national governments in recent years. In terms of willingness, of course, all governments claim to be willing – all governments agreed to the SDGs and their predecessors such as Agenda 21 and the Johannesburg Plan of Implementation (JPOI). However, during the negotiations, many national governments pushed for weaker text, and it was a variety of non-governmental stakeholders who pushed the national governments to be more ambitious (Dodds, Donoghue and Leiva-Roesch, 2016). Thus, the current global emphasis on promoting multi-stakeholder participation in SDG implementation through voluntary actions is at least partly due to doubts about national governments' ability and willingness to act.

However, this chapter argues that national governments also need encouragement to be more ambitious, and it would be a mistake to give up on them or let them off the hook. Ever since Agenda 21, or even earlier, no national government wants to be perceived as arguing against sustainable development. The SDGs were developed and agreed by national governments, which will also oversee the monitoring of the progress of their implementation through the HLPF and its procedures, which they created. All the key means of implementation are in the hands of national governments, particularly financing, regulation, and formulating national plans coordinating a range of stakeholders.

National governments have unique and powerful tools. These tools include taxation and spending, allocation and enforcement of property rights, coercive dispute settlement (through courts), and regulation, with accompanying enforcement mechanisms. The problem is that in many cases, these tools simply are not being used, are not being used

effectively, or they are being used to support unsustainable development rather than sustainable development. Sovereignty still resides in nation-states under the current global (international) governance system, which means that only nation-states have these powers. Therefore, developing countries also have these powers in principle, although they may not be as well-established as they are in developed countries.

The rest of this chapter is organized as follows. Section 2 discusses common existing recommendations to national governments on SDG implementation. Section 3 makes the case that national governments have strong tools and resources to implement SDGs. Section 4 surveys the status of national actions to implement the SDGs. Section 5 makes broad recommendations for national governments, and the last section concludes.

2. COMMON BUT INADEQUATE RECOMMENDATIONS FOR NATIONAL GOVERNMENTS

Many recommendations to national governments on SDG implementation are often quite vague. A common theme is that governments should provide "enabling conditions" to help other actors, as if that is their only role, and there is less emphasis on what government itself can do. What kind of "enabling conditions" is often not spelled out concretely, but recommendations commonly focus on providing positive incentives and assistance for voluntary initiatives, rather than regulation, compliance and enforcement, or other strong measures that are mainly the preserve of national governments.

Positive encouragement in the form of financing and budget allocations are generally welcomed. However, most recommendations typically avoid calling directly for large amounts of spending or mandatory revenue generation mechanisms such as increased taxes (or even borrowing) which would be required to support the large spending increases needed for the SDGs. Instead, the emphasis is typically on "innovative" financing, which relies more on soliciting voluntary funding from the private sector.

Multi-stakeholder governance is a common overarching concept for many existing recommendations. The importance of facilitating participation of various stakeholders and coordination between different levels of governance has been clearly demonstrated by existing research. It is very important to make sure that policies fairly meet the concerns of different groups and secure their support and acceptance to facilitate effective implementation. A multi-stakeholder approach is clearly needed to effectively coordinate complex interlinked policy issues such as SDGs.

However, one unintended effect of the emphasis on the multi-stakeholder approach is that it tends to draw attention away from considering stronger, more ambitious policies by national governments that may be more transformative. This is because much of the attention is focused on persuading governments to use a multi-stakeholder approach and ways to effectively organize multi-stakeholder participation. The stronger and more transformative policies discussed in this chapter should, of course, be subject to these

multi-stakeholder processes to generate support and facilitate their implementation. Multi-stakeholder governance should not, however, be at the expense of strong, effective national and local governments. Moreover, the effectiveness of the multi-stakeholder approach itself will be enhanced by stronger national and local governments.

3. ENDURING CAPABILITIES OF NATIONAL GOVERNMENTS

The hypothesis of the decline of the nation state has been discussed since the latest wave of globalization began in the 1960s, and the discussion has further advanced in recent years as nation-states' powers have continued to erode due to social media, other technological advances, populism, and other factors. Declarations of the end of the nation state have been matched by corresponding articles about "bringing the state back in" (Milner and Keohane 1996; Schmidt 2009; Jessop 2001; Cammack 1989).

From the standpoint of many proponents of sustainable development, national governments have not been able to deliver, despite multiple attempts. Many problems of sustainable development, particularly the environmental aspects, seem to be worsening (Millennium Ecosystem Assessment, 2005; Tollefson and Gilbert, 2012; IPCC, 2014), and humanity is on the verge of crossing the "planetary boundaries" of the safe operating space for humanity (Rockström et al., 2009; Rockström and Klum, 2015; Steffen et al., 2015) more than forty years after the Stockholm conference, and more than 20 years after governments recognized the importance of climate change. To many observers, national governments appear to be unable or unwilling to adequately address these issues.

However, the failure of governments to adequately address these issues is not necessarily due to insufficient capacity to address them, but it may be more related to insufficient motivation. The many global conferences to address sustainable development have been organized by governments, and their outcomes have been determined by governments. Sustainable development advocates were successful in persuading governments to hold the meetings, but they did not persuade governments to take strong actions. In other words, the governments apparently decided not to deliver.

This chapter argues that for national governments of many countries, basic overall capacity already exists. In the current international system, sovereignty resides in national governments. Therefore, in principle, only they have the authority (recognized by other countries) to raise revenue through taxes, issue laws and regulations enforced through courts and police, and maintain military forces for defence. Partial delegation of some of these powers to sub-national governments or outsourcing to private actors is common. And in practice, there are often various political and other constraints on the use of these powers. Nevertheless, these basic means of implementation are available to governments, should they choose to use them.

Money should not be the main constraint. Most governments have very large potential financial resources. The 5 largest Asian countries (Japan, China, Korea, India, and

Indonesia) account for about 28 percent of global GDP as shown by Table 3-1. Taxes as a share of GDP among East Asian countries are highest in Japan, at 34 percent. In general, the larger and generally wealthier countries, as well as the least developed countries have higher tax ratios, above 20 percent compared to many middle-income countries, which are significantly lower. Therefore, it seems that most countries have room to raise taxes. A one percent increase in taxes' share of GDP could raise USD 2 to 4 billion in several ASEAN countries (Malaysia, Philippines, Singapore, Thailand, and Vietnam).

Table 3-1: GDP and Taxes of Selected Asian Countries

	GDP 2018 (billion USD)	Per capita GDP (USD)	Taxes as a share of GDP (%)	Value of 1% of GDP (billion USD)
World	79,600	16,800	28.4	796.0
Japan	4,900	42,700	34.30	48.8
China	11,940	16,600	22.40	119.4
Korea	2,027	39,400	23.00	20.3
India	2,439	7,200	10.20	24.4
Indonesia	1,011	12,400	12.90	10.1
Malaysia	310	28,900	16.50	3.1
Philippines	321	8,200	13.90	3.2
Singapore	306	90,500	17.50	3.1
Thailand	438	17,800	18.20	4.3
Brunei	NA	76,700	NA	NA
Cambodia	22	4,000	19.20	0.22
Laos	17	7,400	18.30	0.17
Myanmar	NA	NA	NA	NA
Vietnam	216	6,900	22.90	2.2

Source: (CIA, 2018a)

The Addis Ababa Action Agenda (AAAA) emphasized the importance of mobilization of domestic revenue for sustainable development (United Nations, 2015). It is encouraging that a number of international cooperation initiatives have been organized to increase countries' capacities to mobilize domestic revenue and strengthen enforcement of tax collection, although it is too early to assess their progress (Lebada, 2017).

Also, government finances often can be readily augmented by borrowing. Of course, this may be quite difficult for Japan, where government debt is nearly double GDP. However, several East Asian middle-income countries have debt to GDP ratios of 50 percent or less, so they have considerable room to increase borrowing, if necessary, as can be seen from Table 3-2.

Table 3-2: Ratio of Government Debt to GDP for Selected Countries

Country	Government debt to GDP (%)
Japan	193.1
China	34.6
Malaysia	52.6
Philippines	26.5
Singapore	28.1
Thailand	30.2

Source: (CIA, 2018b)

The market economy itself is not free from government intervention, but rather is highly dependent on wide range of strong rules and regulations, many of which are enforced by the courts (Blair, 1995; Vogel, 2018). These include property rights; monetary systems, including the provision of money and establishment of financial service providers; the legal structure of businesses, particularly corporations, including their decision making structures and reporting requirements; labour relations and contracts; the financial system, including market structures such as stock and bond markets, and direct lending as well as the certification, rights, and responsibilities of market participants; and finally, the construction and use of public infrastructure such as electricity, water, sewers, telecommunications frequencies, roads, railways, and airports. All these areas depend on a large, complex foundation of regulations built up over many decades. Similarly, in the case of international trade, most countries can support at least a minimal customs and immigration regulatory infrastructure to enforce tariffs (which are usually very complex) and perform customs and immigration inspections. US President Donald Trump's unilateral protectionist policies and efforts to renegotiate NAFTA (while threatening to withdraw from it) illustrate the potential of a powerful nation-state to endanger the complex global trade networks and liberal trade regime built up over the past few decades.

Thus, it is clearly not the case that national governments in general have lost their ability to create and enforce regulations, particularly those which are necessary to the basic functioning of markets. Of course, the nature and degree of enforcement varies considerably between and within countries and sectors. Each area may have different monitoring and enforcement costs. And there are some examples of countries which lack basic administrative capacity, and even "failed states". Nevertheless, in most cases, even in developing countries, a certain minimal functionality, such as a certain level of property rights, is achieved so that markets can provide their basic functions.

For example, in China, national environmental policies and regulation have steadily strengthened over past two decades, following the country's rapid economic growth (Zhou and Elder, 2013; Lin and Elder, 2014a). It has not been sufficient to solve all of China's environmental problems and many questions have been raised about the implementation, but the policies and regulations themselves have clearly become

stronger. The place of the environment in China's administrative hierarchy has also steadily risen over the years. It started out as the State Environmental Protection Administration (SEPA) in 1988 (following the US example of using the lower ranking designation of "Agency" instead of "Department"). SEPA was upgraded to a ministry, the Ministry of Environmental Protection (MEP), in 2008. In 2018, its name was changed to the Ministry of Ecology and Environment (MEE), and its powers were considerably strengthened, as it assumed jurisdiction over climate policy, which was formerly under the National Development and Reform Commission (NDRC). Jurisdiction regarding various other policy areas such as water, agricultural pollution, and marine conservation were also transferred to MEE from various other ministries (Ewing, 2018). Staff numbers increased from 300 to 500 and MEE has been given a broader remit with functions including: climate change and emissions reduction policies; environmental monitoring; air/water/soil pollution; ecological/marine conservation; nuclear safety and radiation safety, amongst others.

4. CURRENT STATUS OF NATIONAL ACTIONS TO IMPLEMENT THE SDGS

It is not easy to evaluate countries on their progress after only two years since the adoption of the SDGs. The SDGs are wide-ranging and highly complex, and the development of implementation structures may take some time (O'Connor et al., 2016).

Nevertheless, many countries established implementation structures fairly quickly, and they enthusiastically began to implement the SDGs, according to several early reports on SDG implementation. The Department of Economic and Social Affairs of the UN Division for Sustainable Development (DESA) has prepared two assessment reports of the Voluntary National Reviews (VNRs) presented at the High Level Political Forum (HLPF); one in 2016, the first year after the adoption of the SDGs, and the other in 2017 (DESA, 2016, 2017).

HLPF 2016 was the first since the adoption of the SDGs in 2015, and 22 countries bravely volunteered to present their progress despite the very short time to begin implementation. In 2017, 43 countries presented their voluntary reviews.

The DESA reports show that many countries have been making concrete efforts. The 2016 report indicated that all countries which reported made progress on establishing or strengthening institutional structures for implementation, in many cases linking the SDGs to existing national plans. Many countries addressed challenges as well as progress, and they commented on interlinkages among goals. In the 2017 VNRs (DESA, 2017), two-thirds of countries only addressed a selected number of SDGs. Still, most of the discussion of the countries' reporting on specific SDGs in the report's executive summary indicates that countries mainly focused on highlighting the importance of specific issues and "challenges", while discussion of detailed implementation measures was modest.

Some of the environment-related actions summarized in DESA's 2017 report are listed in Table 3-3. Overall, it shows that some countries are starting to take concrete actions and incorporating SDGs into their plans and policies. Still, there is no analysis of the scale, ambitiousness, or effectiveness of these actions, or what resources have been allocated to them. The report does not highlight any specific examples as standing out for making a significant difference.

Table 3-3: Summary of Potentially Environment-related Actions in 2017 VNRs

SDG	Potentially Environment-related Actions
2	• "Legal and policy frameworks … to ensure the right to food as well as initiatives aimed at ending hunger and food security" • "National plans and policies on food security" • "Food security programmes for society's most vulnerable groups" • "Initiatives to ensure sustainable food production systems"
3	• "Various targeted initiatives being implemented"
7	• "Measures taken such as diversifying energy sources, developing renewable energy sources, improving energy efficiency, awareness-raising… connecting more households to the energy grid"
8	• "Policy approaches … included measures to ensure decent work, the promotion of corporate social responsibility, the establishment of minimum wages, … actions … to assist youth… and improve access to finance for small and medium sized enterprises…"
9	• "Initiatives to improve transportation infrastructure… strengthening of national capabilities in science and innovation"
10	• "Social protection policies and social security systems"
11	• "Policies for providing adequate housing" • "Policies on enhanced public transport, incentivizing cycling and walking, and investments in rail transport"
12	• "Policies on sustainable or green public procurement, green taxation and incentives, sustainability reporting, recycling schemes, reduction of food waste, and corporate responsibility"
13	• "Several policies and actions for both climate mitigation and adaptation were reported on". • "Countries highlighted examples of ecosystem-based adaptation and carbon sinks, carbon-pricing, cross-border cooperation on disaster reduction, flood management and weather forecasting".
14	• Integrated coastal management • Application of an ecosystem approach • Establishment of marine protected areas
15	• Integration and mainstreaming of ecosystem and biodiversity conservation into sectoral plans • Sustainable forest management • Policies to tackle poaching and trafficking of endangered species and derived products

Source: (DESA, 2017)

Outside of the discussion of specific SDGs, the report's general discussion focuses on the themes of leaving no one behind, monitoring and data, assessing interlinkages and trade-offs, and implementation mechanisms, particularly for coordination and multi-stakeholder

engagement. Discussion of "SDGs in national development plans, strategies, and budgets" focuses mainly on procedural initiatives to integrate SDGs into national plans and processes, which is certainly important, although it is not clear yet to what extent SDGs will make a difference in terms of motivating additional action and resource allocation, or whether the SDGs will be mainly an exercise in relabelling existing policies and plans. The section on means of implementation focused mainly on efforts and challenges, and it did not report any substantial capacity strengthening or large increases in financing.

On the other hand, the SDG Index and Dashboards Report 2017, which assesses countries' current progress, shows that few countries are doing well on the SDGs, especially on SDGs 11-15[1] which have significant environmental content (Sachs et al., 2017). Of course, the SDGs are still in the beginning stages, so this mainly indicates the starting baseline. Nevertheless, it clearly indicates a considerable gap between the current situation and achievement of the SDGs, and that even developed countries will need to make considerable efforts. Moreover, others have argued that the SDG Index and Dashboards does not sufficiently reflect sustainability considerations, and is still correlated with a high material footprint (Wackernagel, Hanscom and Lin, 2017).

5. TRANSFORMATION-ORIENTED RECOMMENDATIONS TO RAISE THE LEVEL OF AMBITION

This section outlines several categories of transformation-oriented recommendations for national governments to help raise their level of ambition. The first is regulation—a traditional "means of implementation" for domestic economic and development policies in the post-World War II era before sustainability issues came onto the agenda from the 1970s; its popularity started declining with the Reagan and Thatcher political revolutions of the 1980s. Second is the more traditional means of implementation of budgeting and financing. It is argued here that governments have considerable underappreciated ability to generate additional financing through taxes, or through budget reallocation. Third is the establishment of a new "progress" scorecard to replace GDP. The importance of this point has been understood by many, although most discussions do not clearly articulate who is responsible for changing the scorecard, and certainly most governments have not been persuaded. This chapter argues that national governments need to take the lead in changing the scorecard, and that it will take considerable effort and resources to do so. Finally, this section highlights the need for national governments to mainstream sustainability and environmental considerations in other policies. International cooperation and "peer pressure" also have important roles to play.

5.1 Regulation

5.1.1 Advantages of Regulation

Most discussions of policy recommendations related to sustainability focus on easier voluntary approaches, avoiding more difficult discussions about regulatory approaches.

Voluntary efforts are certainly appreciated, but they are not likely to be sufficient to achieve sustainability, and stronger measures are likely to be needed. If recommended voluntary measures are so good for everyone, then why not require them? For example, if it is technologically feasible to produce fuel-efficient cars, then why are cars with lower fuel efficiency still allowed? Shouldn't we raise (or establish?) minimum fuel efficiency standards, and prohibit the sale of cars which are below the minimum and phase out older cars that no longer meet the standards? Should we rely on persuading on consumers to voluntarily buy products with certified ecolabels? Why not simply require all products in key categories with known environmental consequences to acquire ecolabel certification, for example copy paper or timber products (Forest Stewardship Council)[2], fish, or palm oil (Roundtable on Sustainable Palm Oil)[3]?

Table 3-4: Select Environment-Related References in the SDGs

SDG/Target	Selected Environment-related References
1.5.	"Build the resilience of the poor … and reduce their exposure…to…environmental shocks and disasters"
2.4.	"Ensure sustainable food production systems … that help maintain ecosystems… and that progressively improve land and soil quality"
3.9.	"Substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination"
6.1.	"Universal and equitable access to safe … drinking water"
6.2.	"Sanitation and hygiene for all"
6.3.	"Improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally"
6.6.	"Protect and restore water-related ecosystems"
7.2.	Share of renewable energy
7.3.	Energy efficiency improvement
8.4.	"Decouple economic growth from environmental degradation"
9.2.	"Inclusive and sustainable industrialization"
9.4.	Upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes…"
11.1.	Access to "safe housing"
11.2.	Sustainable transport systems
11.3.	Sustainable urbanization
11.6.	"Reduce the adverse per capita environmental impact of cities…paying special attention to air quality and municipal and other waste management"
SDG 12	All targets
SDG 13	All targets (plus the Paris Agreement targets)
SDG 14	All targets, especially 14.1., "prevent and significantly reduce marine pollution of all kinds"
SDG 15	All targets

A broad range of environment-related SDG targets require some sort of comprehensive regulation, particularly comprehensive emissions and ambient standards for pollutants (air, land, water). A selected – though long – list of environment-related SDGs and targets is listed in Table 3-4. These targets are all very ambitious: the poor should be resilient against environmental shocks and disasters, death and illness from pollution should be substantially reduced, drinking water should be safe, water quality should be improved by reducing pollution, water and land -related ecosystems should be protected and restored, housing should be safe, and transportation should be sustainable. Regarding the economy, it should be "decoupled" from environmental degradation, industrialization should be sustainable, and infrastructure and industries should be "upgraded" and "retrofitted" to "make them sustainable", and production and consumption should be made sustainable. It is difficult to see how most of these could be accomplished without stronger regulation. Some, such as the promotion of renewable energy, energy efficiency, sustainable transport, etc. certainly need cooperation and some investment from the private sector, but the process could be significantly accelerated through regulatory measures rather than simply relying on market forces and existing regulatory frameworks.

For pollution-related targets, the basics of pollution emission controls and ambient standards are well known. Developed countries already have regulatory frameworks, although there is plenty of room to expand them and strengthen their enforcement to match the broad and ambitious scope of the SDGs. For some developing countries, particularly those with insufficient capacity, it may be more difficult, but many developing countries have already made substantial progress in establishing legal and regulatory frameworks, if not necessarily robust enforcement. Building regulatory and enforcement capacity should be priority.

The regulatory standards should be the indicators of progress in these areas, and the regulatory support and enforcement should serve to accelerate progress. Thus, quantitative indicators are readily available. Of course, there are many pollutants to regulate, so it would not be possible to have just 1 or 2 "representative" indicators for the pollution related targets. However, the regulation for a specific pollutant would apply to a broad range of pollution-related targets, so there would be some efficiency related to the interlinkages. For example, indicators based on regulations for a range of specific air pollutants would be applicable to all the pollution-related targets. Environmental quality indices that combine several indicators, such as the air quality index, are another way of efficiently monitoring progress towards goals and targets.

A "back to basics" approach should be prioritised in the case of countries with inadequate basic pollution regulations and/or enforcement. Subsequently, more advanced regulations could be considered to promote sustainable production and consumption systems; sustainable industrialization, infrastructure, and transport; renewable energy, etc.

At least the threat of stronger regulation is often needed to persuade companies to agree on and implement voluntary measures. For example, in Japan, industries responsible for emissions of Volatile Organic Compounds (VOCs) agreed to implement voluntary reduction in order to head off potential mandatory regulations (Matsumoto, Elder and

Ogihara, 2015). Similarly, control of ozone depleting substances, responsible for the hole in the ozone layer above the poles, could be addressed voluntarily, as companies had an alternative refrigerant chemical available (although it subsequently turned out to be a significant greenhouse gas) (World Bank Group, 1998).

One underappreciated advantage of regulation is that it can reduce the government's direct financial cost of supporting SDGs and sustainable development. Regulations shift the up-front costs to businesses and consumers, and they may be reflected in some combination of higher prices for consumers or reduced profits for businesses, so the overall costs are more spread out, and the direct cost to the government is mainly for enforcement, predominantly personnel costs. In contrast, fiscal measures to achieve the same outcomes such as increased taxes and/or subsidies may have a much larger direct impact on the budget.

5.1.2 Enforcement

The potential disadvantage of regulation is the difficulty in compliance and enforcement. Certainly, the enforcement of existing environment regulations is regarded as weak in most countries, and many studies have observed weak enforcement in many other policy areas. It is also commonly believed that enforcement is further weakened by globalization, which could enable a "race to the bottom" where companies would move production of pollution-intensive goods to countries with weaker environmental regulations and enforcement, although empirical studies have had difficulties demonstrating how much this happens in practice (Konisky, 2007).

However, a more careful examination of how regulation works in practice shows that there are still plenty of examples where regulation can be enforced. Therefore, this chapter argues that there are several ways to strengthen the implementation of regulations, and they can still play an important role.

In practice, the major obstacles to government in their ability to implement regulations include difficulties in gaining information (imperfect information and/or information asymmetries) and insufficient trained personnel and equipment for enforcement. The first problem may be made easier by new technological developments such as drones or satellite surveillance. The second problem is mainly an issue of political motivation, often presented as a budgetary issue, but which may be related to a broader problem involving the widespread perception of a trade-off between the environment and development. Generally, environmental protection is only 1-2 percent of GDP, but obtaining increased budgets is a constant battle of environmental agencies (Pizer and Kopp, 2003). In other words, in many countries, political leaders are still reluctant to prioritize enforcement of environmental regulations or provide sufficient resources. It is not the case that there are not enough resources for enforcement, or that the social and economic constraints to enforcement are inherently too difficult to overcome.

In the past, environmental monitoring was not easy, as equipment was bulky and expensive, and it was not easy to gain access to polluting facilities. Now, monitoring equipment and technology is much more powerful, transportable, and less expensive.

Generally, companies are required to self-report if accidental discharges (or discharges in excess of permits) occur, allowing governments to focus on ambient environmental monitoring and surprise inspections (UK Department for Environment Food and Rural Affairs, 2013). Citizen measurements can augment official measurements by governments. Air pollution monitors have dramatically decreased in size, to the point that they are now small enough to be wearable by individual people. This will enable much more detailed monitoring of a much wider range of areas (Handwerk, 2015). Information can be rapidly shared on social media. Air pollution monitoring and public dissemination of the data by the US embassy in Beijing played a role in strengthening China's air pollution policies and enforcement (Lin and Elder, 2014b). Earth observation technologies are making it much easier to measure environmental changes including deforestation, land degradation, air pollution, etc. (Chuvieco, 2008; Tomás and Li, 2017; Mathieu and Aubrecht, 2018). A major environmental group, the Environmental Defense Fund, is planning to launch its own satellite to measure the sources of methane emissions, particularly from oil and gas operations (Mufson, 2018).

Certainly, sometimes governments have resisted stronger environmental regulations, and enforcement of existing regulations has been problematic. However, this is not due to any inherent inability of governments to enact or enforce regulations.

Looking at regulations in a range of other areas, not related to the environment and sustainability, clearly there are many regulations around the world, some enforced better than others. For example, there are many laws and regulations related to property rights, such as who owns the underground mineral rights. Most countries have regulations regarding the establishment of companies, and publicly traded companies usually need to follow additional laws and regulations such as governance structures, accounting standards, reporting requirements, etc. Regulations sometimes make environmental management more difficult. For example, there are many regulations which place limits on disclosure of the contents of fracking fluids, which effectively prevent the public from knowing their full contents (Horwitt, 2017). Other laws work to shield companies from legal liability and make it difficult to prove environmental damages.

Of course, enforceability of regulations varies according to a range of conditions and some kinds of regulations are more enforceable than others, particularly depending on how much monitoring is needed, difficulty of monitoring, labour intensity of enforcement actions, and the complexity of court or administrative procedures. In some cases, these constraints may be technical. But in many cases, degree of enforceability is a political choice made at the regulation design phase, depending on how well they are intended to be enforced. Regulations can be designed to be easy or difficult to enforce. For example, a regulation that prevents companies from being forced to disclose the contents of fracking fluids is technically easy to enforce: fracking companies simply avoid disclosing. Monitoring emissions of pollution from factories is more difficult, especially if companies are permitted to report voluntarily with minimal monitoring and receive advance notice of "surprise" inspections. Policymakers also decide how much human and budgetary resources to devote to enforcement.

The issue is not that it is inherently difficult for regulations to be adopted or enforced. Rather, the issue of whether there is enough political motivation or a strong enough political coalition to design more technically enforceable regulations and devote the necessary financial and human resources to enforce them. One important recent example is the diesel emissions scandal, in which several automobile manufacturers rigged their engines to emit less pollution when undergoing pollution testing, but turned off the emission controls under normal driving conditions (Hotten, 2015a). The cheating was technically detectable, as it was eventually detected by a small independent group at the University of West Virginia using a small budget of only USD 70,000 (Ewing 2016). The fact that it was not detected earlier was due to insufficient resources devoted to testing by governments. Moreover, in the EU, there was a question about whether the cheating was actually illegal, since the text of the regulation was written in weak manner which could be interpreted to allow the kind of cheating that occurred (Stefanini, 2015a). Clearly, it is not inherently difficult to write enforceable regulations and enforce them. The issue is whether the government chooses to write and enforce regulations, and what are the determinants of the process to decide these points.

5.1.3 Costs

Regarding enforcement costs, in the overall context of national budgets, direct costs for enforcement of environmental and other regulations is simply not very large compared to other budget items such as military, pensions, health care, education, transportation infrastructure, etc. Mainly these are personnel costs. Cost benefit analysis of environmental regulations normally shows large benefits and low costs. For example, hiring just 100 new regulators in a specific area could make a big difference in enforcement. If they are paid an average of USD 30,000 per year, the cost would be USD 3 million, or in a more developed country, possibly USD 70,000 per year, the cost would be USD 7 million.

Hiring more regulators can be rethought as a source of green jobs; moreover, it is a way for government to quickly increase jobs. Ordinarily, creating a job requires substantial capital investment in addition to the salary cost, for example in the case of constructing a road or building. However, the additional investment needed for environmental regulators is much smaller, just a computer, office space, and maybe a car or some monitoring equipment. Mainly the opposition to hiring more regulators comes from regulated industries which want to make it easier to evade regulations.

5.1.4 Economic Competitiveness

Thus, the main overall obstacle to stronger enforcement of environmental regulations is the persistence of the belief among policymakers that stronger environmental regulations and enforcement will somehow undermine the economy. This, in turn, enables polluting industries to persuade political decision makers to avoid strong enforcement of environmental regulations and "cut the red tape".

There is a vast literature explaining how a clean environment is the foundation of the economy, prosperity, and health (Millennium Ecosystem Assessment, 2005; TEEB, 2010;

UNEP, 2011; OECD, 2017; Landrigan et al., 2018), and how environmental protection helps economic competitiveness (Porter and van der Linde. Claas, 1995). This chapter will not comprehensively review this literature but will highlight one prominent industry case: automobiles.

Stronger environmental regulation has been the key to competitiveness in the auto industry since the beginning of environmental regulation of automobiles in the 1970s. This case also illustrates that many automobile companies have miscalculated their own self-interest, in some cases needing to be rescued by their national governments. The story begins with the first automobile emissions regulations in the US. At that time, Japan was trying to help its auto industry compete globally and enter the US market, so it adopted similar regulations. After the US auto industry successfully convinced the US government to delay the implementation of these regulations, the Japanese auto producers similarly asked the Japanese government to delay implementation of its regulations too. The Japanese government refused to delay the regulations. Therefore, when the US regulations finally came into effect, the US producers were not ready, which provided the Japanese auto companies their golden opportunity to finally break into the US market. In both countries, the auto companies badly miscalculated their self-interest (Pharr and Badaracco, 1986; Sagara, 2013). In retrospect, the US auto companies would have been better off if the implementation of the regulations had been accelerated instead of delayed, keeping the Japanese producers out longer, and making them work harder to catch up.

Likewise, German auto producers made a wrong strategic decision to focus on dead end highly polluting diesel technology, while persuading European policymakers to adopt a lax regulatory enforcement policy which allowed the auto producers to cheat on emissions testing (Stefanini, 2015b). The cheating was caught due to the increased ease of testing by independent groups (Ewing 2016). The result was tens of billions of US dollars in economic losses, which placed Volkswagen's future existence at risk (Hotten, 2015b). This episode significantly increased European air pollution, incurring significant costs related to illnesses and premature deaths (Jonson et al., 2017). Belatedly, Volkswagen shifted direction and now plans large investments in more environmentally friendly electric vehicles (McGee, 2016). Although some were sceptical about the seriousness of this strategy (Amelang, 2017), recently, VW has announced its ambition to "leapfrog" Tesla (McGee, 2017). This is another case in which the companies involved badly misjudged their own economic interest, and mistakenly chose a high polluting strategy over a lower polluting strategy. In this case, clearly there was no technical barrier to regulation and enforcement. Rather, the political decision makers deliberately created a lax enforcement regime to accommodate the companies' flawed, short-sighted perspective instead of guiding the companies in a more economically and environmentally viable direction, unnecessarily jeopardizing the health and prosperity of their constituents.

In contrast, several countries have announced target dates to stop sales of all fossil fuel vehicles including Norway, India, France, and the UK (Galeon, 2017). Following these announcements, in September 2017, China announced that it was also considering following the same approach (Deng, 2017). Even in Germany, in the wake of the diesel

emissions cheating scandal, the Bundesrat passed a resolution calling for the EU to allow only zero-emission vehicles after 2030 (Schmidt, 2016). One quantitative study observed that many developing countries try to enhance the competitiveness of their auto parts industries by making their auto emissions standards more stringent to facilitate exports to markets with higher standards (Saikawa, 2013).

China has adopted a kind of eco-industrial policy to promote electric cars, and renewable energy more generally, while steadily strengthening its environmental regulations and enforcement (Lin and Elder, 2014b; Zhang and Liu, 2016; Clover, 2017; Kenderdine, 2017; Perkowski, 2017). In April 2018, China announced a plan to ban fossil fuel vehicles on the resort island of Hainan (Bloomberg, 2018). Even at the beginning of the period of strengthening air pollution standards for automobiles, China already aimed to use regulation as a way to strengthen the long term possible export competitiveness of the industry over the opposition of domestic producers (Oliver et al., 2009; Saikawa, 2013).

5.2 Revenue and Budgets

It is often claimed that there is insufficient money available to pay for sustainable development, especially from national governments. It is commonly perceived that national government budgets are tight in all countries, so it is concluded that governments should seek "innovative" sources of funding and try to leverage financing from the private sector by establishing public private partnerships.

In fact, there is no shortage of funds. Rather, the issue is how to consistently redirect funds away from unsustainable activities and towards sustainable investment and spending. In principle, governments have considerable scope to raise revenue on their own through taxation or borrowing. There is no real need to prioritize funding from the private sector, except through taxes and bank loans. Private sector funding and public-private partnerships may be good solutions in some cases, but there are also many potential obstacles and challenges, such as the risks of privatizing valuable public assets and effective monitoring and enforcement of public-private partnership agreements.

Where can governments obtain this funding? Global GDP is about USD 70 trillion. Environmental taxes could be the most appropriate form, but taxes on consumption or income could also be considered. Total global taxes are about USD 22 trillion, or about 28.4 percent. A one percent increase in global taxes would produce USD 700 billion. Additional taxation on this modest scale would not severely affect the overall global economy or achieve a significant redistribution in the overall allocation of resources, but it could be enough to make a significant difference for many sustainability issues. Moreover, if even this scale of taxation is considered too burdensome, then national governments could also choose to borrow this amount of money. Another option could be to obtain funding from a small tax on financial assets, which totalled USD 273 trillion (0.5 percent would yield USD 1.37 trillion) (European Commission, 2012).

Many have proposed a financial services transactions tax. The US Congressional Budget

Office (CBO) estimated in 2016 that a 0.1 percent financial transaction tax could raise USD 707 billion in revenues between 2017 and 2026, or about USD 78 billion per year. The CBO noted that in 2016, the total value of US stocks was about USD 23 trillion, with about USD 265 billion traded on a typical day, while the total value of the bond market was about USD 40 trillion in 2015, with about 700 billion traded on a typical day (Congressional Budget Office, 2016). Globally, the potential would be much higher.

5.3 Creating a New Scorecard: Alternatives to GDP

The systematic flaws of GDP were well known even before sustainability issues came onto the global agenda in the 1960s and 1970s (Philipsen, 2015; Lepenies, 2016). GDP does not only count pollution clean-up costs as "good" while ignoring clean air and water. It also counts hospital treatment for diseases as "good" while good health is ignored. It also ignores unpaid household chores – often performed by women – as well as community volunteer activities and efforts to enhance quality education. Thus, GDP as a yardstick is clearly inconsistent with many SDGs.

Many alternatives to GDP have been proposed (Kubiszewski et al., 2013) (and these will not be reviewed in this chapter), but few have gained much traction, and GDP retains its grip on the minds of many policymakers and ordinary citizens around the world. This is despite reports of "jobless growth" and rising populism in many developed countries illustrating for many people growth does not necessarily lead to prosperity.

Two possible reasons for the lack of progress of alternative measures will be considered here. First, most proposals for alternatives do not clearly identify a strategy for promoting them, or who should take the lead. Second, it may be less well known that the production of GDP statistics is highly institutionalized, and substantial financial and human resources are devoted to producing them. GDP is further institutionalized and promoted by an entire academic discipline, economics, supported by other related disciplines, as well as by a large group of international organizations including the IMF, OECD, and multilateral development banks such as the World Bank and Asian Development Bank, etc.

Therefore, national governments should take the lead and incorporate new measures into national decision-making processes. The first step is for the alternative to be accepted by political decision makers as well as voters and citizens who may play a role in the selection of the political decision makers. The second step is to integrate the new concept into decisions and procedures at the administrative level.

It will be necessary to develop institutional capacity of the national statistical agencies to develop and collect the statistics for the country's new measure of progress or wellbeing. It will also be necessary to develop the capacity of other government departments to contribute to this endeavour as well as to use the results. Institutional capacity could be strengthened by a combination of increased staff and outsourcing. These could be considered as "green jobs". It would not be necessary to eliminate existing capacity to produce GDP statistics, as they are important for understanding the flow of materials,

goods, and services, and they are also useful for existing businesses. But the GDP statistics would need to be augmented by others and incorporated into a broader sustainability framework.

The Government of France, under President Sarkozy, commissioned a study on alternatives to GDP (Stiglitz, Sen and Fitoussi, 2009). An important conclusion of that seminal report was that "the time is ripe for our measurement system to shift emphasis from measuring economic production to measuring people's wellbeing…and measures of wellbeing should be put in a context of sustainability". Subsequently, the Commission on the Measurement of Economic Performance and Social Progress (2011) examined existing approaches to measuring socio-economic progress, ranging from Gross National Income, Net National Income, Quality of Life Indicators, Human Development Index, Sustainable Measure of Economic Welfare, Index of Sustainable Welfare, Genuine Progress Indicator, Ecological Footprint, Genuine Savings Index, Personal Security Index, Environmental Sustainability Index, Environmental Performance Index, Index of Economic Well-Being, Inequality-Adjusted Happiness, Advanced Quality of Life Index, Happy Life Expectancy Index, among others. From this eclectic mix of measurement techniques, no strong candidate has yet emerged.

A few countries have made concrete efforts to develop alternative measurements of progress. Bhutan is probably the most prominent one, with its concept of Gross National Happiness (Centre for Bhutan Studies & GNH Research, 2016). The elements that make up the Gross National Happiness Index are (i) living standards; (ii) health; (iii) education; (iv) good governance; (v) ecological diversity and resilience; (vi) work-life balance; (vii) psychological well-being; (viii) cultural diversity and resilience; and (ix) community vitality. Comprehensive surveys are conducted every 5 years and the 2015 survey found that 91.2 percent of people reported experiencing happiness, with 43.4 percent saying that they are deeply happy (Centre for Bhutan Studies & GNH Research, 2016).

5.4 Policy integration and coordination

National governments need to play a major coordinating role in implementing SDGs, and not just because national governments made the final decision to adopt the SDGs. Sovereignty resides with national governments, which, in principle, are supposed to play a neutral mediating role among different interests within society, even though in practice they are not always neutral and do not always mediate. In addition, the government can encourage and motivate stakeholders through a variety of carrots and sticks, such as funding, taxes, and regulation.

Many have argued that a comprehensive whole-of-government approach is needed, to coordinate both horizontally and vertically between different policy areas and sectors, as well as between the various levels of government and governance (local, national, global). This is due to the broad, nearly comprehensive nature of the SDGs as well as their extensive and complex interlinkages. Coordination is necessary to maximize the synergies and minimize the trade-offs between goals and targets.

Table 3-5: National SDG Coordination Mechanisms in Selected Asian Countries

Country	Coordination Mechanism
Afghanistan	An SDG Secretariat in the Ministry of Economy, and division of the 17 SDGs into 8 socio-economic sectors, aligning goals and targets with development plans and policies.
Azerbaijan	National Coordination Council for Sustainable Development of the Republic of Azerbaijan, with a Secretariat under the Ministry of Economy. Four working groups on (i) economic growth and decent employment; (ii) social issues; (iii) environmental issues; and (iv) monitoring and evaluation.
Bangladesh	Bangladesh has mapped out relevant ministries against each goal and target and published a "Handbook on Mapping of Ministries by Targets in the Implementation of SDGs aligning with 7th Five Year Plan (2016- 2020)".
India	the National Institution for Transforming India is established under the leadership of the Prime Minister. National SDG indicators are being constructed and statistical agencies geared up to collect data at the sub-national level.
Indonesia	A Presidential Decree on SDGs established the National Coordination Team consisting of Steering Committee, Implementing Team, Working Groups, Experts Team and SDGs Secretariat (under BAPPENAS). Goals, targets, and indicators of SDGs agreed to date are those under the Millennium Development Goals (MDGs) that were implemented from 2000-2015.
Japan	A new Cabinet body, SDGs Promotion Headquarters, headed by the Prime Minister and comprising all ministers.
Korea	The Korea National Assembly UN SDGs Forum was established in 2014. The Commission on Sustainable Development is a ministerial committee under the Ministry of Environment.
Malaysia	A National SDG Council, chaired by the Prime Minister, supported by a National Steering Committee, chaired by the Director General of the Economic Planning Unit. Five SDG Cluster Working Committees: (i) wellbeing; (ii) inclusivity; (iii) human capital; (iv) environment and natural resources; and (v) economic growth.
Maldives	National Ministerial Coordination Committee, Technical Committee on SDGs, associated thematic sub-clusters, with support from the Sustainable Development Goals Division of Ministry of Environment and Energy.
Nepal	High level SDGs Steering Committee, SDGs Coordination and Implementation Committee, and nine SDGs Implementation and Monitoring Thematic Committees. Also a SDG Forum established by civil society organisations.
Philippines	Creation of a dedicated oversight committee and technical secretariat is being proposed under the National Economic Development Authority Board.
Thailand	The already established National Committee for Sustainable Development has been adjusted and is chaired by the Prime Minister, with the Secretary General of the National Economic and Social Development Board as the secretariat, with 37 members from all major groups. Three sub-committees have been established: (i) implementing SDGs - with taskforces on integrating the implementation of the SDGs, preparing reports on progress, and reviewing and recommending economic, social, and legal measures; (ii) promoting understanding and evaluating sustainable development in accordance with sufficiency economy philosophy; and (iii) developing information system to support sustainable development.

Source: This table was compiled from information in the Voluntary National Reviews Database, which is hosted by the United Nation's Sustainable Development Knowledge Platform, available at: https://sustainabledevelopment.un.org/vnrs/index.php?str=National+Coordination+Council+for+Sustainable+Development+#results_area. (Accessed June 28, 2018.)

Many countries have already created high level coordination mechanisms to supervise SDG implementation, according to the VNRs in 2016 (DESA, 2016) and 2017 (DESA, 2017). In some cases, these are new, while other cases utilize existing coordination mechanisms. This is a very important and welcome development. National coordination mechanisms in 13 Asian countries are summarized in Table 3-5.

The next step should be for national governments to establish sustainability criteria, linked to SDGs, to be applied to all government decisions, including new policies and regulations as well as budgets. Existing policies should also be reviewed according to sustainability/SDG criteria. The SDG coordinating mechanisms could take the lead in implementation of these criteria. This is similar to the concepts of Strategic Environment Assessment (SEA), which assesses policies, plans and programmes from an environmental perspective, or broader Sustainability Impact Assessments (SIA). Some countries have required procedures to systematically assess new policies and regulations in terms of costs and benefits. In the US, this function is performed by either the Office of Management and Budget (OMB) which is directly under the President, or the Congressional Budget Office, which reports directly to the Congress, depending on situation. Systems such as this could easily be adapted and upgraded to add sustainability impact assessments. This assessment could include an analysis of synergies and trade-offs according to a range of sustainability criteria, such as those related to the SDGs. This would not only help policies, plans and programmes become more sustainable in general, but it would also go a long way towards making them more complementary and synergistic, and therefore cost effective.

5.5 International cooperation and coordination

It is important to add here that many of these measures may be more effective if countries coordinate their policies. There are some concerns that countries which strengthen regulations and increase taxes may find it more difficult to attract foreign investment, or some firms may exit. However, there is a large body of research on trade and environment which has not found significant evidence of a "race to the bottom" in search of countries with the lowest taxes and weakest environmental regulations. Nevertheless, many policymakers and environmentalists may still have concerns about this, so as much as possible, it would be better to adopt these measures in a coordinated manner (Konisky, 2007; Saikawa, 2013).

6. CONCLUSION

This chapter argues that national governments can and should take the lead in implementing SDGs. Governments need to raise the level of their ambition to try to achieve the transformative potential of the SDGs. Voluntary efforts by companies and citizens are certainly very welcome and helpful, but they are not likely to achieve enough by themselves to realize the transformative potential of the SDGs. Sovereignty is centred in national governments, despite the growing influence of large corporations, and only

national governments have the power to make and enforce laws and regulations and to generate revenue through taxation, or to delegate these powers to others, such as local governments.

Many have vaguely recommended that national governments should provide "enabling environments" for other actors, usually implying voluntary action. This chapter argues that enabling environments will probably need to go beyond gentle support of voluntary actions by other actors, and use laws, regulations, taxation, and direct spending to provide these enabling environments. Overall, governments may need to specify clear directions, not just "enabling" those who are already persuaded to act. Governments may also need to restrict or prevent actors from the possibility of continuing in unsustainable directions.

The question of why national governments may be reluctant to take more ambitious actions (and why some actors in civil society may be reluctant to push governments to be more ambitious) is beyond the scope of this chapter, and there may be a variety of reasons (including political ideologies and cultural factors). Nevertheless, one reason may be that some important stakeholders in society, particularly those which may have more influence on government policies, are also not fully persuaded about the need for more ambitious action. If this is the case, it suggests that there may also be limits to the potential success of the strategy of promoting voluntary stakeholder actions. Therefore, SDG advocates may need to rethink their strategies for explaining and motivating non-governmental stakeholders and broader society, so that national governments are clear on the level of support for sustainable development transformation.

Notes

1 It is impossible to assess progress on the environmental elements of other SDGs due to the report's methodology.

2 Their website is available at https://ic.fsc.org/en.

3 Their website is available at https://rspo.org/.

References

Amelang, S. (2017) 'Dieselgate forces VW to embrace green mobility', *Clean Energy Wire Factsheet*, 15 September. Available at: https://www.cleanenergywire.org/factsheets/dieselgate-forces-vw-embrace-green-mobility.

Blair, M. M. (1995) *Ownership and Control: Rethinking Corporate Governance for the Twenty-First Century*. Washington DC: Brookings Institution Press.

Bloomberg (2018) 'China Will Force a Resort Island to Phase Out Gasoline Cars', *Bloomberg.com*, 15 April. Available at: https://www.bloomberg.com/news/articles/2018-04-14/hainan-becomes-test-case-in-china-campaign-to-phase-out-gas-cars.

Cammack, P. (1989) 'Review Article: Bringing the State Back In?', *British Journal of Political Science*, pp. 261–290. doi: 10.1017/S0007123400005469.

Centre for Bhutan Studies & GNH Research (2016) *A Compass Towards a Just and Harmonious Society: 2015 GNH Survey Report*. Thimphu, Bhutan: Centre for Bhutan Studies & GNH Research. Available at: http://www.bhutanstudies.org.bt/wp-content/uploads/2017/05/2015-Survey-

Results.pdf (Accessed: 22 June 2018).

Chuvieco, E. (2008) *Earth Observation of Global Change: The Role of Satellite Remote Sensing in Monitoring the Global Environment*. Springer Netherlands. doi: 10.1007/978-1-4020-6358-9.

CIA (2018a) *World Factbook*. Available at: https://www.cia.gov/library/publications/the-world-factbook/geos/xx.html (Accessed: 24 April 2018).

CIA (2018b) *World Factbook*.

Clover, C. (2017) 'Subsidies help China sell the most electric cars', *Financial Times*, 24 October. Available at: https://www.ft.com/content/18afe28e-a1d2-11e7-8d56-98a09be71849.

Commission on the Measurement of Economic Performance and Social Progress (2011) 'Survey of Existing Approaches to Measuring Socio-Economic Progress.' Available at: https://www.mendeley.com/research-papers/survey-existing-approaches-measuring-socioeconomic-progress-2/?utm_source=desktop&utm_medium=1.18&utm_campaign=open_catalog&userDocumentId=%7B0b516699-09eb-44fd-aa6f-718e222b7f8b%7D (Accessed: 22 June 2018).

Congressional Budget Office (2016) 'Options for Reducing the Deficit 2017-2026: Impose a Tax on Financial Transactions', *www.cbo.gov*, 8 December. Available at: https://www.cbo.gov/budget-options/2016/52287.

Deng, W. (2017) 'Eco-city Development in China', *Asia Dialogue*, 26 June. Available at: http://theasiadialogue.com/2017/06/26/eco-city-development-in-china/ (Accessed: 22 June 2018).

DESA (2016) *2016 Synthesis of Voluntary National Reviews*. New York: Division for Sustainable Development, Department of Economic and Social Affairs, United Nations. Available at: https://sustainabledevelopment.un.org/content/documents/126002016_VNR_Synthesis_Report.pdf.

DESA (2017) *2017 Voluntary National Reviews: Synthesis Report*. New York: High Level Political Forum on Sustainable Development. Available at: https://sustainabledevelopment.un.org/content/documents/17109Synthesis_Report_VNRs_2017.pdf.

Dodds, F., Donoghue, D. and Leiva-Roesch, J. (2016) *Negotiating the Sustainable Development Goals*. Routledge.

European Commission (2012) *Review of current practices for taxation of financial instruments, profits and remuneration of the financial sector*, *Working Paper No. 31-2012*. Available at: https://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/taxation/gen_info/economic_analysis/tax_papers/taxation_paper_31_en.pdf (Accessed: 22 June 2018).

Ewing, J. (2016a) 'Researchers Who Exposed VW Scandal Gain Little Reward From Success', *Politico.com*, 24 July. Available at: https://www.nytimes.com/2016/07/25/business/vw-wvu-diesel-volkswagen-west-virginia.html.

Ewing, J. (2016b) 'Researchers Who Exposed VW Scandal Gain Little Reward From Success', *Politico.com*, July.

Ewing, J. (2018) 'Tough Tasks for China's New Environment Ministry', *The Diplomat*, 17 March. Available at: https://thediplomat.com/2018/03/tough-tasks-for-chinas-new-environment-ministry/ (Accessed: 12 April 2018).

Galeon, D. (2017) 'These 7 Countries Want to Say Goodbye to Fossil Fuel-Based Cars', *Futurism*, 20 September. Available at: https://futurism.com/these-7-countries-want-to-say-goodbye-to-fossil-fuel-based-cars/.

Handwerk, B. (2015) 'With Wearable Devices That Monitor Air Quality, Scientists Can Crowdsource Pollution Maps', *Smithsonian.com*, 12 March. Available at: https://www.smithsonianmag.com/innovation/with-wearable-devices-that-monitor-air-quality-scientists-can-crowdsource-pollution-maps-180954556/.

Horwitt, D. (2017) 'Chapter Four - Hydraulic Fracturing Chemical Disclosure: Can the Public Know What's Going Into Oil and Natural Gas Wells?', *Advances in Chemical Pollution, Environmental*

Management and Protection, 1, pp. 63–111. doi: https://doi.org/10.1016/bs.apmp.2017.08.009.

Hotten, R. (2015a) 'Volkswagen: The Scandal Explained', *BBC News*, 10 December. Available at: http://www.bbc.com/news/business-34324772.

Hotten, R. (2015b) 'Volkswagen: The Scandal Explained', *BBC News*, December.

IPCC (2014) *Fifth Assessment Report: Summary for Policymakers*.

Jessop, B. (2001) 'Bringing the State Back In (Yet Again): Reviews, Revisions, Rejections, and Redirections', *International Review of Sociology*, 11(2), pp. 149–173. doi: 10.1080/713674035.

Jonson, J. E. *et al.* (2017) 'Impact of excess NOx emissions from diesel cars on air quality, public health and eutrophication in Europe', *Environmental Research Letters*, 12(9). doi: 10.1088/1748-9326/aa8850.

Kenderdine, T. (2017) 'China's Industrial Policy, Strategic Emerging Industries and Space Law', *Asia and the Pacific Policy Studies*, 4(2), pp. 325–342. doi: 10.1002/app5.177.

Konisky, D. M. (2007) 'Regulatory Competition and Environmental Enforcement: Is There a Race to the Bottom?', *American Journal of Political Science*, 51(4), pp. 853–872.

Kubiszewski, I. *et al.* (2013) 'Beyond GDP: Measuring and achieving global genuine progress', *Ecological Economics*, 93, pp. 57–68. doi: 10.1016/j.ecolecon.2013.04.019.

Landrigan, P. J. *et al.* (2018) 'The Lancet Commission on pollution and health', *The Lancet*. Elsevier, 391(10119), pp. 462–512. doi: 10.1016/S0140-6736(17)32345-0.

Lebada, A. M. (2017) 'International Tax Cooperation Initiatives Driving Progress on Target 17.1', *IISD Commentary*, 3 August. Available at: http://sdg.iisd.org/commentary/policy-briefs/international-tax-cooperation-initiatives-driving-progress-on-target-17-1/.

Lepenies, P. (2016) *The Power of a Single Number: A Political History of GDP*. New York: Columbia University Press.

Lin, X. and Elder, M. (2014a) *Major Developments in China's National Air Pollution Policies in the Early 12th Five-Year Plan*. Hayama, Japan. Available at: http://pub.iges.or.jp/modules/envirolib/view.php?docid=4954.

Lin, X. and Elder, M. (2014b) *Major Developments in China's National Air Pollution Policies in the Early 12th Five-Year Plan*. Hayama, Japan.

Loughlin, M. (2017) 'The erosion of sovereignty', *Netherlands Journal of Legal Philosophy*, (2), pp. 57–81.

Mathieu, P.-P. and Aubrecht, C. (2018) *Earth Observation Open Science and Innovation*. Springer.

Matsumoto, N., Elder, M. and Ogihara, A. (2015) 'Japan's policy to reduce emissions of volatile organic compounds: Factors that facilitate industry participation in voluntary actions', *Journal of Cleaner Production*, 108, pp. 931–943. doi: 10.1016/j.jclepro.2015.06.145.

McGee, P. (2016) 'VW set to unveil new strategy following diesel emissions scandal', *ft.com*, 12 June. Available at: https://www.ft.com/content/fa44e6c2-2ef1-11e6-a18d-a96ab29e3c95.

McGee, P. (2017) 'Volkswagen plans to "leapfrog" Tesla in electric car race', *ft.com*, 8 May. Available at: https://www.ft.com/content/a43ac2ce-3198-11e7-9555-23ef563ecf9a.

Millennium Ecosystem Assessment (2005) *Ecosystems and Human Well-being: Synthesis*. Washington DC: Island Press.

Milner, H. V and Keohane, R. O. (1996) 'Internationalization and domestic politics: An introduction', *Internationalization and domestic politics*, pp. 3–24.

Mufson, S. (2018) 'This environmental group is launching its own satellite to learn more about greenhouse gas leaks', *Washington Post*, 11 April. Available at: https://www.washingtonpost.com/news/energy-environment/wp/2018/04/11/this-environmental-group-is-launching-its-own-satellite-to-learn-more-about-greenhouse-gas-leaks/?noredirect=on&utm_term=.04bb513710c2.

O'Connor, D. *et al.* (2016) *Universality, integration, and policy coherence for sustainable development: Early SDG implementation in selected OECD countries*, *World Resources Institute Working Paper (Washington)*. Available at: http://ecdpm.org/publications/universality-integration-policy-coherence-sustainable-development/ (Accessed: 28 September 2016).

OECD (2017) *Healthy People, Healthy Planet: The Role of Health Systems in Promoting Healthier Lifestyles and a Greener Future*. Paris: OECD.

Oliver, H. H. *et al.* (2009) 'China's fuel economy standards for passenger vehicles: Rationale, policy process, and impacts', *Energy Policy*, 37(11), pp. 4720–4729. doi: 10.1016/j.enpol.2009.06.026.

Oxfam (2016) 'An Economy for the 1%', *Oxfam Briefing Paper*, January. Available at: https://www.oxfam.org/sites/www.oxfam.org/files/file_attachments/bp210-economy-one-percent-tax-havens-180116-en_0.pdf (Accessed: 29 June 2018).

Perkowski, J. (2017) 'How China Is Raising The Bar With Aggressive New Electric Vehicle Rules', *Forbes.com*, 10 October. Available at: https://www.forbes.com/sites/jackperkowski/2017/10/10/china-raises-the-bar-with-new-electric-vehicle-rules/#51bc95c477ac.

Pharr, S. J. and Badaracco, J. (1986) '"Coping With Crisis: Environmental Regulation', in McCraw, T. K. (ed.) *America vs. Japan*. Boston: Harvard Business School Press.

Philipsen, D. (2015) *The Little Big Number: How GDP Came to Rule the World and What to Do about It*. Princeton: Princeton University Press.

Piketty, T. (2014) *Capitalism in the Twenty First Century*. Belknap Press.

Pizer, W. A. and Kopp, R. (2003) 'Calculating the Costs of Environmental Regulation. Resources for the Future'. Available at: http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-03-06.pdf (Accessed: 22 June 2018).

Porter, M. and van der Linde. Claas (1995) 'Green and Competitive: Ending the Stalemate', *Harvard Business Review*, September. Available at: http://hbr.org/1995/09/green-and-competitive-ending-the-stalemate/ar/1.

Rockström, J. *et al.* (2009) 'Planetary boundaries: Exploring the safe operating space for humanity', *Ecology and Society*, 14(2), pp. 472–475. doi: 10.1038/461472a.

Rockström, J. and Klum, M. (2015) *Big World Small Planet: Abundance within Planetary Boundaries*. Max Strom Publishing.

Sachs, J. *et al.* (2017) *SDG Index and Dashboards Report 2017*. New York: Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN).

Sagara, T. (2013) 'Key Lessons in the Evolution of Emission Standards for Cars in Japan', *Online Journal of Social Sciences Research*, 2(7), pp. 190–199. Available at: http://onlineresearchjournals.org/JSS/pdf/2013/jul/Sagara.pdf.

Saikawa, E. (2013) 'Policy Diffusion of Emission Standards: Is There a Race to the Top?', *World Politics*, 65(1), pp. 1–33. doi: 10.1017/S0043887112000238.

Schmidt, B. (2016) 'Germany's Bundesrat Resolves End Of Internal Combustion Engine', *Forbes*, 8 October. Available at: https://www.forbes.com/sites/bertelschmitt/2016/10/08/germanys-bundesrat-resolves-end-of-internal-combustion-engine/#5cf89c1560bd.

Schmidt, V. A. (2009) 'Putting the political back into political economy by bringing the state back in yet again', *World Politics*, 61(3), pp. 516–546. doi: 10.1017/S0043887109000173.

Stefanini, S. (2015a) 'VW scandal spotlights lax EU auto standards', *Politico.com*, 23 September. Available at: https://www.politico.eu/article/volkswagen-emissions-nox-eu-us-epa-test/.

Stefanini, S. (2015b) 'VW scandal spotlights lax EU auto standards', *Politico.com*, September.

Steffen, W. *et al.* (2015) 'Planetary boundaries: Guiding human development on a changing planet', *Science (New York, N.Y.)*, 348(6240), p. 1217. doi: 10.1126/science.aaa9629.

Stiglitz, J. E., Sen, A. and Fitoussi, J.-P. (2009) 'Report by the Commission on the Measurement of Economic Performance and Social Progress'. Available at: http://ec.europa.eu/eurostat/documents/118025/118123/Fitoussi+Commission+report (Accessed: 22 June 2018).

TEEB (2010) *The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A Synthesis of the Approach, Conclusions and Recommendations of TEEB*. The Economics of Ecosystems and Biodiversity. Available at: http://www.teebweb.org/our-publications/teeb-study-reports/synthesis-report/ (Accessed: 7 February 2018).

Tollefson, J. and Gilbert, N. (2012) 'Earth Summit: Rio Report Card', *Nature*, 486(7401), pp. 20–23. doi: 10.1038/486020a.

Tomás, R. and Li, Z. (2017) 'Earth Observations for Geohazards: Present and Future Challenges', *Remote Sensing*, 9(3). doi: 10.3390/rs9030194.

UK Department for Environment Food and Rural Affairs (2013) *Environmental Reporting Guidelines: Including mandatory greenhouse gas emssions reporting guidance*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/206392/pb13944-env-reporting-guidance.pdf (Accessed: 22 June 2018).

UNEP (2011) *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication*. Nairobi, Kenya: United Nations Environment Programme. Available at: http://web.unep.org/greeneconomy/.

United Nations (2015) *Addis Ababa Action Agenda of the Third International Conference on Financing for Development*. New York. Available at: https://sustainabledevelopment.un.org/frameworks/addisababaactionagenda.

Vogel, S. K. (2018) *Marketcraft: How Governments Make Markets Work*. New York: Oxford University Press.

Wackernagel, M., Hanscom, L. and Lin, D. (2017) 'Making the Sustainable Development Goals Consistent with Sustainability', *Frontiers in Energy Research*, 5. doi: 10.3389/fenrg.2017.00018.

World Bank Group (1998) *Ozone-depleting Substances: Alternatives, Pollution Prevention and Abatement Handbook*. Available at: https://www.ifc.org/wps/wcm/connect/4e730100488559478284d26a6515bb18/HandbookOzoneDepletingSubstancesAlternatives.pdf?MOD=AJPERES (Accessed: 22 June 2018).

Zhang, L. and Liu, Y. (2016) 'Analysis of New Energy Vehicles Industry Policy in China's Cities from the Perspective of Policy instruments', in *Energy Procedia*, pp. 437–442. doi: 10.1016/j.egypro.2016.12.074.

Zhou, X. and Elder, M. (2013) 'Regional air quality management in China: the 2010 Guideline on Strengthening Joint Prevention and Control of Atmospheric Pollution', *International Journal of Sustainable Society*, 5(3), pp. 232–249. doi: 10.1504/IJSSOC.2013.054713.

Chapter 4

Transformation of Asian Cities Towards Sustainability

Peter King, Shom Teoh, Toshizo Maeda, and Mark Elder

Chapter 4

Transformation of Asian Cities Towards Sustainability

Peter King, Shom Teoh, Toshizo Maeda, and Mark Elder

Main messages

- Many cities face enormous sustainability challenges, partly due to rapid development and migration, compounded by natural disasters and climate change;
- Transformation to a sustainable future will depend on disruptive solutions to food security, water conservation, low-carbon energy supplies and energy efficiency, mass transit and pedestrian access, affordable housing, decent, safe employment, and social and cultural cohesion;
- We have seen glimpses of sustainable solutions for cities, and some larger, more developed cities have been working on a sustainability agenda well before the SDGs were agreed. The challenge is to scale up effective measures at a pace that has never been achieved before;
- Virtually all the SDGs and about two thirds of targets are relevant to cities, but they need to be localized to enable effective implementation. There is insufficient evidence to date that the SDGs will have a major transformational impact in cities;
- Many cities may choose to pick a few goals matching their current priorities instead of taking an integrated approach;
- Strengthening cities' management capacity may be one of the highest priorities, especially in developing countries. Otherwise, it will be difficult to implement any other recommendations, even with sufficient funding;
- Central governments should contribute more to creating sustainable cities.

1. INTRODUCTION

The world's urban population is projected to double by 2050 according to the New Urban Agenda, endorsed by the UN General Assembly in December 2016. This unparalleled movement of humanity alone can be regarded as transformative, as the bulk of the world's

population in future will be living and working in urbanized areas, for the first time in human history. It also poses "massive sustainability challenges in terms of housing, infrastructure, basic services, food security, health, education, decent jobs, safety and natural resources, among others" (United Nations, 2017).

In 2010, Asia's urban population was 754 million people, more than the total population of the USA and the European Union combined, with growth rates especially fast in East and Northeast Asia and Southeast Asia. Seven of the 10 most populous cities of the world are in Asia: Tokyo, Delhi, Shanghai, Mumbai, Beijing, Dhaka and Kolkata (ESCAP, 2013; UNDESA, 2014).

To give a snapshot of this pace of change in the Asian region, in China the urban population was 459 million in 2000. By 2010, the urban population was 670 million and half the population lived in urban areas. In 2013, the urban population increased to 730 million, located in 658 cities with a municipal government and in 20,113 designated towns. It is currently 820 million, accounting for 58 percent of the total population, almost doubling in the span of two decades. India's urban population in 1961 was 79 million, growing to 428 million in 2015, and projected to rise to 606 million by 2030. Nearly 60 percent of India's GDP is generated in urban areas. Indonesia's urban population is about 144 million, comprising 54.6 percent of its total population (UNDESA, 2014).

Rural-urban migration and transboundary migration (due to climate change or merely seeking economic opportunities), along with natural population growth, is also swelling cities. Due to conflict or unstable governance, a sudden-onset climate-related hazard, or slow-onset climate change, people may be displaced internally for long periods or decide to migrate internally to urban areas, or to cities in other countries (Stapleton *et al.*, 2017).

Despite some progress, most cities in the developing world suffer from poverty, slums, social and economic exclusion, unsanitary conditions, pollution in all its forms, crime, inadequate open space, and unsafe living conditions. Because of the pace of urbanization even previously well-planned cities are not sustainable and most cities are growing organically in the absence of effective planning. Consequently, there are tremendous social, environmental, and economic costs, with the burden often falling on the poorest of the poor, while the rich either move out or protect themselves in gated, guarded enclaves.

Over 250 million people in Asia are living in slums, with about 75 million living below the poverty line (Baker and Gadgil, 2017). For these people, living conditions are difficult: crowding; inadequate infrastructure and services; health, safety, and environmental risks; flooding and other disasters; poor mobility and access to jobs; high expenses for basic needs of shelter, food, and water; limited land and property rights; and as result rising social tensions. No thought can be given to urban sustainability unless these current conditions in Asia's slums are adequately addressed.

"Transformative and sustainable development" will be needed to tackle these challenges, according to The New Urban Agenda (United Nations, 2017). The Sustainable

Development Goals (SDGs) are intended to push towards this needed transformation, especially Goal 11 on making cities and human settlements inclusive, safe, resilient and sustainable.

What would constitute the elements of sustainable cities? The fundamental forms would include basic amenities, mass transit systems, parks and green spaces, clean air and water, walking and biking accessibility to local facilities like schools, shops, and parks etc. But beyond these physical transformations, sustainable cities need to embrace social goals like the right to housing, civic engagement, cultural and artistic expression, inclusion, safety, gender equality, and care of the aged among others. Economically, future cities need to provide sustainable economic growth, decent jobs for all, and sustainable transport systems that link people and economic services. The comprehensive list of desirable outcomes provided by the New Urban Agenda looks daunting, when we consider the current state of most cities in the developing world, so it is understandable that even small achievements are widely applauded. Nevertheless, incremental change will not transform our cities—can we really scale up with the urgency that is needed? Do national and regional programmes promoting sustainable cities hold the key to the possibility of scaling up?

This chapter surveys how cities have tried to respond to these challenges and suggests ways to enhance cities' transformative potential on the pathway towards sustainable development. The next section highlights the unsustainable impacts of cities. Section three outlines how SDGs are related to cities. Section four discusses some typical policy responses to strengthen the sustainability of cities. Section five explores the strengths and weaknesses of model cities and eco-towns as precursors to sustainability. Section six emphasises that strengthening cities' management capacities is a key prerequisite for the success of any other measure to enable them to reach their transformative potential. Section seven discusses the issue of finance, and section eight presents the main recommendations and the conclusion.

2. UNSUSTAINABLE CITIES AND THEIR IMPACTS

Many cities face enormous and complex sustainability challenges. This is especially the case in Asia, the home of many fast-growing megacities.

Migrants to cities are often forced to live in informal slum areas, with inadequate and unsafe housing, limited access to utilities, health services, schools, and public transport. These slum areas are also subject to local flooding, river bank erosion, and landslides (ESCAP and UN-Habitat, 2015). The challenge here is ensuring that suitable, safe land is set aside for urban expansion and poor people can afford and access these areas.

Cities are often located in naturally hazardous zones, on flood plains, along the coast, on mountain sides, or on former lake basins. Mexico City, for example, was built on a former lake bed (the former Lake Texcoco), which makes earthquakes more hazardous, as the soil

is like jelly when an earthquake hits, putting the 25 million residents at constant risk (Vance, 2017). In the 2011 Tohoku earthquake and subsequent tsunami in Japan, more than 120,000 buildings were destroyed, 278,000 were half-destroyed and 726,000 were partially destroyed, with total economic costs estimated at over USD 235 billion. The 2004 Banda Aceh earthquake in Indonesia, killed over 230,000 people (Oskin, 2017). Earthquakes may also trigger landslides which can bury urban houses without warning.

In Asia, 400 million people lack electricity, 300 million do not have access to safe drinking water and 1.5 billion lack basic sanitation (ADB, 2017c). Many rural to urban migrants expect to find such basic services in their destination cities, only to find that they cannot afford proper housing and are forced to live in slums. Today more than 828 million people live in slums; 43 percent in South-central Asia, while projections suggest that by 2040, globally, 2 billion people will live in slums (Patrick, 2012).

According to the World Health Organisation, slum dwellers are disproportionately at risk of infectious diseases such as tuberculosis, hepatitis, dengue fever, pneumonia, cholera and malaria. Lack of access to sanitation and safe water supplies lead to a chronic prevalence of diarrhoea, especially among children, often without access to health-services. Poor housing puts them at risk of heat stress, hypothermia, indoor pollution, and death or injury from storm damage (WHO/UN-Habitat, 2010).

Many of the slum dwellers eke out a living by recycling waste or carrying out other dangerous and dirty occupations that no one else will do. Following closure of the notorious Smokey Mountain garbage dump in Manila, Philippines, many of the waste pickers moved to the "Promised Land" disposal site in Payatas, where over 10,000 tonnes per day of waste is piled up in a ravine on the outskirts of the city. In 2000, following typhoon rains, the waste avalanche crashed down on the 800 families living there, killing more than 200 people (Ng, 2000).

In Asia's cities, only 76 percent of the population have access to basic sanitation, compared to 98 percent in OECD countries, growing at less than 1 percent per annum. Inadequate sanitation is a contributing cause of water pollution, water-borne diseases, and destruction of aquatic habitats (OECD, 2015).

The influence of cities goes way beyond municipal boundaries, as the hinterlands provide food, water, construction materials, and other resources that urban areas are increasingly consuming. Among these resources, the consumption of energy is one of the most important factors affecting the whole society through the emission of greenhouse gases and associated climate change.

Between 2006 and 2015, direct physical losses from extreme weather events and geophysical hazards in Asia averaged USD 46 billion per annum, with over 337,000 disaster-related fatalities (ADB, 2017c). Climate change is likely to exacerbate current urban disasters. Many major urban areas in low-lying coastal zones may face sea-level rise or flooding. Globally, 13 percent of the urban population lives less than 10m above sea level and is exposed to submergence, coastal flooding and coastal erosion (Stapleton et

al., 2017). According to insurance companies, over the past 30 years, major floods have increased from 50 per year to about 200 per year (Patrick, 2012).

Climate change threatens to make cities almost unbearable for many of the world's poorest people in low-lying cities like Dhaka, Bangkok, Jakarta, and Ho Chi Minh City. It is estimated that 275 million people worldwide live in areas that will eventually be flooded at 3 ℃ of global warming, with 80 percent of those living in Asia. For example, Osaka, Japan (5.2 million affected); Shanghai, China (17.5 million affected) (Strauss, Kulp and Leverman, 2015).

Without adequate climate change mitigation, temperatures will exceed the limit of human survivability in some cities. For example, in Lucknow (Uttar Pradesh) and Patna (Bihar), with urban populations of 2.9 and 2.2 million respectively, daily wet bulb maximum temperature is projected to exceed the survivability threshold by the end of the century (Im, Pal and Eltahir, 2017). In 2015, deadly heat waves in India and Pakistan killed more than 3,500 people.

3. SUSTAINABLE DEVELOPMENT GOALS AND CITIES

Cities are prominently featured in the SDGs. One of the 17 SDGs focuses directly on cities, SDG 11 ("make cities and human settlements inclusive, safe, resilient and sustainable"). The Agenda 2030 targets (slightly abbreviated) for SDG 11 cover the following:

- Providing access for all to adequate, safe and affordable housing and basic services and upgrade slums;
- Access to safe, affordable, accessible and sustainable transport systems;
- Inclusive and sustainable urbanization;
- Protection and safeguarding cultural and natural heritage;
- Reducing the number of deaths, people affected, and direct economic losses caused by disasters;
- Reducing the environmental impact of cities, especially air quality and waste management;
- Universal access to safe, inclusive and accessible, green and public spaces;
- Linking urban, peri-urban and rural areas by strengthening national and regional development planning;
- Holistic disaster risk management at all levels; and
- Support to least developed countries in building sustainable and resilient buildings utilizing local materials

In addition, most other SDGs like no poverty (SDG 1), zero hunger (SDG 2), good health and wellbeing (SDG 3), quality education (SDG 4), decent work and economic growth (SDG 8) and sustainable industrialization (SDG 9) etc. are also highly relevant for cities. SDG 6 on water and sanitation is a core responsibility of many cities. Cities usually have a strong interest in energy (SDG 7), although they have more influence over the energy efficiency element than the renewable energy element. Only one goal may seem not relevant to

cities, is SDG 15, on oceans, although in fact cities, especially coastal megacities, are closely related to oceans. According to the World Urban Forum in 2018, "65 percent of the 169 targets behind the 17 SDGs will not be reached without proper engagement of and coordination with local and regional governments".

The Sustainable Development Solutions Network (SDSN) has issued a step by step guide to help cities localize the SDGs (SDSN and GIZ, 2016), abbreviated as follows:

- Step 1: Initiate an inclusive, participatory process of SDG localization - elevate awareness of the SDGs, set the stage for multi-stakeholder involvement, and provide strong political leadership and integrated governance arrangements.
- Step 2: Set the local SDG agenda - adapt the global SDGs into an ambitious yet realistic local agenda, through evidence-based decision-making, backed by public support and input.
- Step 3: Plan for SDG implementation - goal-based long-term, multi-sectoral planning supported by adequate resources, and multi-stakeholder partnerships.
- Step 4: Monitor SDG progress – to ensure that SDG implementation remains on track.

While some of the larger, more developed cities have the necessary capacity to implement this localization process (Greene and Meixell, 2017), most cities in the developing world are struggling to cope with day-to-day responsibilities and smaller cities are unlikely to have the necessary trained staff. Also, the SDG indicators are designed for the national or regional level, not for cities, and there are significant data limitations (Lucci and Lynch, 2016). Local governments are also not involved in the High Level Political Forum monitoring processes and may not have a legal mandate to implement some of the SDGs (Greene and Meixell, 2017).

An early survey of local and national governments in ASEAN countries showed that while a small number of front runner cities were eager to engage with SDGs, the majority were likely to take a passive stance waiting for direction and resources from national governments. Many cities cited a lack financial and human resource capacity and noted that national governments have the main jurisdiction over many areas. Difficulty working in English was also cited as a challenge (Teoh, 2018).

Some cities were working on sustainability objectives well before the SDGs were released. For example, Vancouver adopted its Sustainability Framework in 2008 (Metro Vancouver, 2010). The USA Sustainable Cities Initiative is operative in three pilot cities: New York, Baltimore, and San Jose. In the global South, one localization initiative is the Rio Sustainable Cities Initiative, launched by SDSN and GIZ, which is involving key stakeholders across the Rio de Janeiro Metropolitan Area[1]. Interestingly, Brazil has a national Ministry of Cities, one of the partners in this initiative, reflecting the need for vertical integration between the national and local levels. Other cities have been working for parts of the SDGs for many years but have yet to embark on a comprehensive implementation plan for all SDGs (Lucci and Lynch, 2016).

While it is probably too early to draw definitive conclusions about the ability of the SDGs to trigger a transformation in cities, it is instructive to examine the ongoing role of cities

in the pursuit of sustainable development and the response to other global initiatives that were precursors to the SDGs.

4. TYPICAL POLICY RESPONSES BY CITIES TO SUSTAINABILITY PROBLEMS

Sustainability problems are not new, and cities have been trying to address them for a long time. A wide variety of approaches has been tried, as cities have widely different characteristics, conditions, and capacities. Some cities have tried ambitious changes, in some cases which might be considered transformative if not necessarily sustainable, and mainly focusing on one sector rather than a comprehensive approach. In many cases, however, efforts are incremental, if they make any efforts at all. Overall, there are limits to what cities can do as they have limited ability to regulate and raise finances and limited human resource capacity.

The World Bank notes that no single policy approach will suit all cities in Asia. There are 3 types of urbanization in the region: (i) incipient urbanization (also called secondary cities, or townships); (ii) intermediate urbanization (where more than half of the population is already urbanized); and (iii) advanced urbanization (where more than 75 percent of the population is living in cities – Japan, Korea, Malaysia). For countries experiencing incipient urbanization, it may be possible to stave off the worst outcomes of city growth by learning from other cities, but these places tend to have lower levels of wealth and technical capacity, meaning that they would need external support. For the intermediate urbanization case (e.g. China, Indonesia, Philippines, Thailand, Vietnam) there is an urgent need to address sub-standard housing, poor service delivery, and social exclusion, but again the financial and technical capacity for transformation may be missing. Even in countries with advanced urbanization and large cities like Beijing, Jakarta, Manila, and Bangkok, there are still pockets of slums and inadequate infrastructure and service delivery (Baker and Gadgil, 2017).

Once cities are built, much of the form of the city and its infrastructure are locked in, suggesting that spatial planning remains a crucial policy instrument (World Bank, 2015). Environmental benefits accrue from ensuring that urban density meets the needs of citizens through pedestrian friendly walkways, bicycle paths, open spaces, and accessibility to all urban services. Cities built around the needs of motor vehicles as so much of suburbia has done in the past are no longer viable or desirable urban forms. By 2010, Asia had almost as many subway lines (216) as Europe (233), covering 4,210 km, with considerable potential to expand (ADB, 2017c). As at least 350 urban areas in Asia now spill over local administrative boundaries, there is a critical need to adjust the institutional arrangements that will allow for centralized spatial planning controls.

Local governments can control the supply of urban land through strictly enforced zoning schemes and they can capture the increased value of land, for example surrounding transport hubs, and utilize this income to improve urban infrastructure (Amirtahmasebi et

al., 2016). National governments can also support investment and economic growth opportunities in secondary cities to take some of the pressure off Asia's megacities.

In Shanghai, a mega-city plagued by pollution, traffic congestion, shortage of public services, and booming property prices typical of Asia's mega-cities, the national government has adopted some drastic policies to control growth. By 2035, the resident population will be capped at 25 million and the land available for development will not exceed 3,200 km^2. This will mean radical change as the population was already at 24.15 million in 2015 and is possibly unachievable (Reuters, 2017).

The increasingly obvious impacts of climate change have energized cities around the world to develop policies and programmes to implement the Paris Agreement. The policy response by New York City illustrates what major cities can bring to the challenge of a sustainability transformation (New York City Mayor's Office of Sustainability, 2017). New York City's Executive Order 26 (June 2, 2017) commits the City to develop a pathway to achieve the greenhouse gas (GHG) emissions reductions necessary to align with the principles of the Paris Agreement and a 1.5 °C outcome. Key policy decisions include (i) building energy performance mandates; (ii) deep energy retrofits for city-owned buildings; (iii) improved building codes; (iv) clean energy financing; (v) low energy building programmes; (vi) sustainable transport; (vii) separation of organic waste; (viii) 100 percent renewable energy for city operations; (ix) 50 percent renewable energy and upgraded transmission system; (x) electric vehicle charging infrastructure; (xi) carbon and externalities pricing and accounting; (xii) global cities protocol for carbon neutrality; and (xii) enhanced climate communications. New York City has also announced that its public pension fund will develop a decarbonization strategy that would enable it to stop investing in fossil fuels and increase investment in renewable energy (Climate Action, 2017). New York City is also taking legal action against the big oil companies, based on evidence that they knew fossil fuels could cause climate change, in the same way that tobacco companies knew that smoking would cause cancer.

Singapore is also taking climate change seriously (Tan, 2018). To cope with coastal erosion and flooding as sea levels rise (i) minimum land reclamation levels are being raised to 4m above sea level; (ii) hard seawalls or stone embankments will cover at least 70 percent of the coastline; and (iii) remaining coastal areas will comprise of sandy beaches (for recreation) or mangrove buffers. According to national projections, the mean sea level is expected to rise by up to 1m by 2100.

A 2014 report "Liveable & sustainable cities: a framework" notes that Singapore's metro network has expanded by 30 percent since 2008, with more expansions planned, as well as other improvements to the public transportation system (Centre for Liveable Cities Singapore and Singapore, 2014). As much of the above land space is fully occupied and there are limits on how much additional land reclamation can take place, Singapore is also developing a master plan for underground, which will accommodate most of the transportation system, along with ammunition dumps, oil storage, and sewerage tunnels (Misir, 2015). In March 2015, two laws were amended to facilitate underground development: the State Lands Act now says the state owns underground space "more

than 30 meters below the surface" and the Land Acquisition Act allows the state "to buy out plots of surface land or a specific stratum of subsurface space so that the ground underneath it can be accessed".

Another typical policy response has been to start anew and create new cities such as Nay Pyi Taw in Myanmar, Islamabad in Pakistan, Songdo in South Korea, Shenzen in China, among many others. One of the more striking examples is in the Maldives which is responding to rising sea levels by relocating people living on outer islands to be closer to the capital of Malé. The City of Hope is being constructed on a nearby artificial island called Hulhumalé, by pumping sand from surrounding atolls and depositing it on shallow reefs that surround the lagoon, fortified with 3m high seawalls. When finished in 2023, the City of Hope will be able to accommodate about 130,000 people (IFC, 2017).

Another example is Saudi Arabia's TechUtopia Neom (Hadfield, 2017) backed by USD 500 billion from the government and powered by renewable energy. The urban area (25,900 km^2) will stretch into Jordan and Egypt, with a bridge spanning the Red Sea. It will feature 100 percent solar energy, autonomous transport, hydroponic farms, artificial intelligence, and advanced manufacturing. Importantly the "software" will also change Saudi Arabia's legal and cultural infrastructure with "no set ways of thinking" and "no restrictions", "open to all races and religions".

5. MODEL CITIES, ECO-TOWNS, AND FRONT-RUNNER CITIES AS PRECURSORS TO SUSTAINABLE CITIES

Various countries have experimented with programmes to develop their own version of sustainable cities. These include India's eco-cities; France's eco-quartier; Japan's eco-model cities; and the United Kingdom's future cities (Joss and Cowley, 2017). The Association of Southeast Asian Nations (ASEAN) has also started recognizing "Model Cities" in 8 member-states since 2011. India's eco-city programme was prepared by the Central Pollution Control Board in 2001, with technical assistance from the German Agency for Technical Cooperation. Six medium sized cities, with populations under 500,000 were chosen. The activities focused on improving public spaces, drainage and sewerage, green areas, reducing congestion, and providing employment for the urban poor. Unfortunately, despite some local improvements to existing infrastructure, the programme "was strongly criticized for not delivering on its goals" (Joss and Cowley, 2017). Subsequent efforts such as the Delhi-Mumbai eco-city programme, the Near Zero Energy Satellite Towns, and Solar Cities launched a decade later, appear not to have learned the lessons from the earlier programme.

France's eco-quartier programme was launched as part of the national Urban Sustainability Plan in 2009, attempting to combine economic investment and sustainable development. The programme focused on retrofitting existing urban centres and urban expansion. Measures of success include the selection of 38 urban areas, issuance of 39 eco-quartier certifications, 600 participating organisations, and over 55,000 buildings

certified (Joss and Cowley, 2017).

Japan's eco-model city programme was launched in 2008 "in order to transform Japan into a low-carbon society" (Murakami, 2008). Initially 82 cities applied and were classified by size. Large cities were expected to transition to low carbon with reforms in energy utilization, transportation, housing, and urban infrastructure. Regional central cities were expected to achieve a compact city with every public amenity within walking distance and develop the public transport network. Small cities were expected to approach low carbonization by using their rich natural environment for energy and carbon offsets/sequestration. Ultimately 6 cities fully satisfied the selection criteria (Yokohama, Kitakyushu, Obihiro, Toyama, Shimokawa, and Minamata) while another 7 cities were candidates but needed to resolve some issues to fully satisfy the selection criteria (Murakami, 2008).

Following the Fukushima Daiichi nuclear disaster in 2011, an additional 10 cities were selected. At about the same time, the Government also launched a FutureCity initiative involving 11 model cities (four of which overlapped with the earlier programme), bringing the total number of model cities to 30. The "FutureCity" initiative was one of 21 national strategic projects for the "New Growth Strategy" (approved by Cabinet on 18 June 2010) (Fujino and Asakawa, 2017). The Cabinet Office also set up the Promotion Council for Low-Carbon Cities to share and disseminate information on best practices (Joss and Cowley, 2017).

In the UK, the Technology Strategy Board (now Innovate UK) announced a Future Cities Demonstrator competition in 2012. Of the 50 cities expressing interest, 30 were awarded funding for feasibility studies and 26 submitted proposals for a large-scale demonstration project (Joss and Cowley, 2017). Glasgow was chosen as the winner of this process and has implemented its demonstration projects, mainly focused on retrofitting through data-driven technological innovation. How successful this approach will be remains to be seen, but the UK has had experience previously with eco-towns and zero carbon homes initiatives that were subsequently abandoned (Joss and Cowley, 2017).

An important observation from Joss and Cowley (2017) in comparing these four cases is that "retrofitting cities for long-term sustainable futures typically involves planning and development over several years if not decades, [so] any policy that is short-term may end up being disruptive rather than enabling".

In China, around 280 cities have declared interest in becoming eco-cities and there are already 25 eco-city projects (Deng, 2017). In China each eco-city is expected to decouple economic growth from environmental degradation through innovative urban policy strategies, practices and technologies. Focus is placed on creating new urban areas, low-carbon "green" buildings, and retrofitting existing buildings and infrastructure. China's 12th Five-Year Plan for Green Building and Green Eco-city Development has selected 100 new urban areas to demonstrate these concepts. One of the prime examples of this approach, as well as city-to-city cooperation, is the Sino-Singapore Tianjin Eco-city, which claims to be a model for sustainable development.[2] In the master plan for the city,

eco-cells are the basic building blocks comprising a comfortable walking distance. Four eco-cells provide an eco-neighbourhood, which in turn are combined to form one of four eco-districts, that make up the eco-city. A green lung is at the core of the eco-city, with green eco-corridors reaching into other sections of the eco-city, and water bodies linked together for waterfront development and recreational facilities.

Unfortunately, not all eco-city projects are successful, and China has its share of failed experiments. Dongtan on Chongming Island near Shanghai was designed by British consultants to run on renewable energy, be car-free, and recycle all water and waste, for half a million people (McGirk, 2015). Eventually this experiment was abandoned, some key officials were charged with corruption, and nature began to regain its place in the Chongming Dongtan Nature Reserve.

In 2011, ASEAN established the "Model Cities" programme which has since recognised 39 cities in 8 ASEAN member states as examples of "frontrunners" in sustainable and environmentally-friendly city development. In Asia, the "grow first, clean up later" philosophy development is still prevalent among most policymakers. What distinguishes ASEAN's "Model Cities" is their willingness to implement environmental management with higher or equal priority to socio-economic development in the absence of legal mandates or financial incentives, as compared to the average developing city. Essentially, these Model Cities have tried to emulate the wealthier frontrunner cities in Japan, Europe and the United States.

Over 7 years, "Model Cities" made remarkable strides in reducing public litter, greening public spaces and increasing waste recovery through intensive educational campaigns and pilot projects targeting children, teachers, youths and citizen volunteers. The high-performance cities (typically small- to medium-sized cities with a population less than 250,000 persons) managed to divert organic and recyclable wastes away from the landfill by up to 30 percent compared to the baseline, within a few years. Many cities have instituted bans and controlled use of single-use plastics. Once cities made significant progress on solid waste management, they tend to advance to technically complex projects addressing wastewater treatment, air quality, energy, green buildings and climate change.

Model Cities were exceptionally effective at obtaining support for their initiatives without resorting to expensive technologies, legal instruments and large financial subsidies from the central government. Social media significantly lowered the costs of public educational campaigns. While Model Cities demonstrated the feasibility of disruptive sustainability practices at a limited scale (i.e. typically involving only citizen volunteers and enforcement in less than 10 percent of the total city boundary), they are still far from reaching the 'tipping point' for large-scale transformation.

6. RECOMMENDATIONS

Realistically, the transformational "ceiling" to citywide implementation may only be broken by more serious enforcement of stringent national policy and laws. Many policy areas are not within the jurisdiction of cities in many countries. In particular, cities' power to raise revenue, especially through taxes, is limited. In many countries, there is often no political motivation to pursue disruptive policies in the absence of highly visible public crises or environmental tragedies.

Two less discussed factors seriously impeding the scaling up of sustainable policies and practices are short election cycles and relatively low project management capacity of public officials. Strong support from the mayor is often necessary to initiate and implement major projects and policies (Nakamura and Elder, 2010). Scaling up transformation requires sustained actions far longer than the typical local election cycle (3–4 years). Many sustainable city projects are at risk of being discontinued or dismantled with the change of mayors.

Even if a city's mayoral leadership is stable, it is essential that the most capable city officials with high-level skills in long-term planning, problem solving, communications and critical thinking are empowered to make decisions. Unfortunately, government hiring and promotion mechanisms as well as public service culture are not yet sufficiently meritocratic in most cities. Worryingly, there is no evidence that ASEAN governments are as competitive as the private sector in recruiting and retaining the top talents of society to push ahead with disruptive public policies. Therefore, in ASEAN, government-led transformation towards sustainable cities will depend hugely on government reform and strengthening of public governance as well as other non-state change agents such as citizen advocates and international development organisations.

The rest of this section will discuss two issues in more detail. The first is management capacity, and the second is financing.

6.1 City Management Responses

The first step in helping cities to transform themselves into sustainable cities, particularly in developing countries, is to strengthen their basic management capacity. Many proposals related to specific policy areas have been made before, such as better public transportation, stronger building codes and enforcement, integrated waste management, etc. However, in many cases, none of these measures can be implemented, or at least implemented well, without much stronger management capacity, including the ability to coordinate integrated approaches. Similarly, management capacity may be a higher priority even than financing, since without management capacity, it will be difficult to spend available money effectively.

There are many common daunting and difficult challenges for rapidly developing Asian cities. The sheer numbers of people, along with a huge influx of migrants/immigrants

(rural to urban; foreign) tend to overwhelm city infrastructure. Because of this excessively rapid urbanization, the demand for municipal services (sanitation, transport, housing) is larger than the available supply (see SDGs[3]) (United Nations, 2017). Many of the more recent low-income migrants tend to live in disaster-prone areas (low-lying floodplains and coastal zones; landslide-prone slopes), so there is an urgent need for awareness and education along with appropriate zoning and land-use plans (for further details see the Sendai Framework for Disaster Risk Reduction 2015-2030 [4] and AADMER Work Programme 2016-2020 (ASEAN, 2016). As a result, most Asian cities have a visible rich-poor divide. Rich people live in protected areas, often walled off with armed guards, and enjoy higher quality municipal services. In addition, Asian society is aging fast (especially in Japan and China) so there is a need for investment in infrastructure during the bonus period while there is still sufficient working (and therefore taxable) population (e.g., Project for Promoting Sustainability in Future Cities of Thailand, NESDB[5]).

Demands on local governments are multifaceted and complex. They must address simultaneously economic development, industrialization (often prioritizing business first), job creation and income generation, accommodating increasing numbers of immigrants; and increasing productivity (often by neglecting the costs of externalities).

They must also maintain the quality of life for city residents. Environmental protection and pollution control, solid waste management, wastewater treatment, air quality management (pollution control of the transportation sector and industries) are usually delegated to local governments. In addition, cities are expected to address nature conservation (forests, mangroves, wetlands, green parks, rivers and lakes), housing (water supply, power supply, sanitary services), access (public transportation; convenience), social security (education, hospitals, health, crime), and disaster risk management.

There are several ways of measuring cities competitiveness in maintaining this quality of life (e.g., Cities index such as Cities of Opportunity (PWC, 2016), Singapore's CLC Liveability Framework (Centre for Liveable Cities Singapore and Singapore, 2014), quality of life (QOL) evaluation by CASBEE Cities[6], and UN-Habitat's City Prosperity Initiative (CPI)[7]). Of course, a new and increasingly urgent concern is posed by climate change, meaning that city administrations now must deal with low-carbonization, energy efficiency promotion, renewable and clean energy usage, and GHG emissions measurement/accounting (e.g., GHG Protocol for Cities (WRI, C40 and ICLEI, 2014)).

Balanced development is ideal, but often economic development is prioritized over environmental protection. The challenge is to protect the environment while promoting economic development.

Demand for local governments to address these multifaceted issues is high; however, available resources (staff, budget) are limited. Despite these constraints, good leaders/managers can deliver results.

The quality of municipal services depends on the quality of municipal staff. Municipal staff need to be trained, motivated and incentivized to perform better. Financial incentives are

a challenge. It is ideal if a city can attract quality managers from highly-paid private companies, but this is not often the case. Yokohama City[8] and Toyama City[9] have recruited managers from private companies and other organisations – so, it's not impossible. Big Japanese cities accept national government officials and send their staff to national agencies – in this way, nurturing strong relationship and narrowing the national-rural knowledge gap. These larger cities also set up a Tokyo office to better coordinate with and try to influence national policies.

In developing countries, cities may need to rely expert inputs from the national level or from abroad. Training should be focused on planning, legislation and financing – the main administrative tools that cities possess. For example, for municipal solid waste management, waste needs to be collected from each household, transported, treated (sorted for recycling, composted, incinerated, etc.) to minimize the volume, and the remainder disposed at landfill sites in a controlled manner (ADB, 2017b). All these processes need to be managed effectively using available resources, and can be improved by:

- Legislation for collecting waste management fees; controlling illegal dumping; outsourcing collection, transportation, treatment and management of landfills;
- Enforcement supported by monitoring and evaluation required for making the system work;
- Collecting fees required for better service. Waste generators (polluters) should pay for the service. Waste minimization should be incentivized by increasing charges (but this is not easily done); and
- Stakeholder communication to improve understanding of the system.

Various management skills are required for better planning with proper legislation and resource allocation. Some cities are performing better than others. Effective management of one sector can lead to the same in other sectors (e.g. Nonthaburi[10], Surabaya[11], Davao[12], Malang[13]). Long-term planning and political stability are also essential (e.g. San Fernando, La Union[14] [15]; Nonthaburi[16]).

For example, there are mayoral elections every three years in the Philippines. As a result, quick economic development projects tend to be prioritized over long-term environmental projects. Also, cities dominated by specific families sometimes have an advantage in investing in long-term projects. The former Makati Mayor has transformed the solid waste management status significantly due to his strong leadership – demanding results in time. The Nonthaburi Mayor has been elected for 5 terms, while the Surabaya Mayor is a former director of solid waste and parks management department. The policies of both cities have been stable for a long period of time.

Disaster risk reduction can lead to population growth and prosperity, for example in Ormoc City in the Philippines, where flood risk reduction and river management has been implemented from upstream to downstream[17].

Good performing cities can attract further support as credibility is guaranteed such as the GEF/WB Global Platform for Sustainable Cities[18] and the ADB Future Cities Programme

(ADB, 2017a). Many development projects in Surabaya, Nonthaburi, San Fernando (La Union), Malang, etc. are based on these programmes.

Singapore is a role model for long-term planning focusing on economic development and quality of life. Human resource development is integrated, and private sector investment is induced. The Singapore model has included: public housing and transport; "constellation" concept; 1971 Concept Plan Structure; The State and City Planning (SCP) Project; 1991 Concept Plan review; Central area development; industrialization through FDI; Development Guide Plans (DGPs); Urban Redevelopment Authority (URA); Housing Development Board (HDB); Economic Development Board (EDB); and training of business-minded, talented officials.

City managers also need to become more competent in mobilizing private resources – for park management, investment in disaster risk reduction, energy efficient (zero-energy) buildings, smart communities. Some examples include:

- Green building certificate: Singapore[19]; Tokyo[20]
- Park management: Sibu (Philippines)[21], Malaysia;
- Green and Clean campaign: Surabaya[22]
- Food barriers: Singapore[23]
- Smart community demonstration project: Kitakyushu (Japan)[24]
- Collecting final disposal fees from industries for the use of environmental awareness activities: Kitakyushu (Japan)[25]

Some sectors require close coordination with national agencies, such as transportation, city planning (urban and land-use plans), energy management, disaster risk management, low-carbon planning.

Some sectors require a more business-like attitude – urban development, transit-oriented development, waterfront development, increasing the land value and tapping into that to further invest in quality of life enhancing measures. Some examples include:

- Transit Oriented Development: Toyama (Japan)[26]; Yokohama Minato Mirai (Japan)[27]; private railway company-led development in Tokyo and Osaka[28]
- Bus Rapid Transit: Ahmedabad (India)[29]

As can be seen from these multi-faceted management demands, city administrations have been dealing with most of the issues addressed by the SDGs for many decades prior to 2015 and many valuable lessons have been learned. Therefore, it is difficult to conclude that the SDGS alone will trigger a transformation towards sustainable development—as sustainable development has been a constant, yet distant goal for most cities in Asia, for the reasons outlined above. Add to these practical management difficulties the issue of financing and the challenges become even more daunting.

6.2 Financing the Transformation to Sustainable Cities

On financing to capture the benefits of urbanization, the New Urban Agenda states:

> "We support context-sensitive approaches to financing urbanization and enhancing financial management capacities at all levels of government through the adoption of specific instruments and mechanisms necessary to achieve sustainable urban development, recognizing that **each country has the primary responsibility for its own economic and social development**".
>
> "We will mobilize endogenous resources and **revenues generated through the capture of benefits of urbanization**, as well as the catalysing effects and maximized impact of public and private investments, in order to improve the financial conditions for urban development and open access to additional sources, recognizing that, for all countries, public policies and the mobilization and effective use of domestic resources, underpinned by the principle of national ownership, are central to our common pursuit of sustainable urban development, including implementation of the New Urban Agenda".
>
> "We will promote sound and transparent systems of **financial transfers from national governments to subnational and local governments** based on the latter's needs, priorities, functions, mandates and performance-based incentives, as appropriate, in order to provide them with adequate, timely and predictable resources and enhance their ability to raise revenue and manage expenditures" (United Nations, 2017).

The Asian Development Bank (ADB) estimates that "developing Asia will need to invest USD 26 trillion from 2016 to 2030, or USD 1.7 trillion per year, if the region is to maintain its growth momentum, eradicate poverty, and respond to climate change" (ADB, 2017c). In Asia's urban transport sector alone, mass transit subway investments are likely to reach USD 230 billion over the next 15 years.

At the sub-regional level, the International Finance Corporation (IFC) has highlighted some of the likely investment costs for South Asia. To address climate change alone, a USD 3.4 trillion investment opportunity for South Asia exists in key sectors between 2018 and 2030, assuming each country will fully meet its NDC and relevant sectoral targets and policy objectives (IFC, 2017). Other investment needed includes USD 1.53 trillion in green buildings, USD 286.1 trillion in transport infrastructure, USD 669.8 billion in electric vehicles, USD 18.6 billion in municipal solid waste, and USD 144.6 billion in climate-smart urban water.

Coming down to an individual country level, China is rapidly urbanizing and has invested heavily in urban infrastructure over the past decade. From 2016-2030, projected investment needed in urban China amounts to USD 6.3 trillion (water supply-USD 0.3 trillion; wastewater-USD 0.3 trillion; solid waste-USD 0.3 trillion; roads-USD 2.2 trillion; subways-USD 1.9 trillion; district heating-USD 0.3 trillion; and urban climate change mitigation (to 2020)-USD 1.0 trillion) (ADB, 2017c). For India, a total of USD 2.9 trillion is needed for urban investment from 2018-2030 (IFC, 2017).

Some specific sector investments include USD 13 billion for climate-smart wastewater infrastructure in Bangladesh, USD 2.5 billion and USD 940 million for electric vehicles in Nepal and Bhutan respectively, USD 1.5 billion in climate-proofed transport infrastructure in Maldives, and USD 6.2 billion for wastewater and USD 3.5 billion for solid waste management in Sri Lanka (IFC, 2017).

Current infrastructure investment, however, is considerably less than the USD 1.7 trillion per year estimated as the annual need, and is closer to USD 700 billion (2011 data), with East Asia investing the most (USD 563 billion) and Southeast Asia the least (USD 41 billion). Southeast Asia's annual infrastructure investment is only 2.1 percent of GDP, compared to 5.8 percent in East Asia (ADB, 2017c). ADB's analysis suggests that at least 6 percent of GDP should be invested in infrastructure, much of it in cities. Private investment is mostly in housing, telecommunications, and energy. Complicating investment needs, climate change adjusted estimates are about 16 percent higher than business as usual (ADB, 2017c).

So where will these billions and trillions of dollars needed for transformation of Asia's cities come from?

Land value capture is one of the principal means of financing urban infrastructure, capturing the appreciation of land prices for subsequent re-investment in infrastructure, with prominent examples in Japan, South Korea, and China (ADB, 2017c). Governments can acquire land and/or use rights and then sell, lease or trade that land to finance infrastructure. They can also build the infrastructure and then impose taxes, fees, or user charges to recoup the investment. Alternatively, developers can be given the rights to develop the infrastructure and lease the surrounding land for housing or commerce. Land value capture combined with higher floor space indexes close to transportation hubs, allows for densification of cities without triggering increased congestion. The best example of this approach has been through the railway network in Japan, where land released for development close to stations increased in value very rapidly. According to ADB (2017) land value capture is "most appropriate for three project types: (i) new land development; (ii) major capital projects, particularly in transportation; and (iii) infrastructure that supports basic services such as water supply, wastewater treatment, and drainage".

New cities also benefit from land value capture, as experienced in South Korea. When the Government rezoned four new urban districts from agriculture or forestry in Gyeonggi Province, the land developer captured part of the increase in land values and then financed new suburban railways and expressways to connect with Seoul (ADB, 2017c). In China, where rural land is owned by the state, land value capture is through land transfer fees (lump sum payments for long-term leases of land), which local governments can then use as collateral for loans.

As cities are often constrained in their taxing powers, many cities have turned to urban bonds for financing critical infrastructure. Credit worthiness is a key requirement for local

governments to unlock capital investments through (i) credible accounting; (ii) sound financial management; (iii) independent auditing; and (iv) performance evaluation (IFC, 2017). Green bonds are also growing in volume, tapping into a deep pool of value investors. For example, India issued USD 3.2 billion in green bonds in April 2017 for renewable energy, low-carbon transport, green buildings, and energy efficiency.

Although local governments do not have the same powers for taxation as national governments, they do have limited taxation, fees, charges, and rebates which can help to promote sustainable development. For example, land tax can be levied on the improved value of properties, as property prices rise naturally in response to limited supply. License fees, permits, and charges can direct private investment towards environmentally sound activities and punish polluters.

In Singapore, 25 percent of each citizen's income is pooled automatically and the employer also needs to pool the same amount since 1984. It used to be 5 percent each when the scheme started in 1955 and the rate has been gradually increased in parallel to the economic growth. This fund has been heavily invested in development projects including public housing, central district development, public transport, Jurong Industrial Estate, etc. The Central Provident Fund was amended in 1968, so that Singaporeans could withdraw funds to cover mortgages under the Home Ownership Programme introduced in 1964[30].

The IFC notes that this financing cannot all come from the public sector (IFC, 2017). Therefore, they recommend that governments (i) create coherent regulations and policies that enable markets to thrive; (ii) promote competition and innovation; (iii) identify and allocate risks across the public and private sectors; and (iv) build capacity and new skills in the workforce. Public-private partnerships that factor in the best aspects of public governance and private sector innovation are key. Strong, consistent political leadership providing clear signals to the private sector is essential to provide the certainty that the private sector needs to tackle these new markets. Turning national plans and strategies into bankable projects and developing a pipeline of ready-to-fund, economically viable projects will also attract the private sector and financial markets.

At the same time, there may be a limit to the extent to which the private sector can support sustainable development projects which generate significant public value, but not much private profit. And cities' ability to generate their own funds through taxation or bonds is limited. Therefore, for some major projects or programmes, for example public transportation, national governments will probably need to contribute significant funding, or alternatively, give cities more power to raise funds on their own.

7. CONCLUSIONS

Indicative of the extent to which cities can claim to be transformative is their ability to

address simultaneously the SDGs and the Paris Agreement, among other multilateral agreements. For example, the 30 FutureCity and Eco-Model Cities in Japan address on average 6.6 out of the 17 SDGs (Fujino and Asakawa, 2017). Shimokawa City, self-styled as a "Forest FutureCity", is developing its own SDG vision for all 17 goals in 2030 and is preparing indicators for monitoring progress and disseminating the results. By way of contrast, only 12 percent of local governments in Japan appear to be even aware of the SDGs (Murakami, 2017). In a way, this highlights the difficulty in scaling up from these small, worthy but piecemeal initiatives, to a complete global paradigm shift in the way cities are planned and managed through the window of sustainable development.

As cities become the primary locations of most of the world's population, some hard policy choices and investment decisions need to be made. Will cities meet the needs of all citizens, or will they divide into elite gated communities for the few, protected by armed guards, and festering slums and loci of discontent for the many? Will governments attempt to retrofit already unsustainable cities or abandon them and create new cities or new precincts that follow sustainability principles? Will central governments delegate increasing taxation powers to city administrations or find other ways to finance the infrastructure deficits and urban services? How will the trillions of dollars needed to enable the sustainability transformation be mobilized fast enough? Can the private sector be sufficiently engaged in the transformation of cities, if larger profit can still be made from unsustainable development? These are not decisions that can be postponed any longer as city transformations won't happen overnight.

There are glimpses of what a sustainable future of cities might look like and there are many worthy experiments and pilot activities underway. The prospect of achieving the SDGs, however, will depend largely on successful implementation in cities, where most people will live. The overwhelming evidence suggests, however, that the "festering slums and loci of discontent" will become the norm, unless there is a complete paradigm shift among governments at all levels. That paradigm shift was well articulated in the New Urban Agenda. The challenge now is to turn that vision into action.

Notes

1 Information is available on the website of the Sustainable Development Solutions Network (SDSN) at: http://unsdsn.org/what-we-do/solution-initiatives/rio-sustainable-cities-initiative/. (Accessed June 19, 2018.)

2 See: https://www.tianjinecocity.gov.sg/bg_intro.htm. (Accessed June 19, 2018.)

3 See: https://sustainabledevelopment.un.org/sdgs. (Accessed June 18, 2018.)

4 See: http://www.unisdr.org/we/coordinate/sendai-framework. (Accessed June 18, 2018.)

5 See: http://www.nesdb.go.th/ewt_news.php?nid=6905&filename=esdps. (Accessed June 27, 2018.)

6 See: http://www.ibec.or.jp/CASBEE/english/. (Accessed June 19, 2018.)

7 See: https://unhabitat.org/urban-initiatives/initiatives-programmes/city-prosperity-initiative/. (Accessed June 19, 2018.)

8 See: http://bizgate.nikkei.co.jp/innovation/city/009475_3.html. (Accessed June 19, 2018.)

9 See: http://www.city.toyama.toyama.jp/kikakukanribu/kohoka/kishakaiken/H27/kishakaiken280301_2.html. (Accessed June 19, 2018.)

10 See: http://lcc.ait.asia/upload/activities/Nonthaburi%20Sustainable%20Environmental%20Management%20_11May2011.pdf (Accessed June 19, 2018.)

11 See: https://www.iges.or.jp/jp/archive/kuc/pdf/activity20110727/3_zaky.pdf (Accessed June 19, 2018.)

12 See: https://hls-esc.org/documents/8hlsesc/Thematic%20A1/Thematic%20%20A1%20-%20Davao%2C%20Philippines%20_Davao%20City%20for%20Clean%20Air%20%20by%20Atty.%20Zuleika%20T.%20Lopez.pdf. Accessed June 19, 2018.)

13 See: https://hls-esc.org/documents/7hlsesc/B2%20-%20Malang.pdf. (Accessed June 19, 2018.)

14 See: https://www.scribd.com/presentation/22746018/Presentation-4A-San-Fernando-City-La-Union. (Accessed June 19, 2018.)

15 See: https://kitakyushu.iges.or.jp/docs/network_meetings/kin4/ppt/10.Ortega.pdf. (Accessed June 28, 2018.)

16 See: http://lcc.ait.asia/upload/activities/Nonthaburi%20Sustainable%20Environmental%20Management%20_11May2011.pdf (Accessed June 19, 2018.)

17 See: http://countrysafeguardsystems.net/sites/default/files/4.2%20Disaster%20Risk%20Reduction%20Efforts%20and%20Resettlement%20Experience%20of%20JICA%20Philippines.pdf. (Accessed June 28, 2018.)

18 See: https://www.thegpsc.org/. (Accessed June 28, 2018.)

19 See: http://www.sgbc.sg/. (Accessed June 28, 2018.)

20 See: http://www.kankyo.metro.tokyo.jp/en/climate/files/Tokyo_GB_eng.pdf. (Accessed April 15, 2018.)

21 See: https://hls-esc.org/documents/1hlsesc/CP3.pdf. (Accessed June 28, 2018.)

22 See: https://www.jawapos.com/read/2017/08/22/152441/launching-surabaya-green-and-clean-2017-kompetisi-harus-lebih-maju. (Accessed June 28, 2018.)

23 See: https://docs.wixstatic.com/ugd/e763c6_6d222bccb931424ea3d8704be28487f5.pdf. (Accessed June 28, 2018.)

24 See: http://www.nedo.go.jp/content/100639530.pdf. (Accessed June 28, 2018.)

25 See: http://www.city.kitakyushu.lg.jp/zaisei/file_0057.html. (Accessed June 28, 2018.)

26 See: http://future-city.jp/en/torikumi/toyama/. (Accessed June 28, 2018.)

27 See: http://www.city.yokohama.lg.jp.e.sj.hp.transer.com/toshi/mm21/. (Accessed June 28, 2018.)

28 See: https://hls-esc.org/documents/1hlsesc/DP1.pdf. (Accessed June 28, 2018.)

29 See: http://unfccc.int/secretariat/momentum_for_change/items/7098.php. (Accessed June 28, 2018.)

30 See: https://www.cpf.gov.sg/Members/AboutUs/about-us-info/cpf-overview. (Accessed June 28, 2018.)

References

ADB (2017a) *Engaging with Cities of the Future: A Perspective*. Manila, Philippines: Asian Development Bank. Available at: https://www.adb.org/documents/engaging-future-cities (Accessed: 28 June 2018).

ADB (2017b) *Integrated Solid Waste Management for Local Governments: A Practical Guide*. Manila, Philippines: Asian Development Bank.

ADB (2017c) *Meeting Asia's Infrastructure Needs*. Manila: Asian Development Bank. Available at: https://www.adb.org/publications/asia-infrastructure-needs (Accessed: 22 June 2018).

Amirtahmasebi, R. *et al.* (2016) *Regenerating Urban Land: A Practitioner's Guide to Leveraging Private Investment*. Washington DC: World Bank. doi: 10.1596/978-1-4648-0473-1.

ASEAN (2016) *AADMER Work Programme 2016-2020*. Jakarta: ASEAN Secretariat. Available at: http://www.asean.org/storage/2016/02/AADMER-Work-Programme-2016-2020-v1.6.pdf.

Baker, J. L. and Gadgil, G. U. (2017) *East Asia and Pacific Cities: Expanding Opportunities for the Urban Poor*. Washington DC: World Bank. doi: 10.1596/978-1-4648-1093-0.

Centre for Liveable Cities Singapore and Singapore, C. S. C. (2014) *Liveable and Sustainable Cities: A Framework*. Singapore: Centre for Liveable Cities Singapore, Civil Service College Singapore. Available at: https://www.clc.gov.sg/docs/default-source/books/clc-csc-liveable-sustainable-cities.pdf.

Climate Action (2017) 'New York Pension Fund to divest from fossil fuels', *climateactioniprogram.org*, 21 December. Available at: http://www.climateactionprogramme.org/news/new-york-pension-fund-to-divest-from-fossil-fuels.

Deng, W. (2017) 'Eco-city Development in China', *Asia Dialogue*, 26 June. Available at: http://theasiadialogue.com/2017/06/26/eco-city-development-in-china/ (Accessed: 22 June

2018).

ESCAP (2013) *Urbanization trends in Asia and the Pacific*. Bangkok: United Nations Economic and Social Commission for Asia and the Pacific. Available at: http://www.unescapsdd.org/files/documents/SPPS-Factsheet-urbanization-v5.pdf (Accessed: 21 June 2018).

ESCAP and UN-Habitat (2015) *The State of Asian and Pacific Cities 2015: Urban Transformations Shifting from Quantity to Quality*. United Nations Economic and Social Commission for Asia and the Pacific, and UN-Habitat. Available at: http://www.unescap.org/sites/default/files/The State of Asian and Pacific Cities 2015.pdf.

Fujino, J. and Asakawa, K. (2017) *Taking Action on the SDGs in Japanese Cities: The "FutureCity" Initiative and Its Achievement on the SDGs*. November. Hayama, Japan. Available at: https://pub.iges.or.jp/pub/dp_sdgs_city_e.

Greene, S. and Meixell, B. (2017) *Hacking the Sustainable Development Goals: Can US Cities Measure Up?* Washington DC: Urban Institute. Available at: https://www.urban.org/sites/default/files/publication/92946/2001490-hacking-the-sustainable-development-goals-corrected.pdf (Accessed: 21 June 2018).

Hadfield, G. (2017) 'Saudi Arabia's TechUtopia Neom will have to reinvent the rules to succeed', *techcrunch.com*, 24 December. Available at: https://techcrunch.com/2017/12/24/saudi-arabias-techutopia-neom-will-have-to-reinvent-the-rules-to-succeed/.

IFC (2017) *Climate Investment Opportunities in South Asia*. Washington DC: International Finance Corporation. Available at: https://www.ifc.org/wps/wcm/connect/be4dacbd-18d1-4159-b9e9-e6a95e094d7a/Climate+Investment+Opportunities+in+South+Asia+-+An+IFC+Analysis.pdf?MOD=AJPERES (Accessed: 21 June 2018).

Im, E.-S., Pal, J. S. and Eltahir, E. A. B. (2017) 'Deadly heat waves projected in the densely populated agricultural regions of South Asia', *Science Advances*, 3(8).

Joss, S. and Cowley, R. (2017) 'National Policies for Local Urban Sustainability: A New Governance Approach?', in Eames, M. et al. (eds) *Retrofitting Cities for Tomorrow's World*. London: Wiley, pp. 227–245.

Lucci, P. and Lynch, A. (2016) *The SDGs at city level: Mumbai's example*. 432. Available at: http://localizingthesdgs.org/library/354/The-SDGs-at-city-level-Mumbais-example.pdf (Accessed: 21 June 2018).

McGirk, J. (2015) 'Why Eco-cities Fail', *China Dialogue*, 27 May. Available at: https://www.chinadialogue.net/culture/7934-Why-eco-cities-fail/en (Accessed: 21 June 2018).

Metro Vancouver (2010) *Metro Vancouver Sustainability Framework*. Vancouver: Metro Vancouver. Available at: http://www.metrovancouver.org/about/aboutuspublications/MV-SustainabilityFramework.pdf (Accessed: 21 June 2018).

Misir, T. (2015) 'Singapore Looks Underground for Room to Grow', *Citylab.com*, 29 May. Available at: https://www.citylab.com/equity/2015/05/singapore-looks-underground-for-room-to-grow/394415/.

Murakami, S. (2008) 'Promoting Eco-Model Cities to create a low-carbon society', in *Presentation given at: International Seminar on Promoting the Eco-Model City for Low-Carbon Society*. Kityakushu International Conference Center, Kityakushu, Japan. Available at: http://www.kantei.go.jp/jp/singi/tiiki/kankyo/seminar2008/04murakami.english.pdf (Accessed: 21 June 2018).

Murakami, S. (2017) 'FutureCity Initiative and the Concept of the SDGs (in Japanese)', in *The 7th International Forum for Promoting the "FutureCity" Initiative (4 October)*.

Nakamura, H. and Elder, M. (2010) 'Enabling Factors Promoting Local Initiatives for Sustainable Consumption in Asia: Potential Roles of Local Governments', in IGES (ed.) *Sustainable Consumption and Production in the Asia-Pacific Region: Effective Responses in a Resource Constrained*. Hayama, Japan: Institute for Global Environmental Strategies (White Paper III), pp. p95-117. Available at: https://pub.iges.or.jp/pub/enabling-factors-promoting-local-initiatives (Accessed: 24 May 2018).

New York City Mayor's Office of Sustainability (2017) *1.5°C: Aligning New York City with the Paris Climate Agreement*. Available at: https://www1.nyc.gov/assets/sustainability/downloads/pdf/publications/1point5-AligningNYCwithParisAgrmtFORWEB.pdf (Accessed: 21 June 2018).

Ng, R. (2000) 'Over 200 Feared Dead in Manila Garbage Slide', *reliefweb.int*, 11 July. Available at: https://reliefweb.int/report/philippines/over-200-feared-dead-manila-garbage-slide.

OECD (2015) *Water and Cities*. Paris: OECD Publishing (OECD Studies on Water). doi: 10.1787/9789264230149-en.

Oskin, B. (2017) 'Japan Earthquake & Tsunami of 2011: Facts and Information', *livescience.com*, 13 September. Available at: https://www.livescience.com/39110-japan-2011-earthquake-tsunami-facts.html (Accessed: 21 June 2018).

Patrick, S. M. (2012) 'Cities Are Making Natural Disasters Deadlier', *Citylab.com*, 15 August. Available at: https://www.citylab.com/equity/2012/08/cities-are-making-natural-disasters-deadlier/2957/ (Accessed: 21 June 2018).

PWC (2016) *Cities of Opportunity 7*. Pricewaterhouse Coopers. Available at: https://www.pwc.com/us/en/cities-of-opportunity/2016/cities-of-opportunity-7-report.pdf.

Reuters (2017) 'China's Shanghai to battle "big city disease" by limiting population to 25 million', *Reuters.com*, 26 December. Available at: https://www.reuters.com/article/us-china-shanghai-population/chinas-shanghai-to-battle-big-city-disease-by-limiting-population-to-25-million-idUSKBN1EK04X.

SDSN and GIZ (2016) *Getting Started with the SDGs in Cities: A Guide for Stakeholders*. Sustainable Development Solutions Network and German Cooperation. Available at: http://unsdsn.org/wp-content/uploads/2016/07/9.1.8.-Cities-SDG-Guide.pdf (Accessed: 22 June 2018).

Stapleton, S. O. *et al.* (2017) *Climate change, migration and displacement: the need for a risk-informed and coherent approach*. Overseas Development Institute and United Nations Development Programme. Available at: https://www.odi.org/publications/10977-climate-change-migration-and-displacement-need-risk-informed-and-coherent-approach (Accessed: 22 June 2018).

Strauss, B. H., Kulp, S. and Leverman, A. (2015) *Mapping Choices: Carbon, Climate, and Rising Seas, Our Global Legacy*. Climate Central Research Report. Available at: http://sealevel.climatecentral.org/uploads/research/Global-Mapping-Choices-Report.pdf (Accessed: 28 June 2018).

Tan, A. (2018) 'Singapore to boost climate change defences', *Singapore Straits Times*, 8 January. Available at: https://www.straitstimes.com/singapore/environment/spore-to-boost-climate-change-defences.

Teoh, W. C. (Shom) (2018) *Early Views of ASEAN's 'Frontrunner Cities' on the Sustainable Development Goals (SDGs) and Local Data Management*. Bangkok: Institute for Global Environmental Strategies Policy Report. Available at: https://pub.iges.or.jp/pub/early-views-aseans-frontrunner-cities (Accessed: 24 May 2018).

UNDESA (2014) *World Urbanization Prospects: The 2014 Revision (ST/ESA/SER.A/352)*. United Nations, Department of Economic and Social Affairs, Population Division. doi: 10.4054/DemRes.2005.12.9.

United Nations (2017) *New Urban Agenda, Conference on Housing and Sustainable Urban Development (Habitat III)*. doi: ISBN: 978-92-1-132757-1.

Vance, E. (2017) 'Why the Mexico City earthquake shook up disaster predictions', *Scientific American*, 21 September. Available at: https://www.scientificamerican.com/article/why-the-mexico-city-earthquake-shook-up-disaster-predictions1/# (Accessed: 22 June 2018).

WHO/UN-Habitat (2010) *Chapter 1: Development Context and the Millennium Agenda The Challenge of Slums: Global Report on Human Settlements 2003 Revised and updated version (April 2010)*. Available at: https://unhabitat.org/wp-content/uploads/2003/07/GRHS_2003_Chapter_01_Revised_2010.pdf (Accessed: 22 June 2018).

World Bank (2015) *East Asia's Changing Urban Landscape: Measuring a Decade of Spatial Growth*.

Washington DC: The World Bank. doi: 10.1596/978-1-4648-0363-5.

WRI, C40 and ICLEI (2014) *Global Protocol for Community-Scale Greenhouse Gas Emission Inventories: An Accounting and Reporting Standard for Cities*. World Resources Institute, C40 Climate Leadership Group, ICLEI Local Governments for Sustainability. Available at: https://ghgprotocol.org/sites/default/files/standards/GHGP_GPC_0.pdf.

Chapter 5

Business and SDGs: Raising the Level of Ambition

Peter King, Mark Elder and Akiko Shigemoto

Chapter 5

Business and SDGs: Raising the Level of Ambition

Peter King, Mark Elder, and Akiko Shigemoto

Main messages

- Agenda 2030 calls upon "all businesses to apply their creativity and innovation to solving sustainable development challenges";
- If a major part of total global annual investments by businesses was directed towards the SDGs, then their achievement would not be in question;
- Most efforts to promote business involvement in the SDGs have relied on voluntary approaches rather than regulation;
- Given the profit incentive of most companies and the easy option of cherry picking a few SDGs that align with their business model, reliance on voluntary approaches is unlikely to be transformative;
- Only a few companies have systematically examined their contribution to the SDGs or the implications of the SDGs for their business operations;
- For submission of voluntary national reviews, comprehensive reporting on local company contributions to the SDGs should form a significant portion of national reporting. Also, companies should use corporate sustainability reporting to demonstrate their willingness to adopt the SDGs;
- Governments can create winners and losers through regulation, providing incentives and disincentives to motivate companies to focus on the SDGs and turn away from unsustainable activities; and
- In the long run, if companies do not adopt a more transformative approach, then their current business model could be at risk, and the SDGs will not be achieved.

1. INTRODUCTION

For the SDGs to be truly transformative, business at all levels needs to be fully engaged. This chapter analyses the extent of their involvement to date, starting from the global perspective and then narrowing down to the Asian region to see if business in the "world's factory" has fully embraced the SDGs. The chapter also makes suggestions on how businesses could be encouraged to take more ambitious and transformative actions.

Most existing efforts to promote business involvement in the SDGs rely on voluntary approaches. It is not easy for most companies to understand the SDGs, which are very complex, with 17 goals, 169 targets, and 232 indicators so the easiest option to start with is to pick out one or two SDGs that are in alignment with the company's existing business model. This chapter underlines that this approach is unlikely to be transformative. This chapter emphasizes that the SDGs will require large investments and provide correspondingly large business opportunities, but it also considers that stronger action by governments may be needed to accelerate the pace of making business actions more sustainable.

The chapter is aimed not only at business leaders but also governments that can augment the voluntary nature of the SDGs through more compelling forms, through policies, laws, regulations, standards, and stricter enforcement. The intended audience also comprises consumers, investors, and activists, as they play an important role in making sure that "voluntary" doesn't mean easily ignored.

2. THE ROLE OF BUSINESS IN THE SDGS

As one of the main contributors to unsustainable development, business has an important role to move away from such activities and focus on the SDGs. However, it is very difficult for most companies to understand the SDGs, which are highly complex. Large companies may have enough resources to understand and address SDGs, and some social entrepreneurs already have more sustainable business models. However, for millions of small and medium sized businesses, SDGs may be very difficult to understand and address. Accordingly, the SDG Compass was developed to provide guidance on why the SDGs matter to business, making the business case for companies to be engaged in the SDGs, and assisting businesses to monitor, report, and communicate on the actions they are taking to implement the SDGs (GRI, UN Global Compact and WBCSD, 2015).

In relation to the business case, the first observation is that the SDGs explicitly require business to be fully engaged. Agenda 2030 calls upon "all businesses to apply their creativity and innovation to solving sustainable development challenges", and states that "Governments, international organizations, the business sector and other non-State actors and individuals must contribute to changing unsustainable consumption and production patterns" (United Nations, 2015). Although the SDGs are voluntary, there will be increasing expectations by shareholders and other investors that companies have at least ensured

that their business model is not in direct contravention of the SDGs and where possible has fully examined the opportunities that will flow from implementation of the SDGs.

Therefore, a key reason why businesses should pay attention to the SDGs is to align their activities with stakeholder expectations and policy directives at all levels. Those that fail to make this re-alignment will become increasingly exposed to physical (e.g., climate change), legal, disinvestment, and reputational risks. For example, the major oil companies are now facing a barrage of class action legal cases as they failed to act on prior knowledge of their contribution to climate change. To keep track of these cases, the Sabin Center for Climate Change Law at Columbia Law School and Arnold & Porter have developed two databases (Sabin Center for Climate Change Law, 2018).

The main business case for the SDGs should be the enormous business opportunities provided by the SDGs for companies at the cutting edge of the "green" business sector. As noted by the SDG Compass, progressive companies can use the SDGs to "shape, steer, communicate, and report" on their business strategies and actions. According to the Business and Sustainable Development Commission (Business and Sustainable Development Commission, 2017), the SDGs open up USD 12 trillion in market opportunities in the food and agriculture, cities, energy and materials, and health sectors alone, accounting for 60 percent of the real economy. The Commission also notes that failure to pursue these opportunities will lead to an unsustainable world which will not be viable for any business[1].

Voluntary efforts by companies are important, and strengthening their ambition should be encouraged as much as possible. However, their transformative potential may be limited. It would be unrealistic to expect all companies to participate, and the scale of participation of most companies is likely to be a relatively small share of their business at most. Many actions are likely to be incremental adjustments rather than major transformations of core business models. Simply understanding the complexity of the SDGs is a major challenge for most companies, especially small and medium sized ones. Advising companies on how to build the SDGs into their strategies and plans may be a good business for consulting companies, but many companies may not be able to afford it, so it is unclear how far these initiatives will be able to progress on their own. Moreover, voluntary efforts may be undermined by competition or free riders if the efforts are costly and other companies do not follow suit.

Voluntary measures will probably need to be enhanced and augmented through stronger government actions. "Voluntary" can become "mandatory" if governments are prepared to lead business towards fully implementing the SDGs. A key question is whether governments can force business to adopt the SDGs, given that they are voluntary, or whether companies can simply ignore or pay lip service to the SDGs. Certainly, many of the SDGs have been subject to conventions, laws, regulations, and standards long before the 2030 Agenda. However, these regulations are not necessarily sufficient to effectively promote sustainability, and they are sometimes not well-enforced. Nevertheless, it may be necessary to consider how governments could use regulatory and fiscal incentives to more effectively align companies' activities with the SDGs.

3. SURVEY OF CURRENT BUSINESS ENGAGEMENT

3.1 Global Perspective

From a global perspective, many businesses and business associations are enthusiastically embracing the SDGs. Some businesses which have experienced a loss of public confidence due to various scandals or crises, may follow the SDG framework as a way to regain public trust and essentially regain the social licence to operate. The Business and Sustainable Development Commission believes it is possible for businesses to reset their strategies and transform markets in line with the SDGs (Business and Sustainable Development Commission, 2017). The corporations represented by the Commission recognize that while following this path may be disruptive and will require experimentation, the greatest rewards will go to the front runners and more agile companies. First movers are believed to have a 5-15 years advantage on the sustainable playing field.

Many companies recognized the potential benefits from sustainable development, even before the 2030 Agenda. Over 9,500 companies have adopted the 10 principles of the Global Compact[2], which was formed by the UN in 2000. These principles cover human rights, labour, environment, and anti-corruption. Currently, the Global Compact has a multi-year campaign to raise business awareness and action to support the SDGs by 2030. Each year, a group of SDG pioneers are recognized by the Global Compact Leaders' Summit (UN Global Compact, 2017b). Companies which have adopted the 10 principles are more likely to be attuned to sustainable development and readier to embrace the SDGs.

Among the companies that have joined the Global Compact, 75 percent have indicated that they are already undertaking action on the SDGs. To provide access to innovative business solutions and market opportunities, the Global Compact has launched a Global Opportunities Explorer, based on research from 18,000 business leaders and 17 expert panels. In addition, the Global Compact has prepared a Blueprint for Business Leadership on the SDGs, which systematically works through the 17 goals and highlights potential business responses (UN Global Compact, 2017a). The results for four selected SDGs are summarized below in Table 5-1, totalling over USD 12 trillion.

The World Business Council on Sustainable Development (WBCSD) has provided similar guidance with its CEO Guide to the SDGs (WBCSD, 2017a). This report notes the Better Business, Better World estimates that implementation of the SDGs could create 380 million new jobs by 2030, almost 90 percent of them in developing countries. WBCSD is also preparing sector roadmaps for the SDGs and has inaugurated the Leading Women Awards for business women contributing to the SDGs[3].

Business Call to Action (BCtA) is a business-government alliance to work on the SDGs. Member companies, which number over 200, pledge to develop "inclusive business models that engage people at the base of the economic pyramid (BoP)". The secretariat is hosted by the UN Development Programme (UNDP). Donor governments include: the

Dutch Ministry of Foreign Affairs, the Swedish International Development Cooperation Agency (Sida), the Swiss Agency for Development and Cooperation, the UK Department for International Development (DFID), the US Agency for International Development (USAID). [4]

Other potentially transformative business initiatives focus more specifically on climate change, such as We Mean Business[5], RE100[6], and Science-based Targets Initiatives[7]. Still, much more needs to be done and greenwashing is a constant danger.

Table 5-1 Business Opportunities for Four Selected SDGs

Food & Agriculture (SDG 2)	Cities (SDG 11)	Energy & Materials (SDG 7)	Health & Well-being (SDG 4)
Reducing food waste in the value chain	Affordable housing	Circular models – automotive	Risk pooling
Forest ecosystem services	Energy efficiency - buildings	Expansion of renewables	Remote patient monitoring
Low-income food markets	Electric and hybrid vehicles	Circular models - appliances	Telehealth
Reducing consumer food waste	Public transport in urban areas	Circular models - electronics	Advanced genomics
Product reformulation	Car sharing	Energy efficiency – non-energy intensive	Activity services
Technology in large-scale farms	Road safety equipment	Energy storage systems	Detection of counterfeit drugs
Dietary switch	Autonomous vehicles	Resource recovery	Tobacco control
Sustainable aquaculture	ICE vehicle fuel efficiency	End use steel efficiency	Weight management programs
Technology in smallholder farms	Building resilient cities	Carbon capture and storage	Better disease management
Micro-irrigation	Municipal water leakage	Energy access	Electronic medical records
Restoring degraded land	Cultural tourism	Green chemicals	Better maternal and child health
Reducing packaging waste	Smart metering	Additive manufacturing	Healthcare training
Cattle intensification	Water and sanitation infrastructure	Local content in extractives	Low-cost surgery
Urban agriculture	Office sharing	Shared infrastructure	
	Timber buildings	Mine rehabilitation	
	Durable and modular buildings	Grid interconnection	
USD 2.3 trillion	USD 3.7 trillion	USD 4.3 trillion	USD 1.8 trillion

Source: (UN Global Compact, 2017a)

Only a few companies have systematically examined their contribution to the SDGs. The example of Coca-Cola[8], shown below in Table 5-2, illustrates how such a mapping might be done. This is not to say that Coca-Cola is a sustainable company, as it has had various sustainability-related problems such as the negative health impacts of its signature product and conflicts with local communities over access to water. However, the company is one of the very few which have tried to address all 17 SDGs.

Table 5-2 Coca-Cola Company's Contributions to the SDGs

Sustainable Development Goal	Coca Cola's Contribution to the SDGs
1. No poverty	Providing jobs for over 700,000 people globally
2. Zero hunger	Developing a fortified drink product to give school children needed vitamins and minerals
3. Good health and well-being	Improving health systems across Africa with logistics expertise through Project Last Mile
4. Quality education	Supporting learning inside and outside the classroom through the Coca-Cola Foundation
5. Gender equality	Enabling the empowerment of 5 million women entrepreneurs by 2020
6. Clean water and sanitation	Returning to communities and nature the amount of water used annually through local and regional projects
7. Affordable and clean energy	Using more fuel-efficient distribution fleets to reduce our global carbon footprint
8. Decent work and economic growth	Managing the business and supply chain around the world with respect for human rights
9. Industry, innovation and infrastructure	Providing goods and services to underserved communities via social enterprise initiatives such as EKOCENTERTM
10. Reduced inequalities	Investing in local programmes to help address youth unemployment, such as Coca-Cola Coletivo in Brazil
11. Sustainable cities and communities	Returning at least 1% of the prior year's operating income annually to support sustainable communities
12. Responsible consumption and production	Preventing waste through resource minimization, recycling and package innovation, such as PlantBottleTM
13. Climate action	Reducing the carbon footprint of the "drink in your hand"
14. Life below water	Working with World Wildlife Fund to conserve and protect freshwater resources
15. Life on land	Sustainably resourcing top ingredients by 2020 and working to increase crop yields for farmers
16. Peace, justice and strong institutions	Working with stakeholders to foster transparency and greater respect for human rights
17. Partnerships for the goals	Using the power of Golden Triangle partnerships to make a difference in the communities where Coca-Cola operates

Source: See (Nowak, 2018).

The United States Council for International Business has created a website where companies can highlight their contribution to the SDGs[9]. Without judging the companies listed, some of the contributions are quite interesting. For example, Dupont is working to

improve the livelihoods of at least 3 million farmers and their rural communities by the end of 2020 (SDG1); and is the leading supplier of speciality materials to more than 700 million solar panels (SDG7). ExxonMobil (SDG3) is the largest private sector grant funder combating malaria, with USD 163 million provided to partners from 2000-2017.

Unfortunately, few of the companies listed have conducted the kind of comprehensive mapping that Coca-Cola has attempted, and often their contribution is limited to one or two SDGs. This is similar to the common practice of many governments to cherry-pick a few selected priority SDGs rather than treating them as an indivisible set of goals and targets. The business consultancy PwC surveyed the sustainability reporting of 470 companies in 2017 and found that 37 percent of companies selected priority SDGs, while 25 percent merely mentioned the SDGs, and 38 percent made no mention of the SDGs. Hence, the majority of these companies have no meaningful engagement with the SDGs, and those that do are selecting a few (or even just one) to prioritize (PWC, 2017). For companies that prioritised one or more goals, SDG13 (Climate Action), SDG8 (Decent Work and Economic Growth) and SDG12 (Responsible Consumption and Production) were the 3 most frequently selected. SDG2 (Zero Hunger), SDG1 (No Poverty) and SDG14 (Life Below Water) were considered least often by those companies. In addition, most companies addressed priorities at the goal level, not the target level, suggesting that they may have a superficial understanding of the SDGs (PWC, 2017).

The Dutch SDG Investing Initiative comprising a group of Dutch institutional investors with about Euros 2,800 billion under management is indicative of how the investment community recognizes the potential of the SDGs (Dutch SDG Investing Agenda, 2016). Clearly, USD 5-7 trillion will be needed to invest annually in the SDGs if the agenda is to be fully realized by 2030 (WFE and UNCTAD, 2017). The SDG Investing Initiative aims to catalyse blended financing, make SDG investment the "new normal", stimulate the uptake of sustainability indicators and standards, and address regulatory barriers and incentives to SDG investment.

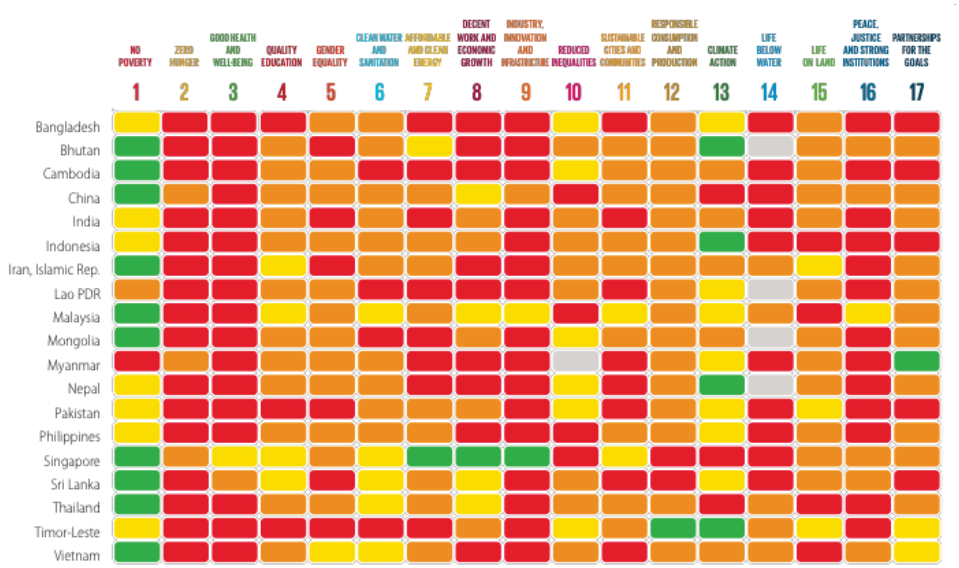
3.2 Asia-Pacific Perspective

The Asia-Pacific SDG Partnership (2017) notes that preparation for implementation of the SDGs has been quite rapid in the Asian region: (i) integration into national development plans, policies and laws (China, Philippines, Azerbaijan, Indonesia, Pakistan); (ii) adaptation to the national context (Cambodia, Lao PDR); (iii) mapping responsibilities (India); (iv) creation of coordination bodies (Azerbaijan, Japan, Indonesia, Philippines, Turkmenistan, Armenia, China); (v) creation of a dedicated ministry (Sri Lanka); and (vi) NGO involvement in implementation structures (Indonesia, Sri Lanka).

Rather surprisingly, SDG9 (industry, innovation, and infrastructure) is seen as being more or less on track. On the other hand, SDG 10 (reduced inequalities); SDG11 (sustainable cities and communities); SDG12 (responsible consumption and production); and SDG15 (life on land) have regressed since 2000 (Asia-Pacific SDG Partnership, 2017).

When observing the Sustainable Development Solutions Network dashboard on progress (Figure 5-1), however, it appears that progress on SDG9 is really limited to Japan, Korea, and Singapore. Greatest progress is evident for SDG1 (poverty), largely as a result of successful implementation of some (but not all) Millennium Development Goals in Asia.

In terms of trade and integration, which is considered to have contributed to much of the Asian region's economic progress over the past few decades (Helbe and Shepherd, 2017), the Trans-Pacific Trade Partnership (TPP) has recognized the principles of SDGs in its "Development" chapter. Article 23:1 (5) indicates that "the Parties recognise the potential for joint development activities between the Parties to reinforce efforts to achieve sustainable development goals". TPP has its share of critics also, particularly about environmental protections and intellectual property rights. Nevertheless, trade is a prominent means of implementation of the SDGs and also is addressed in the Addis Ababa Action Agenda.



Note: A green rating on the SDG Dashboard denotes SDG achievement, and is assigned to a country on a given SDG only if all the indicators under the goal are rated green. Yellow, orange and red indicate increasing distance from SDG achievement. For more information on the dashboard methodology, refer to part 2. Full metadata on the indicators used is available at www.sdgindex.org

Source: (Sachs *et al.*, 2017)

Figure 5-1 SDG Dashboard for East and South Asia

Moving from the regional level to the national level, the experience of Japan is instructive, as Japan tends to take "voluntary" commitments quite seriously. In 2016, the Government of Japan established the SDGs Promotion Headquarters under the Chairmanship of the Prime Minister, comprising all government ministers and heads of related agencies. Following a series of SDGs roundtable discussions, which included the private sector,

Implementation Guidelines for the SDGs were issued in December 2016 (SDGs Promotion Headquarters, 2016).

Eight priority areas were included: (i) empowerment of all people; (ii) achievement of good health and longevity; (iii) creating growth markets, revitalization of rural areas, and promoting science, technology and innovation; (iv) sustainable and resilient land use, promoting quality infrastructure; (v) energy conservation, renewable energy, climate change countermeasures, and sound material-cycle society; (vi) conservation of environment, including biodiversity, forests and the oceans; (vii) achieving peaceful, safe and secure societies; and (viii) strengthening the means and frameworks for the implementation of the SDGs. While organized differently from the 17 SDGs, the scope is fairly broad (not "cherry picking") and can be said to be integrated in some fashion, they seem to largely reflect ongoing work programmes. A stocktaking of progress is planned for 2019.

Japan's Keidanren (Japan Business Federation) has revised its Charter of Corporate Behaviour to call on its members to deliver on the SDGs through realization of Society 5.0 [10] (Keidanren, 2017). According to a translation of the revised Charter "member corporations should fully recognize that their development is founded on the realization of a sustainable society, and they should exercise their social responsibilities by creating new added value and generating employment that will be beneficial to society at large and by conducting their business in a manner that takes the environment, society, and governance into consideration. Corporations should also encourage behavioural changes not only within their own corporations, but also in their group companies and supply chains, and, by fostering partnership and collaboration with a diverse range of organizations, act toward the realization of Society 5.0 and through that, deliver on the SDGs".

In 2017, the Japan International Cooperation Agency (JICA) conducted a survey of Japanese businesses on addressing developing country challenges (JICA, 2017). The survey was intended to assist Japanese companies planning to start up or expand SDG-related businesses. JICA hoped to catalyse cooperation between developing country governments and Japanese companies to attain the SDGs.

Generally, Japanese companies are aware of the SDGs, but few have undertaken specific SDG-related actions. A 2016 survey of 254 companies in the Global Compact Network Japan elicited 163 responses. Of 163 companies that used the SDG Compass as a reference, 43 percent were still understanding the SDGs, 25 percent were still defining priorities, 13 percent setting goals, 8 percent integrating SDGs, and 8 percent reporting and communicating actions on the SDGs. Of particular concern is the common company practice to delegate responsibility for the SDGs to their corporate social responsibility manager, while only 9 percent of middle managers were aware of the SDGs (IGES and United Nations Global Compact Network Japan, 2018).

Priority issues for the previous year included climate change (SDG13), energy (SDG7) and sustainable consumption and production (SDG12), which are closely related to Japan's

domestic priorities. Sector differences also emerged, for example with sustainable cities and communities (SDG11) as the top goal for construction companies. In addition, most companies were focused on short- to mid-term goals, with few planning initiatives up to 2030. Some of the main challenges for companies to mainstream SDGs into their business models include (i) low social recognition; (ii) low understanding in the company; (iii) unclear evaluation methods; and (iv) undefined method for internal deployment (Ueno et al., 2017).

The survey revealed that most Japanese companies use the SDGs as a checklist against their existing business models. Many of the recent sustainability reports of Japanese companies refer to the SDGs (Itochu, 2017; NTT Group, 2017; Sekisui House, 2017). A few leading companies have started mainstreaming the SDGs into their core business, as they recognize potential business opportunities. For example, Sumitomo Chemical has an in-house certification programme for products and technologies that may contribute to the SDGs, with at least 21 products already certified[11]. These include improved lithium batteries in electric vehicles (Mead, 2017). Omron[12] is developing a medium-term business plan with consideration of the SDGs. Sompo Japan Nipponkoa Insurance is setting SDG targets for each business area[13]. The Tokio Marine Group maps each of company's core themes (providing safety and security; protecting the Earth; and supporting people) against the 17 SDGs and shows more than 30 links at the target level[14].

In the limited number of VNRs submitted to date[15], a few Asian countries have explicitly outlined progress made by local companies. For example, Georgia indicated an interest in public-private partnerships to achieve SDG targets and the need to mobilize private investment for hydropower development. India also highlighted its strong public-private partnerships. Accordingly, for the countries that have yet to submit their VNRs, comprehensive reporting on local company contributions to the SDGs should be included.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

Business needs to be a driving force to make the SDGs transformative. If a major part of total global annual investments by businesses was directed towards the SDGs, then their achievement would not be in question. Can businesses be expected to take this path voluntarily? Are the business opportunities arising from SDGs a sufficient incentive? Or do they need to be pushed? If they need to be pushed, are positive incentives enough, or is more regulation needed? Approximately USD 12 trillion in market opportunities in the food and agriculture, cities, energy and materials, and health and wellbeing sectors alone, should be a strong incentive. However, since global GDP is about USD 80 trillion, it may not be quite sufficient.

Governments should step in to help companies overcome the barriers that are stopping these opportunities from being realized, but business should also recognize the

advantages of being a first mover. A quite specific barrier is that, despite being universal, the SDGs are voluntary, and companies may lose their competitiveness if their competitors gain more from continuing unsustainable and damaging activities. Again, governments can step in and make relevant parts of the SDGs mandatory through regulations, standards, and tax regimes.

Another barrier is that shareholders and company management may not be convinced that a SDG-oriented strategy is the best business model for their company. Here, other stakeholders, such as consumer groups and citizen activists, have a role to play in raising awareness and using their collective power to force change. Green procurement, ethical investing, shareholder resolutions, and even consumer boycotts may help to change mindsets of senior company managers and reluctant shareholders.

A final barrier is the temptation to cherry pick one or two of the SDGs which best suit the current business model, without considering how they influence and are influenced by other SDGs. The cherry picking approach undermines the essence of the SDGs as an indivisible set of goals with strong linkages across all goals. Perhaps this is acceptable as an initial step in the right direction, but business needs to be reminded that contributing to one or two SDGs is not sufficient and certainly will not help to attain the transformative power of the SDGs. This does not necessarily mean that the company needs to focus on positive contributions to all the SDGs, but companies should make sure that their efforts to achieve one SDG target (for example, decent work) does not undermine other goals (for example, access to clean water, reducing land degradation, climate change, etc.).

In Asia, there is little evidence that the transformative power of the SDGs has been realized among local companies, despite rather enthusiastic efforts by national governments to try to mainstream SDGs into development plans and creation of dedicated institutions.

While Japan is recognized as one of the leading countries in promoting the SDGs, many companies are either not yet integrating the SDGs at all, using the SDGs as a checklist against their existing business models, or at best cherry picking a few SDGs to concentrate on. Generally, the SDGs have been relegated to corporate social responsibility managers, while middle managers responsible for strategic and operational decisions are barely aware of the SDGs. Most companies have not integrated SDGs into company-wide strategies.

4.2 Recommendations for companies

Naturally, the first step is to see how the SDGs relate to the company's existing activities. Many companies might be surprised at how far removed their business model and current activities are from the SDGs. Others might find they are contributing to one or two of the SDGs but are certainly not contributing to them all and may even be undermining some. The kind of comprehensive mapping conducted by the Coca-Cola company should be attempted by all companies, and not just focusing on the one or two SDGs where the

company might be making a contribution. Companies should also dig deeper into the targets and indicators to get a better understanding of the full import of the SDGs.

Once this mapping is completed, each company should look for strategic business opportunities as the SDGs are implemented and begin to affect each sector. Again, emerging tools like the Global Opportunity Report[16], the Global Opportunities Explorer, and the SDG Compass Inventory of Business Tools[17] may help to orient businesses that are unsure of how to extract maximum opportunity from the SDGs. Additional financial or technical support from the government may be needed for small and medium sized companies, as well as training in how to use these tools.

Once the company has identified the opportunities, risks, and potential value-added efforts, then the possibilities of new strategies, products, or services, or those that need to be excised from the company's repertoire, may be addressed. Depending on the human resources within the company it may be necessary to hire a consultant to help conduct the analysis (Olsen and Zusman, 2016). Others recommend using a multi-stakeholder process (with the help of a consultant), with an inclusive process to bring into the discussion different perspectives.

Some have advocated a focus on helping small and medium sized businesses to address SDGs. The majority of companies are small or medium sized, account for the majority of jobs, provide more innovation, and often provide the dominant local production. However, SDGs are particularly difficult for small and medium businesses, because SDGs are complex, and these businesses have few resources to devote to these issues (compared to big companies). Therefore, small and medium businesses will need a lot of help, not just from NGOs, but also governments, industry associations, development agencies, and international organizations. Industry associations may be the best focal points to help, as it may be difficult to promote SDG-related activities by individual smaller companies. Social entrepreneurs, who have already developed more sustainable business models, might inspire many small and medium businesses by demonstrating their feasibility. There are many online resources and tools, such as the UN Global Compact 2018 Toolbox (Mead, 2017; United Nations Global Compact, 2018), but to use them small and medium businesses may still need help from consultants.

A weakness in many companies is that they have left the SDGs to their corporate social responsibility (CSR) team and view the main activity as reporting on how the company has contributed to the SDGs through the CSR lens. The middle managers and the strategic and operational divisions are barely engaged with the SDGs and may view it as a distraction from their core business. Some large companies such as Unilever, Nike, Microsoft, etc. have more comprehensive sustainability strategies built into their overall strategic plans, but many companies do not. Therefore, in many companies, there is an urgent need to build human resource capacity within the company to capitalize on these opportunities, possibly through internal training programmes. For senior managers, business associations such as the Business and Sustainable Development Commission, Keidanren, or the World Business Council on Sustainable Development may be helpful in keeping a wary eye on competitors, as evidence suggests that first movers can capture

global attention and market advantage (WBCSD, 2017b). These associations also offer a variety of business-oriented tools to help companies orient their staff to the opportunities posed by the SDGs.

Companies should use corporate sustainability reporting to demonstrate their willingness to adopt the SDGs. CEOs should make a clear statement on their planned contributions to the SDGs. The UN Global Compact and the Global Reporting Initiative (GRI) have formed the Corporate Action Group for "Reporting on the SDGs," to enable businesses to incorporate SDG reporting into their existing processes.[18] The Corporate Action Group is assisted by a Multi-Stakeholder Advisory Committee to provide leadership and guidance to companies to embrace the SDGs.

Overall, companies can choose from two basic approaches to the SDGs: 1) a fundamental transformative approach, and 2) an incremental, procedural approach. A fundamental transformative approach involves a basic shift to a more sustainable business model, with a strong commitment from top management. It is not only about making money but also about avoiding harm to society and the environment in the context of SDGs. The company's philosophy, mission, and culture should be reviewed in the context of the SDGs. Also, companies may need innovative thinking to change their business model to fit the SDGs. In the short run companies may realistically start with a procedural approach, which is being widely promoted, including self-analysis of the risks and opportunities related to the SDGs. However, in the long run, if companies do not adopt a more transformative approach, then their current business model could be at risk.

4.3 Recommendations for investors

Investors have a significant potential to influence for corporate behaviour directly. This potential is often not realized for many reasons, such as short-term thinking, the general passiveness of institutional investors, as well as collective action problems in large companies with widely dispersed ownership (Blair, 1995). Short term and passive investors are mainly interested in short term profits and not in sustainability issues. Transformation towards sustainability, if it is to be led by companies, will require investors to adopt the SDGs as a core priority, not only short-term profits. This means that ESG should be the focus of investment, which incorporates environment, social and governance issues into investment analysis and decision-making. Longer term time horizons are required. Specifically, shareholder activism is a potentially powerful means of influencing company decisions to be more long term and improving its social and environmental performance.

Divestment is one major form of stakeholder activism which is an "exit" strategy for investors. Recently, some large institutional investors such as pension funds have started to divest their investments from companies that are not acting sustainably and redirect those funds to more SDG-friendly investment. There are several styles, including sustainable, responsible, or impact investing, each of which have their advocates (C-Change, 2017). Very large divestments from companies related to fossil fuels have been made by New York City, World Bank, Edinburgh University, Norway's sovereign wealth

fund, Medibank, and Oxford University among others. In total, more than 800 institutions with total investments of USD 6 trillion have committed to divest from fossil fuels, although this is still only a small portion of the USD 85 trillion under management. The challenge now is to ensure that the funds divested are subsequently poured into SDG-related investments.

Another form of shareholder activism, an alternative to divestment, is to use the power of share ownership to try to directly influence corporate policies and behaviour, pushing them towards more sustainable business models (C-Change, 2017). Shareholders can try to convince company management to adopt "green" policies and take on new green business opportunities, through shareholder resolutions at annual meetings or through regular communication with company management. However, currently, shareholders interested in prioritizing sustainability issues are usually in the minority, and it is difficult to overcome the power of the major shareholders, who may have no interest in sustainability issues.

4.4 Recommendations for governments

Governments have indicated consistently that the SDGs cannot be achieved without fully engaging the private sector. However, they seem rather uncertain about how best to do this, and they may possibly believe that if there are sufficient opportunities to profit from implementing the SDGs, then businesses will not need any help from governments in searching out and acting on those opportunities, and that achieving the SDGs can basically be handed over to business.

However, significant government involvement seems necessary, not only to provide an enabling environment for voluntary activities, but also to use laws and regulations to accelerate the achievement of the SDGs and raise the level of ambition. Business opportunities and considerations may motivate some companies to some extent, but it is not likely to be sufficient to achieve transformative results. The SDGs may be disruptive of entire national socio-economic systems if they are implemented as an indivisible, inclusive set of goals, so some businesses may be reluctant to contribute. Moreover, the impacts of implementing the SDGs will spill over from business into all aspects of society, so governments have a responsibility to facilitate this. Some of the possible ways that governments can help to accelerate private sector engagement with the SDGs and raise the level of ambition are as follows.

First, use government regulation (based on multi-stakeholder consultation) to shift investment, curb unsustainable activities, and promote sustainable production and consumption practices. Regulatory approaches could also include taxes and fees (e.g., pollution taxes), taxes on other aspects of unsustainable production to put a price on externalities, or incentives (e.g., tax relief) to promote sustainable actions.

Second, to promote sustainable consumption and production, consider extended producer responsibility, cleaner production, green procurement, and directed research

and development. Government policy in this area of the SDGs may need sector-specific regulation, maintaining policy coherence across sectors. Integrated product policy or mandatory lifecycle analysis can examine the sustainability impacts throughout a product's life cycle, from laboratory to eventual disposal, and ensure that steps are taken to minimize unwanted social and environmental impacts at all product phases. Governments may also provide minimum product standards to ensure that approaches like design for the environment are adopted by manufacturers.

Third, governments may consider legal changes in corporate governance to mandate sustainability considerations. For example, making directors individually responsible (as well as the corporations) for environmental damage can help to avoid loopholes such as bankruptcy or abandonment of highly polluted production facilities. Provisions for class action against companies for failing to address sustainability can also make companies less willing to take risks that could ultimately damage the environment or society.

Fourth, stronger environmental regulation is believed to strengthen competitiveness. As frontrunners often achieve market advantage, there is a good case for progressively tightening product standards, as illustrated by vehicle exhaust emission controls in Europe. Some research literature doesn't find much evidence of the effect, but that's because companies have the option to escape (again aptly illustrated by companies deliberately altering the vehicle emission test protocols). Governments can create winners and losers through regulation, providing incentives and disincentives to motivate companies to focus on the SDGs and turn away from unsustainable activities.

Finally, international cooperation (especially between national governments) is necessary to create a level playing field, thus preventing loopholes to evade responsibility. While some footloose companies may choose to relocate to countries with lax environmental standards, there is less incentive for such behaviour if standards and enforcement are harmonised. Regulations may be effective but only if there is a coordinated approach among countries. The problem is that companies can easily move to countries with less regulation to evade responsibility, potentially triggering the hotly disputed theoretical concept of a "race to the bottom", although there is little evidence, however, that governments deliberately reduce their environmental standards to attract footloose industries (Copeland and Taylor, 2004; Levinson and Taylor, 2008; Frankel, 2009; Poelhekke and van der Ploeg, 2012; IGES, 2015).

4.5 Recommendations for consumers and citizens

The power of the people is the final piece of the puzzle to ensure that the SDGs are indivisible and leave no one behind. If all else fails, citizens as former/present/potential consumers can consider actively using boycotts or other public campaigns to force companies to change their behaviour and implement the SDGs. One of the earliest examples of a successful boycott in England was in 1791 against sugar produced by slaves. [19] More recent environment-related boycotts include one against Seaworld demanding it to end all orca breeding programmes, one against the fashion chain Flannels

which persuaded it to agree to stop selling fur products, one against Johnson & Johnson's baby products that contained a formaldehyde-releasing preservative, and one against Nestlé which persuaded the company to promise a zero deforestation policy in its palm oil supply chain. Many NPOs and citizen activists are encouraging people to contribute to the achievement of the SDGs. Some have engaged in more forceful action, for example, 350.org[20] is using online campaigns, grassroots campaigns, and mass public actions to oppose new fossil fuel projects and build clean energy futures. Additional examples of successful boycotts, many of which have been run by international NGOs, can be seen at http://www.ethicalconsumer.org/boycotts/successfulboycotts.aspx. These actions may also take some time to achieve results, but they may be the only way to make progress if other actors do not do their part.

Notes

1 "We must have the courage to strike out in new directions and embrace an economic model which is not only low-carbon and environmentally sustainable, but also turns poverty, inequality and lack of financial access into new market opportunities for smart, progressive, profit-oriented companies"(Business and Sustainable Development Commission, 2017).
2 The principles are available at: https://www.unglobalcompact.org/what-is-gc/mission/principles. (Accessed June 28, 2018.)
3 Further information can be found at https://sdghub.com/. (Accessed June 27, 2018.)
4 Further information is available at: http://www.undp.org/content/undp/en/home/partners/private_sector/BCTA.html. (Accessed June 27, 2018.)
5 See: https://www.wemeanbusinesscoalition.org/. (Accessed June 27, 2018.)
6 See: http://there100.org/. (Accessed June 27, 2018.)
7 See: http://sciencebasedtargets.org/. (Accessed June 27, 2018.)
8 See: http://www.coca-colacompany.com/stories/sustainable-development-goals. (Accessed June 27, 2018.)
9 See: http://www.businessfor2030.org/explore-by-company/. (Accessed June 27, 2018.)
10 Society 5.0 is expected to be oriented around the internet of things, artificial intelligence, robots and other innovative technologies. It builds on the hunter gatherer society (1.0), agrarian society (2.0), industrial society (3.0), and information society (4.0).
11 See: https://www.sumitomo-chem.co.jp/english/csr/report/docs/SDB2017e_p10-34.pdf. (Accessed June 27, 2018.)
12 Manufacturer of control equipment, factory automation systems, electronic components, automotive electronics, ticket vending machines and medical equipment. See https://www.omron.com/. (Accessed June 27, 2018.)
13 See: http://www.sjnk.co.jp/english/. (Accessed June 28, 2018.)
14 See: http://www.tokiomarinehd.com/en/sustainability/group_csr/sdgs.html. (Accessed June 28, 2018.)
15 See: https://sustainabledevelopment.un.org/vnrs/. (Accessed June 28, 2018.)
16 See: https://sdghub.com/project/global-opportunity-report-2018/. (Accessed June 28, 2018.)
17 See: https://sdgcompass.org/business-tools/. (Accessed June 28, 2018.)
18 See: https://www.globalreporting.org/resourcelibrary/GRI%20UNGC%20Corporate%20Action%20Group%20(002).pdf. (Accessed June 28, 2018.)
19 See: http://www.ethicalconsumer.org/boycotts/successfulboycotts.aspx. (Accessed June 28, 2018.)
20 See: https://350.org/. (Accessed June 28, 2018.)

References

Asia-Pacific SDG Partnership (2017) *Taking Stock: Making Progress towards Sustainable Development in Asia-Pacific*. ESCAP, ADB, UNDP. Available at: http://www.asia-pacific.undp.org/content/dam/rbap/docs/meetTheSDGs/ADB ESCAP UNDP SDG Partnership.pdf (Accessed: 28 June 2018).

Blair, M. M. (1995) *Ownership and Control: Rethinking Corporate Governance for the Twenty-First Century*. Washington DC: Brookings Institution Press.

Business and Sustainable Development Commission (2017) *Better Business Better World*. London. Available at: http://report.businesscommission.org/uploads/BetterBiz-BetterWorld_170215_012417.pdf.

C-Change (2017) *SDG Investing: Advancing a New Normal in Global Capital Markets*. Available at: http://www.un.org/esa/ffd/wp-content/uploads/2017/03/SDG-Investing-Report_170306.pdf.

Copeland, B. R. and Taylor, M. S. (2004) 'Trade, Growth, and the Environment', *Journal of Economic Literature*, 42, pp. 7–71.

Dutch SDG Investing Agenda (2016) *Building Highways to SDG Investing: Invitation to Collaborate on a Dutch Sustainable Development Investing Agenda*. Available at: https://www.pggm.nl/wie-zijn-we/pers/Documents/Building-Highways-to-SDG-Investing.pdf.

Frankel, J. (2009) *Environmental Effects of International Trade*. RWP09-006. Available at: https://research.hks.harvard.edu/publications/getFile.aspx?Id=335.

GRI, UN Global Compact and WBCSD (2015) *SDG Compass: The Guide for Business Action on the SDGs*. GRI, UN Global Compact, World Business Council for Sustainable Development (WBCSD). Available at: https://sdgcompass.org/wp-content/uploads/2016/05/019104_SDG_Compass_Guide_2015_v29.pdf.

Helbe, M. and Shepherd, B. (eds) (2017) *WIN–WIN: How International Trade Can Help Meet the Sustainable Development Goals*. Tokyo: Asian Development Bank Institute (ADBI). Available at: https://www.adb.org/sites/default/files/publication/327451/adbi-win-win-how-international-trade-can-help-meet-sdgs.pdf.

IGES (2015) *Greening Integration in Asia: How Regional Integration Can Benefit People and the Environment*. Hayama, Japan: Institute for Global Environmental Strategies. Available at: http://www.iges.or.jp/en/pmo/wp5.html.

IGES and United Nations Global Compact Network Japan (2018) *SDGs and Business for the Future: Actions by Private Companies in Japan (in Japanese)*. Available at: https://pub.iges.or.jp/pub/SDGs_Business_for_the_Future (Accessed: 28 June 2018).

Itochu (2017) *Sustainability Report 2017*. Available at: https://www.itochu.co.jp/en/files/17fulle-all.pdf (Accessed: 28 June 2018).

JICA (2017) 'Survey for businesses on addressing developing country challenges (SDGs Business)', *JICA Press Release*, February. Available at: https://www.jica.go.jp/ press/2016/20170217_01.html (Accessed: 15 April 2018).

Keidanren (2017) *Charter of Corporate Behavior (Provisional Translation)*. Available at: http://www.keidanren.or.jp/en/policy/csr/charter2017.pdf.

Levinson, A. and Taylor, M. S. (2008) 'Unmasking the pollution haven effect', *International Economic Review*, 49(1), pp. 223–254. doi: 10.1111/j.1468-2354.2008.00478.x.

Mead, L. (2017) 'Companies, Investors Report on SDG Contributions', *IISD SDG Knowledge Hub*, 22 August. Available at: http://sdg.iisd.org/news/companies-investors-report-on-sdg-contributions/ (Accessed: 28 June 2018).

Nowak, S. (2018) 'Meeting the SDGs: The Greatest Global Change Happens Together', *Coca-Cola Annual Review Stories*, 25 April. Available at: https://www.coca-colacompany.com/stories/coca-cola-and-the-sustainable-development-goals (Accessed: 29 June 2018).

NTT Group (2017) *Sustainability Report 2017*. Available at: http://www.ntt.co.jp/csr_e/pdf/sustainability_report_2017e.pdf (Accessed: 28 June 2018).

Olsen, S. H. and Zusman, E. (2016) *Taking Action on the Sustainable Development Goals*. Hayama, Japan. Available at: https://pub.iges.or.jp/system/files/publication_documents/pub/discussionpaper/5627/Taking Action on the SDGs.pdf.

Poelhekke, S. and van der Ploeg, F. (2012) *Green Havens and Pollution Havens*, *OxCarre Research Paper*. 353. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2168237.

PWC (2017) *SDG Reporting Challenge 2017: Exploring Business Communication on the Global Goals*. Available at: https://www.pwc.com/gx/en/sustainability/SDG/pwc-sdg-reporting-challenge-

2017-final.pdf.

Sabin Center for Climate Change Law (2018) *Climate Change Litigation Databases*. Available at: http://climatecasechart.com/ (Accessed: 2 May 2018).

Sachs, J. *et al.* (2017) *SDG Index and Dashboards Report 2017*. New York: Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN).

SDGs Promotion Headquarters (2016) *Japan: The SDGs Implementation Guiding Principles*. Tokyo: Ministry of Foreign Affairs, Japan. Available at: http://www.mofa.go.jp/files/000252819.pdf.

Sekisui House (2017) *Sustainability Report 2017*. Available at: https://www.sekisuihouse.co.jp/english/sr/datail/__icsFiles/afieldfile/2017/09/08/all-A3.pdf (Accessed: 28 June 2018).

Ueno, A. *et al.* (2017) *SDGs and Business in Practice: Early Actions by Japanese Private Companies*. UN Global Compact Network Japan, and Institute for Global Environmental Strategies. Available at: https://pub.iges.or.jp/system/files/publication_documents/pub/policyreport/6009/SDGs and Business_rev_final.pdf.

UN Global Compact (2017a) *Blueprint for Business Leadership of the SDGs: A Principles-Based Approach*. Available at: https://www.unglobalcompact.org/docs/publications/Blueprint-for-Business-Leadership-on-the-SDGs.pdf.

UN Global Compact (2017b) *Making Global Goals Local Business: A New Era for Responsible Business*. Available at: https://www.unglobalcompact.org/docs/publications/MGGLB-2017-UNGA.pdf.

United Nations (2015) *Transforming Our World: The 2030 Agenda for Sustainable Development*. Available at: https://sustainabledevelopment.un.org/post2015/transformingourworld/publication.

United Nations Global Compact (2018) *2018 Toolbox*. Available at: https://www.unglobalcompact.org/docs/publications/2018_Toolbox.pdf (Accessed: 28 June 2018).

WBCSD (2017a) *CEO Guide to the SDGs*. World Business Council on Sustainable Development. Available at: https://www.wbcsd.org/Overview/Resources/General/CEO-Guide-to-the-SDGs (Accessed: 28 June 2018).

WBCSD (2017b) *Delivering on the SDGs: The Inclusive Business Approach*. World Business Council on Sustainable Development. Available at: https://www.wbcsd.org/contentwbc/download/2585/31560 (Accessed: 28 June 2018).

WFE and UNCTAD (2017) *The Role of Stock Exchanges in Fostering Economic Growth and Sustainable Development*. World Federation of Exchanges and United Nations Conference on Trade and Development. Available at: http://unctad.org/en/PublicationsLibrary/WFE_UNCTAD_2017_en.pdf (Accessed: 28 June 2018).

Chapter 6

Transforming Finance and Investment for the SDGs

Mark Elder, Akiko Shigemoto, and Peter King

Chapter 6

Transforming Finance and Investment for the SDGs

Mark Elder, Akiko Shigemoto, and Peter King

Main messages

- Making the financial system more sustainable is a key to realizing the transformative potential of the SDGs;
- There is a lot of enthusiasm and many initiatives attempting to build a sustainable financial system. While encouraging that some progress is visible, it is still limited;
- Current approaches mainly focus on voluntary efforts by the private sector. Most solutions currently under discussion are indirect, slow, voluntary, but politically feasible, and seem unlikely to be transformative;
- There is no shortage of funding or resources. The needed annual investments to achieve SDGs are a modest share of global GDP, and a small share of global wealth;
- There is already a large amount of infrastructure investment planned every year in key sectors like energy, transport, and buildings. Therefore, the key is to shift existing planned investments from unsustainable to sustainable, and, if necessary, supplement these investments with some additional funds;
- Voluntary approaches may not be sufficient to achieve this shift in the focus of investments and are not likely to be transformative, so a more regulatory approach may be needed;
- The first step could be to strengthen existing initiatives by requiring disclosure;
- Investments in non-sustainable activities could be restricted by regulation instead of asking companies to do so voluntarily;
- National governments have plenty of legal authority to raise revenues to fund sustainable development, without needing to rely on voluntary contributions or loans by private companies; and
- Overall, there is no need to implore private companies and lenders to finance sustainable development based on ethical considerations. Governments have the power to raise the funds and invest on their own, if they think it is important.

1. INTRODUCTION

The objective of this chapter is to show concretely how finance and investment could be made more ambitious and transformative, to increase the level of ambition of the Sustainable Development Goals (SDGs) and realize their transformative potential. This chapter adopts a systemic perspective, and does not limit the focus to specific stakeholders, types of financial services businesses, or types of financial instruments.

After adoption of the SDGs (UN Secretary General, 2017), the Paris Agreement, and the Addis Ababa Action Agenda (United Nations, 2015) in 2015, many initiatives and efforts, especially by international organizations and NGOs, have been launched to mobilize and scale up financing for sustainable development.

There is a broad consensus that there is a large gap between the amount of financing needed to achieve the SDGs and the global climate targets (both the 2 °C target and the 1.5 °C aspirational target), and the amount of financing currently available. It is also commonly believed that much of this financing will need to come from the mobilization of private funds due to a lack of public funds. Therefore, there are high expectations of the financial sector, and much discussion has been devoted to what kind of mechanism(s) could help to mobilize private funds.

This chapter argues that while these efforts are laudable, from a global perspective, there are already sufficient resources to fund SDGs and climate change efforts embodied in global GDP and accumulated wealth. Moreover, even under business as usual, massive investments have already been planned in all sectors, including energy, transport, buildings, etc. Therefore, the relevant question is how existing resources and already planned financing could be shifted toward more sustainable uses and away from unsustainable uses. In other words, the main issue is not so much about the availability of finance, but rather the allocation of investment. This means that it is important to consider how this shift could be accelerated, and this chapter argues that national governments would probably need to play a stronger role in doing so.

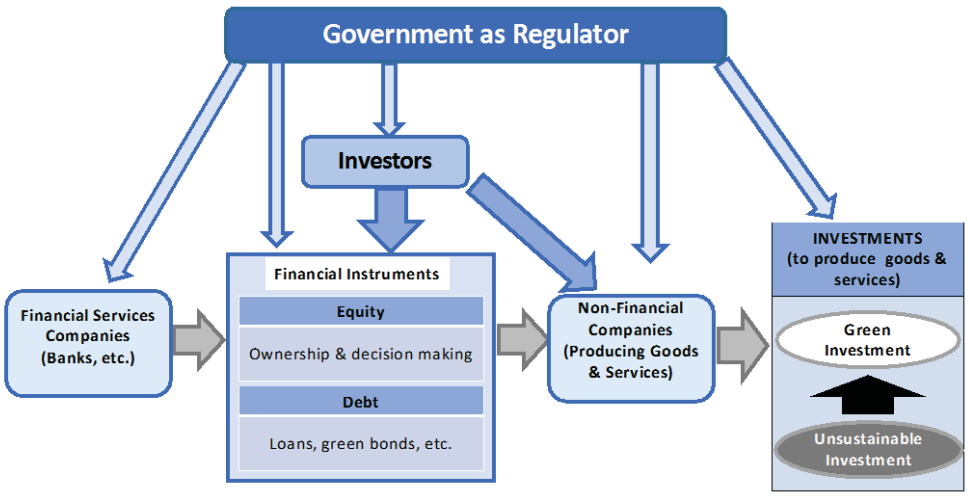
The rest of this chapter is structured as follows. Section 2 provides an overview of the sustainable finance landscape and its key actors. Section 3 surveys the overall investment needs and available financial resources for sustainable development. Section 4 reviews the existing approaches to promoting sustainable finance. Section 5 provides recommendations for how to strengthen sustainable financing. Section 6 concludes.

2. SYSTEMIC OVERVIEW OF SUSTAINABLE FINANCE AND KEY ACTORS

The landscape of sustainable finance and its key actors is very complex. Much of the discussion tends to focus on specific actors or financial instruments, without considering the overall picture. This is quite understandable, as each group of actors considers their

own role in promoting sustainable finance. Nevertheless, an overall perspective is needed to consider how to increase the level of ambition and make these efforts more effective and potentially transformative.

The complexity of the landscape is illustrated by Figure 6-1. First, investments are made to produce goods and services. The basic task is to shift these investments from unsustainable to sustainable production methods, as well as from unsustainable to sustainable goods and services. Goods and services are generally produced by private non-financial companies. Then, the non-financial companies producing goods and services receive funding. Funding takes the form of financial instruments, of which there is a wide variety, generally falling in two categories: equity or debt. Equity includes stocks, while debt includes green bonds, loans, etc. Financing is generally provided by financial services companies, of which there are many types. More specifically, financial services companies perform an intermediary function, bridging investors with companies desiring financing. In some cases, financial services companies (particularly banks) provide funds directly (e.g. loans), while in other cases (e.g. securities companies) they facilitate funding indirectly by arranging the issuance of stocks (equity) or bonds. Equity is a special type of financing because it also includes a stake in the ownership of the company, and therefore, some potential influence over its decision making. Moreover, financial services companies themselves raise money through both equity and debt, and equity owners may have some potential influence over their decision making too.



Source: Authors

Figure 6-1 Actors in Sustainable Finance and Investment

Governments have a dual role. Their role as a regulator is made clear by Figure 6-1, which shows that governments have the authority to regulate each step of the financing process, each actor, and each financial instrument. Regulation also has various dimensions. Financial regulation is generally considered to include system stability and investor protection. In addition, governments may also go beyond traditional "financial" regulation to regulate the contents and conditions of investment, including its allocation among various sectors or purposes, etc.

Government's other role as a market participant is illustrated in Table 6-1 Some financial services companies are government owned, and some government agencies, such as development banks, provide financial services. Governments also borrow money through financial markets, for example issuing bonds. There are also government owned non-financial companies, and in some cases, government agencies produce goods or services directly. Governments may also invest directly in projects.

Table 6-1 Government as a Market Participant

		Government as a Market Participant
Actors	• Financial services companies	• Government ownership stake in financial services companies • Government agency as a financial service provider/ lender
	• Non-financial services companies	• Government ownership stake in companies • Government agency directly producing goods and/or services
	• Investors	• Government ownership stake in companies and/or projects
Financial Instruments	• Equity	• Government ownership stake in companies
	• Debt	• Government sells/issues debt (borrowing) • Government purchases debt (lending)

Source: Authors

3. OVERVIEW OF INVESTMENT NEEDS AND AVAILABLE FINANCIAL RESOURCES FOR SUSTAINABLE DEVELOPMENT

In principle, a discussion of financing for the SDGs needs to start with existing investments and expenditures in SDG areas that were planned before the SDGs were agreed, and then calculate the additional investment needed to achieve the SDGs. It is not easy to do this, but one study estimated that total additional investment for SDGs, beyond already planned investments, was estimated in 2015 to be between USD 2 and 3 trillion per year (Schmidt-Traub, 2015), which is about 2.5-3.8 percent of world GDP of USD 78 trillion in 2014 (at official exchange rates) (Central Intelligence Agency, 2015). Other estimates focus on climate change, not sustainable development overall. The OECD estimated that about

USD 600 billion per year would need to be added to existing planned investments of USD 6.3 trillion per year between 2016 and 2030 in a variety of infrastructure-related sectors (including energy, transport, water, telecommunications) in order to take into account climate concerns (OECD, 2017a).

Therefore, clearly, one main task is to figure out how to raise the necessary "additional" financing. However, what is equally or more important, but less discussed, is the need to consider how to shift the already planned financing away from unsustainable and towards more sustainable investments.

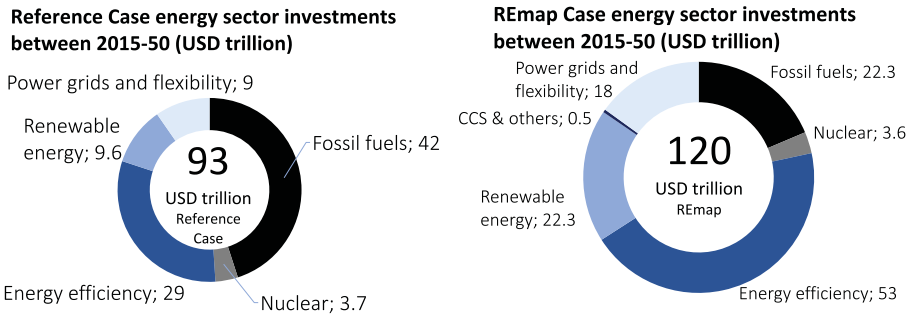
The starting point to search for possible sources of financing is global GDP, wealth, and taxes. These are summarized in Table 6-2. The estimated additional investment needed for SDGs, USD 2 to 3 trillion per year, may sound like a great deal of money, but if it is compared to global GDP and financial assets, it is rather modest, and should be manageable. If 3 percent of GDP is considered too much, for example if raised by increased taxes, then perhaps the equivalent of 1 or 2 percent of world GDP could be taken from wealth, instead, and/or perhaps borrowed. It seems more difficult to raise the money by cutting military spending, which is not much over 2 percent of global GDP.

Table 6-2 Global GDP and Financial Assets

	Trillion USD	Share of Global GDP (%)
Global GDP (2017, official exchange rates)	79.58	100
Total world savings (2017)	21.73	27.3
Total world taxes (2017)	21.33	26.8
World military spending (2016)	1.77	2.22
Total global financial assets (2014)	294	369

Sources: (Ro, 2015; Central Intelligence Agency, 2018)

In the energy sector, for example, IRENA compared existing planned investments with the investments needed to significantly expand renewable energy and energy conservation (IRENA, 2018). The existing planned cumulative energy investment between 2015-2050, estimated at USD 93 trillion, already projects 10.3 percent for renewable energy, 31 percent for energy efficiency, and only 45 percent for fossil fuels. For an additional USD 27 trillion, averaging about USD 771 billion per year over 35 years, the share of total energy investment going to fossil fuels could be cut back to 18.6 percent, while the share going to renewable energy and energy efficiency could be increased to 18.5 percent and 44.1 percent, respectively. The share of fossil fuels may be further reduced by stronger policies and additional investment.



Source: (IRENA, 2018)

Figure 6-2 Shifting Energy Investment to Renewables and Energy Efficiency

Regarding the transport sector, the World Resources Institute estimates the global transport infrastructure investment needs to be about USD 2 trillion annually for a scenario of 2 degrees average increase in global temperature by 2050, synthesizing existing estimates by the IEA, OECD, McKinsey, and ITDP/UC Davis (LEFEVRE et al., 2016). This is about USD 311 billion less than the investment that would be needed under a 4 °C scenario, which is closer to the current trend. This is mainly due to reduced investment in roads and parking (USD 370 billion), which is much larger than the additional investment needed in rail, bus rapid transit, and high-speed rail (USD 59 billion).

Table 6-3 Summary of Transport Infrastructure Investment Needs (in USD bn)

SUBSECTOR	4DS	& OF 4DS	20S	% OF 20S	4DS TO 2DS SHIFT	% SHIFT	SOURCE
Road	$1,375	58.7%	$1,135	55.8%	($240)	-17.5%	IEA 2013
Parking	$635	27.1%	$505	24.8%	($130)	-20.5%	IEA 2013
Rail	$130	5.5%	$155	7.6%	$25	19.2%	IEA 2013
BRT	$1	0.0%	$9	0.4%	$8	805.0%	IEA 2013
HSR	$47	2.0%	$73	3.6%	$26	54.0%	IEA 2013
Airports	$105	4.5%	$105	5.2%	n/a	n/a	OECD2012
Ports	$40	1.7%	$40	1.9%	n/a	n/a	OECD2012
Interregional	$11	0.5%	$11	0.6%	n/a	n/a	OECD2012
Total	**$2,344**		**$2,033**		**($311)**		

Source: (LEFEVRE et al., 2016)

4. REVIEW OF EXISTING APPROACHES AND RECOMMENDATIONS

Stakeholders of the sustainable finance community have made tremendous efforts to establish a sustainable financial system to support sustainable development and address climate change, including a variety of initiatives, conferences, and reports, in response to the SDGs, the Paris Agreement, and the Addis Ababa Action Agenda which were agreed in 2015. One major meeting was the One Planet Summit, co-organized by the UN, World Bank, and France, in December 2017, to celebrate the second anniversary of the Paris Agreement and to accelerate its implementation. At this Summit, MDBs and various private sector actors made various commitments, and it was confirmed that all stakeholders had to stand together to tackle climate change (One Planet Summit, 2017). A major encouraging development is the strong interest taken by the G20 central banks and finance ministers, who established the G20 Sustainable Finance Study Group (G20 Green Finance Study Group, 2016, 2017) in 2016, co-chaired by the People's Bank of China and the Bank of England.

Numerous reports to share knowledge about the promotion of green finance have been published at the global level (e.g. G20, FSB, United Nations, OECD), regional level (e.g. EU, ASEAN), and industry level (Global Green Financial Council, 2017). This section reviews these efforts and reports, which were published between 2015 and 2018, particularly their recommendations. Although these efforts are still in their beginning stages, this section attempts a preliminary assessment of their future prospects in light of the existing challenges for green finance.

These reports have discussed the need to define sustainable finance and proposed a variety of recommendations and action plans for the stakeholders of sustainable finance to build a system for sustainable finance (UNEP Inquiry and World Bank, 2017; EU the High-Level Expert Group on Sustainable Finance, 2018; European Commission, 2018). The reports have several common characteristics and recommendations. First, the main focus is on voluntary actions by the private sector, not regulatory actions by governments. Second, while they do mention roles for governments, these are generally vague general statements and principles, such as the need to provide "resources" or "enabling conditions." They generally do not discuss or recommend specific policies. Moreover, the phrase "enabling conditions" suggests positive incentives for voluntary actions rather than regulations and negative incentives. The European Commission's High-Level Expert Group on Sustainable Finance mentioned a role for financial regulators in sustainable finance (EU the High-Level Expert Group on Sustainable Finance, 2018), but the discussion was not very ambitious or specific about what kind of regulations should be adopted. Third, none of these recommendations or plans have any clear linkage with national policy. The Central Banks and Supervisors Network for Greening the Financial System, launched in December 2017 (Bank of England, 2017) shows some promise to develop a more nationally oriented approach. However, it is a voluntary system limited to only eight banks/regulators such as Bank of England and Banque De France. Fourth, these approaches are not clearly linked to related policy areas, so there is a lack of integrated approaches.

Table 6-4 Progress and Challenges in Sustainable Finance

Issues	Progress	Challenges/Problems
Overall - Green Finance	• Numerous reports/ recommendations to diffuse ideas • Various initiatives, conferences to raise awareness	• How to define green/sustainable • Need to build financial system to support sustainable finance • Limited linkage with public policy • Measuring progress, data tracking
Disclosure	• FSB/TCFD recommendations • France: Article 173 of the Energy Transition Law	• Lack of measurements to assess non-financial impact • Gap between awareness and action • Progress is likely to be gradual
Investors/ESG	• PRI Signatories: 1743, Asset under management: USD 62 trillion as of 2017 (Principles for Responsible Investment, 2018)	• Need to clarify legal frameworks of the fiduciary responsibilities of financial institutions • Effectiveness is not clear; need to avoid greenwashing
Investors/Divestment	• 847 organisations announced commitments to divest USD 6 trillion as of March 2018 (350.org, 2018)	• Effectiveness, money flow after divestment: Need to ensure that the funds divested are subsequently shifted into SDG-related investments
Green Loans	• Increasing number of green investment banks • Of the total value of syndicated loans in 2014, green finance accounted for 15 percent (International Finance Corporation, 2017).	• Few scale advantages • Not flexible for borrowers compared to general purpose loans
Green Bonds	• Countries which have issued sovereign green bonds (France, Fiji, Nigeria, etc.,) • Rapid growth of amount issued: +78% (2017) (Climate Bond Initiative, 2018)	• High transaction costs • Need to avoid green washing • Still small scale, only 0.7% of total global bond issuance (Securities Industry and Financial Markets Association, 2017)
Stock Exchanges	• 73 of 88 global stock exchanges joined UNSSEI (United Nations Sustainable Stock Exchanges Initiative, 2018)	• Need to establish a global consensus for the criteria
Blended Finance	• Enable mobilisation of large scale private capital	• Insolvency risk • Difficult to enforce contracts

Sources: Authors compiled based on the reports published between 2015 and 2018 by OECD, UNEP, World Bank, EC, G20 SFSG, etc. (Ansar, Caldecott and Tilbury, 2013; OECD, 2015; Baron and Fischer, 2015; OECD and CDSB, 2015; Bloomberg New Energy Finance, 2015; Financial Stability Board, 2015; UNEP Inquiry, 2016; OECD, 2016; G20 Green Finance Study Group, 2016; European Commission, 2016; TCFD, 2017a; OECD, 2017c; G20 Green Finance Study Group, 2017; Mehta et al., 2017; OECD, 2017b; UNEP Inquiry and World Bank, 2017; United Nations Sustainable Stock Exchanges Initiative, 2017a, 2017b; European Commission, 2018; OECD, 2018; Climate Disclosure Standards Board and the Carbon Disclosure Project, 2018; EU the High-Level Expert Group on Sustainable Finance, 2018)

Many of these reports are narrowly focused on specific financial instruments (such as green bonds) or actors (financial service providers). Nevertheless, several reports with a more comprehensive scope have been published including G20 SFSG (G20 Green Finance Study Group, 2016, 2017), UNEP, World Bank (UNEP Inquiry and World Bank, 2017), and European Commission (EU the High-Level Expert Group on Sustainable Finance, 2018; European Commission, 2018).

The major topics which have been discussed by significant international initiatives and key reports are 1) the need for greater information disclosure of climate related risk, with particular focus on the role of financial institutions; 2) efforts to change investment behaviour, particularly focusing on private investors, 3) how to promote green financial instruments; and 4) how to mobilise private capital for infrastructure investments. Progress and challenges regarding specific sustainable finance issues are discussed below and summarized in Table 6-4.

4.1 Information and Risk Disclosure

One way to encourage change is to promote awareness of climate risk through information disclosure. Companies increasingly need to disclose climate-related risk information due to increasing demand for this information by investors and insurers. The financial sector also increasingly needs to recognize climate-related risk. Hopefully, if companies go through the exercise of assessing their climate-related risk, then they will be encouraged to modify their business practices in ways that will reduce their GHG emissions or contribute in other ways to addressing climate change. Many information disclosure initiatives are especially focused on climate change, but this may also be expanded to other environmental issues and broader sustainability issues as a part of overall corporate social responsibility, such as the Global Reporting Initiative (Global Reporting Initiative, 2018) .

One of the main initiatives in this area is the Task Force on Climate-Related Financial Disclosures (TCFD), which was set up by the Financial Stability Board (FSB), an international regulatory body that plays a role in stabilizing the global financial system, as requested by the G20 in April 2015. The Task Force was expected to set up a framework to improve the ability of companies and financial institutions to assess and price climate-related risk and opportunities (TCFD, 2018). The TCFD's final recommendations consist of four core elements related to organizational management (governance, strategy, risk management, and metrics/ targets), and suggests that each organization should disclose its climate-related risks from each of these four elements in order to aid investors' understanding (TCFD, 2017b, 2017a). As of April 2018, 264 world business leaders committed to follow the TCFD's recommendations (TCFD, 2018).

The TCFD's recommendations are voluntary but a more ambitious strategy to accelerate change would be to make them legally binding. France is the first country to move in this

direction. As the first case of legally required climate-related risk information disclosure, Article 173 of the French Energy Transition for Green Growth Act (Loi relative à la transition énergétique pour la croissance verte: LTECV), has drawn considerable international attention. Article 173 requires asset management companies to report climate change related financial risks (Ministère de la Transition écologique et solidaire, 2016), and it is expected to enable investors to become more engaged with companies they invest in and more effectively influence their management strategies.

There are many obstacles to greater disclosure including a lack of clear definitions of ESG and a lack of measurements to assess the impact of non-financial ESG elements on financial statements. Companies need to invest sufficient resources to develop the necessary capacity to conduct assessments and prepare the disclosure following certain standards. More companies have started to recognize the importance of this issue, but fewer companies have taken specific actions, and the degree of action taken is variable.

Moreover, to the extent that companies voluntarily increase their disclosure, these disclosures are difficult to assess and compare. This is not only due to the lack of clear definitions of ESG and difficulty of measurement, but also there are also various regulations and standards, which are often not consistent with each other.

Finally, it is not clear to what extent disclosure will influence the actions of companies or investors. In theory, voluntary disclosure of risks should lead to more sustainable behaviour, but it is not clear to what extent this will happen in practice. Certainly, if it is necessary to rely on voluntary action, then information disclosure is an essential step. However, information disclosure is likely to change behaviour only gradually, and may take a long time.

4.2 Change in investment behaviour - Divestment and engagement through Environment, Social, Governance (ESG) investment

Changing investor behaviour is another major direction being pursued. The basic idea is to persuade investors to shift their investments in a more sustainable direction. Most investors do not directly invest in projects or business activities. Instead, most investors invest indirectly through equity (e.g. stock) or debt instruments (e.g. bonds). Moreover, many individuals now invest through funds, which collect money from many people to invest on a large scale. Institutional investors, such as pension funds and mutual funds, mediate very large volumes of investments. There are also many sovereign wealth funds. Therefore, it is not easy for individual investors to make a major difference, so many sustainable finance initiatives have focused on persuading institutional investors to direct their investments in a more sustainable direction, and in particular to divest from investments related to fossil fuels.

The concept of ESG describes the incorporation of environment, social and governance issues into investment analysis and decision-making. It also involves shifting from a short

term to a longer-term investment perspective. To promote the mainstreaming of ESG criteria into investors' decision making, Principles for Responsible Investment (PRI) was launched by UNEP FI and Global Compact in 2006. As of April 2017, 1,714 institutions had signed the PRI, encompassing USD 68.4 trillion under management (Principles for Responsible Investment, 2018). Therefore, this initiative has made measurable progress, especially with institutional investors. However, this represents only about one fifth of total global financial assets, if these are estimated as of 2014 to be nearly USD 300 trillion (Ro, 2015). In theory, it is a very large amount and could make a significant difference if this amount of investment was really "greened." However, in practice, most of these funds probably do not meet all ESG criteria. Rather, the signatories have simply made a commitment to follow the principles in the future; they have not certified that their assets are already meeting ESG criteria. The extent to which these assets are currently meeting ESG criteria is not clear.

Some efforts have been made to track the status of sustainable finance, such as IFC (International Finance Corporation, 2017) and Global Sustainable Investment Alliance (Global Sustainable Investment Alliance, 2017), using different focuses and methodologies. Because there is no agreed common definition of sustainable finance and ESG criteria, it is not easy to track the status of the entire global market. It is also not easy to track the flow of money, including what happens to money after it has been divested from fossil fuels. One encouraging development is that a few major funds, such as Norway's sovereign wealth fund, have announced plans to divest from fossil fuel investments. Still, it is necessary to be careful about "greenwashing."

These initiatives also make a business case for making investments more sustainable; they do not simply rely on ethical considerations to persuade investors. The business case partly focuses on demonstrating that many unsustainable investments involve a high level of risk. For example, climate change will create stranded assets, particularly relating to fossil fuel investments. To prevent extreme global warming a large share of fossil fuel reserves will have to remain in the ground, which puts the balance sheets of fossil fuel producing companies at considerable risk. By clarifying and quantifying these risks, it is hoped that investors will be persuaded to shift their investments out of fossil fuels and other assets which endanger environmental and social sustainability.

As of March 2018, 847 organisations made fossil fuel divestment commitments of about USD 6 trillion (350.org, 2018). These commitments range from partial to full divestment, and some have been implemented while others are expected to be implemented in the future. Some institutional investors already have made extensive divestments. For example, the Norway Government Pension Fund (GPFG) divested from 73 companies as a result of sustainability assessments in 2015; over the past four years, the GPFG has divested from a total of 187 companies (Norges Bank, 2016).

Still, it is also not easy for institutional investors to make their investments more sustainable. Fund managers are already in fierce competition with each other to maximize their investment returns. It is not easy to even generate a positive return each year. Funds which incorporate ESG into their investment decisions take on an extra layer of work, and

risk falling behind funds which do not. Generally, however, ESG investments have performed equally as well, if not better than, less differentiated portfolios.

Recommendations by existing reports focus on the need to clarify legal frameworks of the fiduciary responsibilities of financial institutions from a long-term point of view (UNEP Inquiry and World Bank, 2017). Clearly this is a very important step. However, it may take a long time to resolve this issue. Overall, efforts to persuade investors to change their investment behaviour voluntarily are laudable, and have achieved some success, but this is likely to be a very long-term project with uncertain prospects for success.

4.3 Green financial instruments

Green financial instruments are another major direction of sustainable finance. In particular, green loans and green bonds have been growing rapidly. Various initiatives are summarized in Table 6-5 below.

Table 6-5 Initiatives to Promote Green Financial Instruments

Category	Description / Initiatives
Green loans	Description: • For sustainable infrastructure (e.g. clean energy) financing • Of the total value of syndicated loans in 2014, green finance accounted for 15 percent (International Finance Corporation, 2017). Initiatives: • Green Bank Network (Green Bank Network, 2018) • Green Loan Principles (Loan Market Association, 2018)
Green bonds	Description: • Popular asset class for institutional investors • Can be used for decarbonizing infrastructure • Growth of green bond market: USD 155.5 Bil (+78%) in 2017 (Climate Bond Initiative, 2018) Initiatives: • Green Bond Principles (ICMA 2017) • The ASEAN Capital Markets Forum (ACMF) developed the ASEAN Green Bond Standards (GBS) in November 2017 (ASEAN Capital markets Forum, 2017)
Stock exchanges	Description: • Stock exchanges play a key role in promoting responsible investment in market by setting listing criteria and increasing liquidity of green bonds. Initiatives: • United Nations Sustainable Stock Exchanges Initiative (UN SSEI): as of May 2018, 73 of the world's 88 stock exchanges were partners of the initiative (United Nations Sustainable Stock Exchanges Initiative, 2018)

Source: Authors

Much of the focus is on debt finance, including green loans and green bonds. Loans can be provided directly from financial institutions to individuals, companies and projects. Green bonds are popular among risk-averse/environmental conscious investors. Key issues are how to define what is "green" or "sustainable," as well as what kind of assessment process to use. It is more difficult to integrate equities with ESG, but nevertheless, a large majority of the world's stock exchanges have joined an initiative to consider how stock exchanges could contribute to ESG.

Green financial instruments such as green bonds and green loans have received a considerable amount of attention, and they have made a certain amount of progress. Issuance of green bonds increased rapidly in 2017 to USD 155.5 billion, up 78 percent over the previous year (Climate Bond Initiative, 2018). However, its share of the total global bond issuance -- USD 21.4 trillion in 2016 (Securities Industry and Financial Markets Association, 2017) -- is still very small, only 0.7 percent. Moreover, its share appears likely to remain very small for many years. The OECD estimates that green bond issuance in four key markets (China, the EU, Japan and the United States) will increase to about USD 620 - 720 billion annually by 2035, although it does not report its estimate for the total size of the global bond market (OECD, 2017c). Nevertheless, this estimated amount for 2035 would only be about 3.4 percent of the 2016 total global bond issuance, still a very small percent. Of course, the actual size of the global bond market in 2035 will probably be much larger, so the share of green bonds is likely to be much smaller than 3.4 percent. Therefore, while the contribution of green bonds could be important, by itself, its likely scale is likely to be much too small to be transformative.

The merits of green bonds (compared to ordinary bonds) for market participants, both issuers and investors, are not entirely clear yet. Green bonds have significantly higher transaction costs compared to ordinary bonds because of the need to restrict the use of the proceeds of the bonds based on ESG considerations, and the need to monitor compliance with this restriction. This restriction also adds to the bonds' risk. Therefore, investors need a higher interest rate to compensate for the higher risks and transaction costs.

The perspectives of developed and developing countries may be different. There may be less merit for green bonds in developed countries, as many of them already enjoy relatively low interest rates. From a company issuer's point of view, it may be difficult to pay a higher interest rate since more environmentally friendly or sustainable business may be less profitable compared to other business activities. Ultimately, a "green" company wanting to finance "green" projects through bonds may be better off issuing ordinary bonds with a lower interest rate compared to green bonds with a higher interest rate. Also, sovereign bonds of many developed countries can already be issued for low interest rates, so if they want to use bonds to fund projects, it would be cheaper to use regular bonds with less paperwork and lower interest rates rather than green bonds with more paperwork and higher interest rates. However, for many developing countries, regular bonds have relatively higher interest rates and risks, so green bonds may have some merit for both issuers and lenders, as green bonds may increase the interest rate and credit risk only slightly. Developing country issuers may be willing to pay a small interest rate

premium for "green" bonds in return for greater acceptance by lenders. Lenders may enjoy a slightly higher interest rate for slightly higher risk and higher conformity with sustainable investment objectives. Still, the merits may not be very large, and it is not clear to what extent the merits would offset the extra paperwork costs. Developing countries could still issue regular bonds for green projects, avoiding the extra paperwork of green bonds.

It is also necessary to increase the transparency and reliability of the green bond market to avoid greenwashing. Stock exchanges can play an important role in this respect.

4.4 Blended finance

To mobilise private capital for infrastructure investments related to sustainable development, blended finance has been promoted by multilateral development banks (MDBs) and other development finance institutions (Mehta et al., 2017; OECD, 2018). Blended finance aims to leverage financing from the private sector and minimize the amount of money needed to be contributed by governments, thereby avoiding significant increases in taxes or government borrowing. In this concept, government and private financing are combined. The government funding component is used to attract private co-investors, who invest the rest of the needed funds. The private investor also manages the project and receives a share of the profits if the project generates a financial return. In some cases, the private sector partner may gain long term control or even ownership of the related assets.

While attractive in principle, blended finance suffers from several shortcomings in practice. Blended finance contracts are generally very complex, and considerable effort is needed to monitor and enforce the performance of the contract, particularly the aspects related to sustainability. Many governments are unable or unwilling to devote sufficient resources to contract monitoring and enforcement. Local opposition often emerges in the case of proposals which involve sales of public assets or shifting considerable control of public assets to the private sector.

It is difficult to assess the transformative potential of blended finance. It would depend on the nature and scale of the projects. If the projects were truly about promoting sustainability, and if a large amount of funding was generated, then there could be some transformative potential. However, if the level of sustainability or the scale of the projects is not high, then the transformative potential might not be very high either. As with other schemes, potential greenwashing is also a risk.

The rationale for blended finance is based on the assumptions that the amount of funds available for investment is limited, and that the government's ability to raise funds on its own is limited. However, as this chapter has shown, the amount of financial resources available in the global economy is very large, and there is plenty of scope for governments to raise additional revenues through other means, such as taxes, if necessary. If the financing needs are important and urgent, there is no particular need for governments to wait for companies to provide the funding voluntarily. To be sure, the blended finance

model may be appropriate in certain kinds of situations. Therefore, research on blended finance should focus more on identifying the types of investments this method has clear advantages over other forms of financing.

5. RECOMMENDATIONS

This chapter argues that the role of governments should go beyond just providing encouragement and an enabling environment for the private sector. A stronger government response could move along four main directions. The first two directions focus on efforts to build on the current private sector focused efforts, and efforts based on the government's role as a market participant. These would be considerably stronger and more ambitious than current efforts, although still probably not sufficiently strong enough to result in significant transformation. The second two directions demonstrate a stronger and more ambitious direction, which could potentially be more transformative.

The first direction is to build on the existing efforts to encourage voluntary actions by private sector actors and make them mandatory. Risk assessment and disclosure of financial assets could be required. Sustainable finance and ESG criteria could be strictly defined, and these criteria could be required. Green financial instruments could be provided with stronger mandates or incentives.

The second direction is to build on governments' existing role as a market participant. These are outlined in Table 6-6 below, which also shows that governments' role as a market participant is not limited just to what is traditionally considered as finance, but it can also include other market roles. In some cases, governments directly provide financial services, such as through development banks or loans by agencies/ministries, governments can directly determine what kinds of projects to fund, and they can directly restrict funds to unsustainable activities, and shift the funds to more sustainable activities.

Likewise, in cases where government is an investor, for example in the case of purchase of financial instruments by central banks for monetary policy purposes or direct investment in specific projects, or investments by government pension funds, governments can establish sustainability criteria to guide or prioritize these investments, similar to what is being discussed for private sector investors.

In contrast to private sector initiatives, governments can more easily set stricter standards and adopt them more quickly. Green bonds have perhaps less potential in terms of government as an issuer. Green potential is related to how the borrowed funds are used, not whether the bond itself is green. Governments can issue sovereign bonds at much lower interest rates compared to private companies. If governments issue green bonds with restrictions on the use of the funding, then the risk is increased, and issuing governments might have to pay a higher interest rate compared to traditional government bonds. Therefore, it might be better to use traditional bonds with lower interest rates to fund green activities.

Governments' regular budgets are major potential sources of finance that are not usually considered under the topic of sustainable finance. Nevertheless, government budgets could be used as a direct funding source for green projects and investment. Governments can reduce spending on unsustainable projects and activities and increase spending on more sustainable ones. Greening public procurement is a major direction which has been proposed in the past, and which has plenty of room to expand. In some cases, governments directly provide goods and services, similar to non-financial service companies, for example in the case of government-owned companies, or even ministries/agencies providing specific goods and services. Governments have direct control on the greenness or sustainability of these activities.

Table 6-6 Greening Potential of Governments' Roles as a Market Participant

	Potential Government Role	Examples	Greening Potential
Not traditionally considered "finance"	Direct funding	• Government regular budget • Government special budget • Subsidies	• Reduce spending on unsustainable projects & programs • Increase spending on sustainable projects and programs
	Producer of goods/services	• Government owned companies • Government agencies providing goods/services	• Goods, services, projects, should be made more sustainable
Traditionally considered "finance"	Financial services provider	• Government bank (e.g. development bank) • Government fund administered by a ministry	• Reduce funding to unsustainable projects & programs • Increase funding to sustainable projects and programs
	Investor	• Purchase of financial instruments by central banks	• Establish green/sustainable criteria to prioritize investments/ purchasing
	Borrower (issuing financial instruments)	• Bond issuing (borrowing) • Green government bonds (borrowing)	• Green potential is related to how the borrowed funds are used, not whether the bond itself is "green."

Source: Authors

Each government is free to set up its own criteria for what is green/sustainable and what is not. Ideally, it would be better for governments to coordinate these, but it is not absolutely necessary.

The third direction would be to restrict unsustainable investments. If certain investments are unsustainable or undesirable, then it is not clear why they should be allowed at all, and why it should be left to the judgement of individual investors? One example is the campaign to leave fossil fuels in the ground. This does not have to be done all at once. First, specific geographical areas could be placed off limits, such as national parks, nature reserves, coastal areas, and ocean areas, and the off-limits area could be expanded over time. Second, fossil fuel extraction could be subject to higher taxes (e.g. carbon tax, environment tax) and stricter clean-up and other regulatory requirements. Third, fossil fuel extraction could be simply prohibited in most cases.

The fourth direction would be for governments themselves to provide financing for sustainable development more directly, rather than waiting for the private sector, or trying to influence financing indirectly through the financial system. One aspect of this is raising more revenue, which was emphasized by the Addis Ababa Action Agenda. The share of taxes in GDP for many countries is not very high outside of Europe, so there is considerable scope for raising additional revenue through taxes, even in developing countries. Borrowing could also be an option for some countries. Another major source of revenue is fossil fuel subsidies, which could be shifted to renewable energy and energy efficiency instead. This has been commonly recommended in the past, but many countries still maintain fossil fuel subsidies. Other ideas that have been proposed in the past include taxes on financial transactions. On the spending side, the funding raised could be spent through the regular government budget process, government development banks, or other means.

6. CONCLUSIONS

It is widely recognized that making the financial system more sustainable is a key to realizing the transformative potential of the SDGs. There is a lot of enthusiasm and many initiatives attempting to build a sustainable financial system. It is encouraging that some progress is visible. However, overall progress is limited, and there are several difficult challenges to overcome. It is not easy to assess effectiveness because of a lack of agreed definitions of sustainable finance and ESG criteria. These initiatives are still in the beginning stages, but it appears that the current approaches will take a long time to be effective.

Current approaches mainly focus on voluntary efforts by the private sector. It is generally recognized that governments should provide an "enabling environment." However, most recommendations do not identify concrete measures that governments should take to be more enabling, and they suggest that the government should continue to enable voluntary efforts rather than taking a more regulatory approach.

Most solutions currently under discussion are not transformative. They are indirect, slow, voluntary, but politically feasible. Basically, these measures assume that transformative measures are not politically possible. Therefore, they are best thought of as "second best" or "third best" solutions, when the best solutions are not available. Current voluntary efforts are certainly important and welcome, but progress is slow, and their transformative potential seems limited.

There is no shortage of funding or resources. The needed annual investments to achieve SDGs are a modest share of global GDP, and a small share of global wealth. Moreover, there is already a large amount of infrastructure investment planned every year in key sectors like energy, transport, and buildings. Therefore, the key is to shift existing planned investments from unsustainable to sustainable, and, if necessary, supplement these investments with some additional funds.

Voluntary approaches may not be sufficient to achieve this shift in the focus of investments and not likely to be transformative, so a more regulatory approach may be needed. The first steps could be to strengthen existing initiatives by requiring disclosure. Still, disclosure could be required, instead of asking companies to do so voluntarily. Investments in non-sustainable activities could be restricted by regulation instead of asking companies to do so voluntarily. Finally, national governments have plenty of legal authority to raise revenues to fund sustainable development, without needing to rely on voluntary contributions or loans by private companies. Overall, there is no need to implore private companies and lenders to finance sustainable development based on ethical considerations. Governments have the power to raise the funds and invest on their own, if they think it is important. Why they are not doing so, or what are the obstacles to doing so, could be the focus of future research.

References

350.org (2018) *Fossil Free: Divestment – Commitments*. Available at: https://gofossilfree.org/divestment/commitments/ (Accessed: 30 March 2018).

Ansar, A., Caldecott, B. and Tilbury, J. (2013) *Stranded assets and the fossil fuel divestment campaign: what does divestment mean for the valuation of fossil fuel assets?* doi: 10.1177/0149206309337896.

ASEAN Capital markets Forum (2017) *ASEAN Green Bond Standards*. Available at: http://www.theacmf.org/ACMF/upload/ASEAN_Green_Bond_Standards (Accessed: 22 June 2018).

Bank of England (2017) *Joint statement by the Founding Members of the Central Banks and Supervisors Network for Greening the Financial System*. Available at: https://www.bankofengland.co.uk/-/media/boe/files/research/greening-the-financial-system-statement.pdf (Accessed: 22 June 2018).

Baron, R. and Fischer, D. (2015) *Divestment and Stranded Assets in the Low-carbon Transition, Background paper for the OECD's 32nd Roundtable on Sustainable Development, 28th October 2015*. Available at: https://www.oecd.org/sd-roundtable/papersandpublications/Divestment and Stranded Assets in the Low-carbon Economy 32nd OECD RTSD.pdf (Accessed: 22 June 2018).

Bloomberg New Energy Finance (2015) *Fossil fuel divestment: a US$5 trillion challenge*. Available at: https://data.bloomberglp.com/bnef/sites/4/2014/08/BNEF_DOC_2014-08-25-Fossil-Fuel-Divestment.pdf (Accessed: 22 June 2018).

Central Intelligence Agency (2015) 'The World Factbook 2015'. Available at: https://www.cia.gov/library/publications/resources/the-world-factbook/index.html.

Central Intelligence Agency (2018) *The World Factbook 2018*. Available at: https://www.cia.gov/library/publications/the-world-factbook/geos/xx.html (Accessed: 10 April 2018).

Climate Bond Initiative (2018) *2017 GB Issuance: USD155.5bn: New Record! All the 2017 numbers that count in our Green Bond Highlights report: Plus our Seven Super Trends and 2018 green bonds forecast!*, *Climate Bond Initiative*. Available at: https://www.climatebonds.net/2018/01/2017-gb-issuance-usd1555bn-new-record-all-2017-numbers-count-our-green-bond-highlights (Accessed: 22 June 2018).

Climate Disclosure Standards Board and the Carbon Disclosure Project (2018) *Ready or not : Are companies prepared for the TCFD recommendations?* Available at: https://www.cdp.net/en//articles/media/new-research-shows-clear-gap-between-companies-awareness-of-climate-risks-and-actions-for-tackling-them (Accessed: 22 June 2018).

EU the High-Level Expert Group on Sustainable Finance (2018) *Financing a Sustainable European Economy*. Available at: https://ec.europa.eu/info/sites/info/files/180131-sustainable-finance-final-report_en.pdf (Accessed: 22 June 2018).

European Commission (2016) *Study on the potential of green bond finance for resource-efficient investments*. doi: 10.2779/234777.

European Commission (2018) *Action Plan: Financing Sustainable Growth*. doi: 10.1093/acprof.

Financial Stability Board (2015) *Task Force on Climate-related Financial Disclosures*. Available at: https://www.fsb-tcfd.org/ (Accessed: 22 June 2018).

G20 Green Finance Study Group (2016) *G20 Green Finance Synthesis Report 2016*. Available at: http://unepinquiry.org/wp-content/uploads/2016/09/Synthesis_Report_Full_EN.pdf (Accessed: 22 June 2018).

G20 Green Finance Study Group (2017) *G20 Green Finance Synthesis Report 2017*. Available at: http://unepinquiry.org/wp-content/uploads/2017/07/2017_GFSG_Synthesis_Report_EN.pdf (Accessed: 22 June 2018).

Global Green Financial Council (2017) *Global and European Green Finance Policy Directory*. Available at: https://www.icmagroup.org/green-social-and-sustainability-bonds/global-green-finance-council-ggfc/ (Accessed: 22 June 2018).

Global Reporting Initiative (2018) *Global Reporting Initiative*. Available at: https://www.globalreporting.org/Pages/default.aspx (Accessed: 10 April 2018).

Global Sustainable Investment Alliance (2017) *2016 Global Sustainable Investment Review*. Available at: https://www.ussif.org/files/Publications/GSIA_Review2016.pdf (Accessed: 22 June 2018).

Green Bank Network (2018) *Green Bank Network*. Available at: https://greenbanknetwork.org/ (Accessed: 30 March 2018).

International Finance Corporation (2017) *Green Finance: A Bottom-up Approach to Track Existing Flows*. Available at: http://www.ifc.org/wps/wcm/connect/48d24e3b-2e37-4539-8a5e-a8b4d6e6acac/IFC_Green+Finance+-+A+Bottom-up+Approach+to+Track+Existing+Flows+2017.pdf?MOD=AJPERES (Accessed: 22 June 2018).

IRENA (2018) *Global Energy Transformation: A Roadmap to 2050*. Available at: http://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Apr/IRENA_Report_GET_2018.pdf (Accessed: 22 June 2018).

LEFEVRE, B. *et al.* (2016) *Working Paper the Trillion Dollar Question Ii : Tracking Investment Needs in Transport*. Available at: https://www.wri.org/sites/default/files/The_Trillion_Dollar_Question_II_Tracking_Investment_Needs_in_Transport_0.pdf (Accessed: 22 June 2018).

Loan Market Association (2018) *Green Loan Principles*. Available at: http://www.lma.eu.com/news-publications/press-releases?id=146 (Accessed: 22 June 2018).

Mehta, A. *et al.* (2017) *Catalyzing Green Finance: A Concept for Leveraging Blended Finance for Green Development*, *Asian Development Bank*. Available at: https://www.adb.org/sites/default/files/publication/357156/catalyzing-green-finance.pdf (Accessed: 22 June 2018).

Ministère de la Transition écologique et solidaire (2016) *Loi de transition énergétique pour la croissance verte*. Available at: https://www.ecologique-solidaire.gouv.fr/loi-transition-energetique-croissance-verte (Accessed: 12 March 2018).

Norges Bank (2016) *Clear expectations towards companies*. Available at: https://www.norges-bank.no/en/Published/Press-releases/2016/2016-02-04-Press-release/ (Accessed: 12 March 2018).

OECD (2015) *Annual Survey of Large Pension Funds and Public Pension Reserve Funds: Report on pension funds' long-term investments*. Available at: http://unepinquiry.org/wpcontent/uploads/2016/09/11_Progress_Report_on_Approaches_to_Mobilising_Institutional_Investment_for_Green_Infrastructure.pdf (Accessed: 22 June 2018).

OECD (2016) *Green Investment Banks: Scaling up Private Investment in Low-carbon, Climate-resilient Infrastructure*. doi: 10.1787/9789264245129-en.

OECD (2017a) *Investing in Climate, Investing in Growth*. doi: 10.1787/9789264273528-en.

OECD (2017b) *Investment governance and the integration of environmental, social and governance factors*. Available at: http://www.oecd.org/cgfi/Investment-Governance-Integration-ESG-Factors.pdf (Accessed: 22 June 2018).

OECD (2017c) *Mobilising Bond Markets for a Low-Carbon Transition*. Available at: http://dx.doi.org/10.1787/9789264272323-en (Accessed: 22 June 2018).

OECD (2018) *Making Blended Finance Work for the Sustainable Development Goals*. doi: http://dx.doi.org/10.1787/9789264288768-en.

OECD and CDSB (2015) *Climate Change Disclosure in G20 Countries: Stocktaking of Corporate Reporting Schemes*. Available at: http://search.ebscohost.com/login.aspx?direct=true&db=buh&AN=16712902&site=ehost-live&scope=site (Accessed: 22 June 2018).

One planet summit (2017) *The 12 #OnePlanet commitments*. Available at: https://www.oneplanetsummit.fr/en/the-12-oneplanet-commitments/ (Accessed: 12 March 2018).

Principles for Responsible Investment (2018) *11 year growth of AO, all signatories (Aseet Owners, Investment Managers and servide providers) and respective AUM*. Available at: https://www.unpri.org/pri/about-the-pri (Accessed: 10 April 2018).

Ro, S. (2015) *Here's what the $294 trillion market of global financial assets looks like | Business Insider*, *Business Insider Australia*. Available at: https://www.businessinsider.com.au/global-financial-assets-2015-2 (Accessed: 22 May 2018).

Schmidt-Traub, G. (2015) *Investment Needs to Achieve the Sustainable Development Goals Understanding the Billions and Trillions*, *SDSN Working Paper*. Available at: http://www.unsdsn.org/wp-content/uploads/2015/09/151112-SDG-Financing-Needs.pdf (Accessed: 22 June 2018).

Securities Industry and Financial Markets Association (2017) *SIFMA FACT BOOK 2017*. Available at: https://www.sifma.org/resources/research/sifma-fact-book-2017/ (Accessed: 22 June 2018).

TCFD (2017a) *Final Report: Recommendations of the Task Force on Climate Related Financial Disclosures*. Available at: https://www.fsb-tcfd.org/wp-content/uploads/2017/06/FINAL-TCFD-Report-062817.pdf (Accessed: 22 June 2018).

TCFD (2017b) *Implementing the Recommendations of the TFCD*. Available at: https://www.fsb-tcfd.org/wp-content/uploads/2017/06/FINAL-TCFD-Annex-062817.pdf (Accessed: 22 June 2018).

TCFD (2018) *Task Force on Climate-related Financial Disclosures*. Available at: https://www.fsb-tcfd.org/ (Accessed: 12 March 2018).

UN Secretary General (2017) 'Repositioning the United Nations development system to deliver on the 2030 Agenda: our promise for dignity, prosperity and peace on a healthy planet (advance unedited version)', *Report of the Secretary General, 72nd Session*, December. Available at: https://www.un.org/ecosoc/sites/www.un.org.ecosoc/files/files/en/2018doc/Advance copy of the Report of the Secretary-General on the UNDS repositioning %2B Annex %2821 December 2017rev%29.pdf (Accessed: 22 June 2018).

UNEP Inquiry (2016) *GREENING THE BANKING: Taking Stock of G20 Green Banking Market Practice*. Available at: http://unepinquiry.org/wp-content/uploads/2016/09/9_Greening_the_Banking_System.pdf (Accessed: 22 June 2018).

UNEP Inquiry and World Bank (2017) *Roadmap for a Sustainable Financial System*. Available at: http://unepinquiry.org/publication/roadmap-for-a-sustainable-financial-system/ (Accessed: 22 June 2018).

United Nations (2015) *Addis Ababa Action Agenda of the Third International Conference on Financing for Development*. New York. Available at:

https://sustainabledevelopment.un.org/frameworks/addisababaactionagenda (Accessed: 22 June 2018).

United Nations Sustainable Stock Exchanges Initiative (2017a) *How Stock Exchanges Can Grow Green Finance: A voluntary Action Plan*. Available at: http://www.sseinitiative.org/greenfinance/ (Accessed: 22 June 2018).

United Nations Sustainable Stock Exchanges Initiative (2017b) *Results and Impact Report Sustainable Stock Exchanges initiative*. Available at: http://www.sseinitiative.org/wp-content/uploads/2012/03/2016-Impact-Report_v4.pdf (Accessed: 22 June 2018).

United Nations Sustainable Stock Exchanges Initiative (2018) *List of Partner Exchanges*.

Chapter 7

Technology's Role in Achieving the SDGs

Peter King and Mark Elder

Chapter 7

Technology's Role in Achieving the SDGs

Peter King and Mark Elder

Main messages

- In this report, "sustainable technology" contributes to sustainable development, but the technology itself is not necessarily sustainable.
- Accelerating the adoption and use of "sustainable" technology in all countries is necessary to achieve a transformation to sustainability.
- Technology is prominently highlighted in the SDGs as a means of implementation, but its proposed measures are mostly general and weak.
- Technological solutions are often preferred to more difficult ones such as governance reforms, but technology isn't likely to be a "silver bullet".
- There is already a great deal of available technology to solve sustainability problems, but it has not been sufficiently adopted.
- "Exnovation" to eliminate unsustainable technology is also important.
- Expanded investment in research and development (R&D) of new, innovative technologies could accelerate transformation, but should focus on sustainable uses.
- Life cycle assessment of new technologies should be implemented before their adoption to avoid unexpected sustainability problems.
- Regulation may be needed to ensure that specific technology contributes to rather than undermines SDGs and to address synergies and tradeoffs.
- The rate of technological change is high, and Asian countries are accelerating R&D investment, but not always in a sustainable direction.
- Appropriate technology (less advanced is better) vs. leapfrogging (more advanced is better) is not always an obvious choice.
- Matching sellers and buyers is often difficult; cheapest is often not best.
- Financing of technology is not necessarily the most important problem.
- China is massively increasing its R&D spending, Japan controls many niche markets, and Singapore has invested heavily in smart city technologies.
- Technology matching platforms need ground-level demonstration and capacity building, not only online information dissemination.
- Patent waiving for sustainable technologies, with appropriate compensation for developers, may help overcome cost/transfer barriers.

1. INTRODUCTION

There is no question that innovative technologies that will fulfil people's needs without exceeding planetary boundaries or polluting the environment are needed. There is also an undisputed need for more sustainable modes of production and consumption to achieve the SDGs. Technology will play a key role in making consumption and production more sustainable. Many technologies already exist which could help to achieve sustainable consumption and production and the SDGs, if only the right enabling environment existed, but innovative technologies specifically designed for the SDGs are also needed. Outdated technologies will not be much help in making this transition and may need to go through a process of "exnovation" or phasing out.

This chapter considers how technology could be more effectively pushed in the direction of sustainability, and how it could be used to raise the level of ambition of SDG implementation to be more transformative. To do that, section 2 first considers what is meant by the idea of sustainable technology. Section 3 reviews the place of technology in the SDGs. Section 4 discusses some of the challenges in promoting sustainable technology. Section 5 surveys technology-related initiatives on SDGs (and more broadly), of selected Asian countries. The final section concludes and makes some recommendations on how technology could be better promoted in a more sustainable direction.

2. INNOVATIVE SUSTAINABLE TECHNOLOGY

It is important to note that innovative technologies per se may not be strictly sustainable based on a life cycle analysis approach. Hence, there is debate in the literature whether sustainable technology means that the technology is sustainable in its own right, or it means that the technology merely helps to achieve sustainable development. This chapter takes the latter view. This chapter also takes the view that "sustainable technology" is broader than "environmental technology", with renewable energy technologies possibly the most illustrative example of the difference.

It is commonly believed that sustainable technology only refers to production, but technology can also be used to make consumption more sustainable, even for entertainment. Currently, much entertainment technology is unsustainable. To generate thrills from going really fast, technology is developed to make motorised transport go ever faster, even if congestion on urban roads will only allow vehicles to travel at just over walking speed. Many people like to travel to foreign countries to soak up the sun, so technology is developed to make faster boats and planes to get people to their destinations faster, or energy consuming tanning equipment for people who are too busy or cannot afford to travel. However, these desires could be met by different technologies for sustainable consumption, such as virtual reality for speedsters, or efficient sunbeds for sun lovers, without ever having to leave the house.

Underpinning the creation of innovative technology that could influence or drive sustainable development is effective research and development (R&D). As much of the expenditure on R&D is driven by larger corporations, their priorities are usually on technology which can generate the most profits rather than contribute the most to sustainability. Incremental efficiency improvements rather than breakthrough technologies, for which there is no guarantee of success. Small and medium enterprises and start-up companies, especially ones in competitive markets with low profit margins, may have difficulty conducting any R&D, so they may need grant assistance to conduct R&D. Accordingly, it is largely up to governments to support technological innovation directed towards sustainable development.

Among Asian countries, China accounts for USD 429.5 billion of R&D expenditure, growing at over 7 percent per annum, and is likely to surpass the US by 2026 (having passed the 34 European countries in 2016). Japan is the second largest source of finance for R&D according to the 2017 Global R&D funding forecast (Industrial Research Institute & R&D Magazine.com, 2017). Japan was forecast to spend USD 173.4 billion in 2017, followed by South Korea (USD 83.9 billion), India (USD 77.5 billion), and Australia (USD 36.2 billion). Some countries, like Cambodia and Lao PDR spend less than USD 100 million, while among ASEAN neighbours, Thailand is the largest at USD 4.1 billion. The total for 23 countries in Asia is USD 457 billion (excluding China), growing at 2.93 percent per annum, which is greater and faster than anywhere else, other than the US.

Indicative of the R&D work on technologies being done by large global corporations the World Economic Forum has established the Centre for the Fourth Industrial Revolution in San Francisco, California. One of the interesting activities undertaken by the Centre is to map global transformations, covering a wide range of technologies including 3-D printing, artificial intelligence and robotics, biotechnology, blockchain, chemicals and materials, digital economy, drones, internet of things, neuroscience, sensors, virtual and augmented reality, among 120 drivers of change[1].

The Centre notes that "harnessing these opportunities and proactively managing these risks will require a transformation of the 'enabling environment', namely the governance frameworks and policy protocols, investment and financing models, the prevailing incentives for technology development, and the nature of societal engagement. ….If we get it right, it could create a sustainability revolution" (World Economic Forum, 2017). The emphasis here is "getting it right" as there are many historical examples of backing the "wrong" technology which could hinder innovation. This chapter reaches a similar conclusion (along with many other observers) regarding the importance of creating the appropriate enabling environment, although it should be noted that "getting it right" might vary considerably among countries at different levels of development.

In addition to technological innovation, however, policies may also need to be directed towards "exnovation", which is the deliberate attempt to remove technologies that no longer meet society's needs (David, 2017). Perhaps one example of this is the very powerful fossil fuel divestment campaign aimed at convincing institutional investors and

pension funds to withdraw financing from outdated coal-fired power plants and other fossil fuel technologies (Sheppard, 2017).

Adoption of sustainable technologies is not merely an issue of conducting the appropriate R&D, commercializing the product, and creating a favourable environment for its adoption. Technologies are inextricably embedded in social and cultural systems, so some "sustainable" technologies may fail to be adopted as they require significant behavioural change and adoption of sustainable consumption patterns. For example, the hyperloop technology, which is currently under development in the US, may not appeal to people who fear sitting in an enclosed pod inside a partial vacuum travelling at more than 500 km/hr in a long underground tube. The three-stone cookstove used in many developing countries may be difficult to replace with an energy-efficient and safer cookstove if the meals cooked end up tasting differently.

In contrast, many countries opt for technological solutions because the alternative of changing consumer behaviour or governance structures is perceived as more difficult to achieve. For example, rather than forcing consumers to bring cloth bags to supermarkets to eliminate the use of single-use plastic bags, effort is directed towards biodegradable plastic bags and other packaging. Rather than trying to convince commuters to leave their cars at home and travel by public transit systems, governments opt for technologies to speed cars through toll way fee stations, expand the road network, and build elaborate car parking facilities. These alternatives remain palatable for business as they can be a source of new sales to replace the old technologies.

3. CHALLENGES

3.1 Adopting existing, readily available technology

There are multiple barriers that prevent existing technologies from becoming mainstream (Mulder, 2007). Current industrial technology is geared towards a globalized market that tends to only allow incremental change, especially where existing technologies have long life cycles and it is costly to replace the technology simply because some new technology has emerged. Therefore, adoption of new and more sustainable technologies lags by some years the development and/or patenting of new technologies, primarily because of economic considerations. Hence there are many technologies that could hasten the pathway towards sustainable development, but these are either not economically or socially viable or they require excessive disruption to existing technological systems, particularly in the industrial sector. Of course, some disruptive technologies, like 3-D printing, might take off much faster, but there will still be some time lag.

In developing countries, the barriers are often even greater as they are not only locked into existing antiquated technologies but also the owners of the new technologies are reluctant to transfer these technologies in case they are copied or reverse engineered. Some companies in the same sector are reluctant to sell or licence new technologies

because they fear that this will undermine their competitiveness in the globalized market. For example, Japanese steel companies have been reluctant historically to share new and improved steel making technology, thus delaying reform in this vital industrial sector.

3.2 Challenges to developing new, innovative technologies

Choosing technologies that will advance sustainability from the plethora of R&D results is also a significant challenge. All technologies have the potential for unintended impacts, which can often undermine the scope for sustainable development, so the precautionary principle needs to be applied. Accordingly, examining new technologies within the context of their application, applying a life-cycle analysis, and addressing the economic, social and environmental implications in all life-cycle stages will help to ensure that these unintended impacts are minimized, if not fully eliminated (Onat, Kucukvar, Halog, & Cloutier, 2017). Care should be taken in assessment of all technological advancements to ensure that they genuinely contribute to long-term sustainable development, especially when transferring new technologies to developing countries, where cultural and social behaviours are different from the source country. Unfortunately, application of the precautionary principle and the extensive testing required before release of new technologies is another significant barrier to adoption.

3.3 Challenges of technology transfer

Effective technology transfer is a key challenge to overcome for developing countries. The International Environmental Technology Centre (IETC) points to the "Seven C's for the Successful Transfer and Uptake of Environmentally Sound Technologies" (IETC, 2003) -- context, challenges, choice, certainty, communication, capacity, and commitment.

According to IETC, the main steps in technology transfer are: (i) establishment of cooperative and collaborative partnerships between key stakeholders, with the common purpose of enhancing technology transfer; (ii) implementation of technology needs assessments; (iii) participation in the processes of technology creation, development and adaptation, from the R&D stage; (iv) design and implementation of technology transfer plans and specific actions; (v) evaluation and refinement of the actions and plans; and (vi) dissemination of technology information.

Matchmaking between sources of advanced technology in developed countries and the private sector in developing countries can help to accelerate technology transfer. IGES and TERI conducted JICA-funded "Research Partnership for Application of Low Carbon Technology for Sustainable Development" (2010-2014) under the Science and Technology Research Partnership for Sustainable Development (SATREPS)[2]. Under this partnership, transfer of gas heat pumps, electric heat pumps, once-through boilers, steam system optimization, compressed air, and induction furnace technologies from Japan have been investigated, with potential energy savings of 30-50 percent (Rabhi, Doll, Groen, & Suzuki, 2017). This research found that the major challenges are:

- Lack of a comprehensive database on "seeds" & "needs";

- Inadequate feasibility studies (in quantity and/or quality);
- High up-front cost of Japanese technologies;
- Less focus/interest in demonstration projects;
- Limited follow-up actions to demonstration projects;
- Less focus on adapting technology to local needs; and
- Less enabling environment/supportive institutional infrastructure and policies to enhance the diffusion.

To address these challenges, a matchmaking platform is needed, which would comprise:

- Direct interaction among stakeholders to conduct market assessments, feasibility studies, project proposals, demonstration projects, technical assistance and capacity building, loan syndication, training of trainers, promotion and outreach; and
- Collection, mapping and online sharing of relevant information (online databases on technologies, policies, and financing options), along with dissemination of lessons learnt from ground-level matching.

The case studies in Section 5 below highlight some of the approaches and support systems being undertaken by three countries that are pushing the envelope of new technologies and the steps they are taking to ensure that technology contributes to sustainable development. It should be noted, however, that these countries may also be pursuing technologies that could detract from sustainable development (such as military applications, gene editing, cloning of primates etc.). The case study countries have quite different geo-political, historical, and cultural differences. Therefore, it will be instructive to monitor which of these approaches and forms of regional support will most effectively lead their own respective societies towards sustainable development, as well as influencing future directions throughout Asia.

4. TECHNOLOGY IN THE SDGS

In the SDGs, technology is highlighted in SDG 17 on means of implementation, specifically targets 17.6, 17.7, and 17.8, building on earlier discussions at Rio+20 in 2012 and the Addis Ababa Action Agenda (AAAA). Moreover, technology is also mentioned 8 times as means of implementation targets under six other SDGs (5.b, 7.a, 7.b, 9.a, 9.b, 11.c, 12.a, and 14.a) (Elder, Bengtsson, & Akenji, 2016). These targets are listed below in Table 7-1.

Most of the discussion of technology in the SDGs is vague and general. Much of it is focused on technology transfer in various areas and related financial assistance to developing countries. There is also general discussion on the need to develop technology. However, there are no funding commitments and little discussion on how these targets are to be achieved. Generally, this represents an outdated view focused on asking the developed North to subsidize technology transfers to the South, and not enough on what countries can do for themselves, or how to get their local private actors to adopt

(purchase) sustainable technology rather than unsustainable technology, or how to formulate policies that will create the appropriate enabling environment.

The indicators related to the technology targets are also rather weak. Mainly they focus on information and communication technology (ICT) and development assistance for technology transfer rather than indicators of resource inputs, achievement of technical progress, or achievement of sustainability.

Table 7-1 SDG Targets Directly Related to Technology

5.b	"Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women".
7.a	"By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil fuel technology, and promote investment in energy infrastructure and clean energy technology".
7.b	"By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, in accordance with their respective programmes of support".
9.a	"Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries, and small island developing states".
11.c	"Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilising local materials".
12.a	"Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production".
14.a	"Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing states and least developed countries".
17.6	"Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism".
17.7	"Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed".
17.8	"Fully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular information and communications technology".

Source: Analysis by authors from United Nations (2015).

4.1 Technology Facilitation Mechanism

The Technology Facilitation Mechanism in SDG 17 is one of the few concrete proposals in the SDGs. It was first proposed in 2012 at the UN Conference on Sustainable Development

("Rio+20"), which called for identifying a technology facilitation mechanism. Subsequently, the AAAA (Para. 123) proposed establishing a technology facilitation mechanism. This was then taken up in Agenda 2030 through SDG 17[3].

The Technology Facilitation Mechanism has 3 components: (i) an inter-agency task team (IATT) on Science, Technology and Innovation for the SDGs; (ii) an annual multi-stakeholder forum; and (iii) an online platform. Some 31 UN agencies make up the IATT supported by 10 "eminent" representatives from civil society, the scientific community, and the private sector.[4] Emphasis to date has been on preparing for the forums (including the third forum planned for 5-6 June 2018) and establishment of the platform.

However, the technology facilitation mechanism seems rather weak. Funding is not very large. It is mainly a forum for discussion. Therefore, it is not clear how much it will be able to promote the adoption of sustainable technology.

4.2 Examples of possible sustainable technologies that could contribute to the SDGs

Some examples of potentially transformative technologies are listed below in Table 7-2. They are listed according to the other 16 SDGs, which reflect the global assessment of the most urgent development goals. Of course, the technologies listed are merely a small fraction of the technologies that are currently available or could be available in the near future.

Note that these technologies might also have negative impacts that detract from sustainable development if they are used in the wrong way. For example, gene editing could be used to develop superhumans to form an army, or artificial intelligence could get out of control if computers become smarter than humans. The environmental benefits are also not always immediately apparent. For example, a guaranteed living wage may prevent illegal logging, fishing, or wildlife poaching, but could equally increase consumption of tobacco and alcohol.

Table 7-2 Examples of potentially transformative technologies that may contribute to the SDGs

Sustainable Development Goal	Examples
1. No poverty	Cash transfers via debit cards for a guaranteed living wage. ICT for job searches. Employment in production and use of sustainable technologies.
2. Zero hunger	Gene editing to increase crop yields and adapt to climate change. Pest resistance in organic agriculture. Food preservation and reduced waste technologies.
3. Good health and wellbeing	Solar powered coolers for vaccines. Nanobots and drug delivery systems. CRISPR and DNA editing technology. Plant-embedded medicines. Wearable monitors. Innovative pollution control technologies.

4. Quality education	Artificial intelligence. Online courses. Distance education. Low cost recyclable computers.
5. Gender equality	Product design that meets specific gender needs
6. Clean water and sanitation	Improved filter technologies. Fog harvesting. Waterless toilets. Water recycling technology. Water treatment technologies.
7. Affordable and clean energy	Solar paint. Solar windows and tiles. Floating solar farms. Tethered and offshore wind systems. Energy efficiency technologies. Artificial photosynthesis. Algal biomass. Cleaner mining technologies, especially for rare earths.
8. Decent work and economic growth	Labour assisting robotics. Industrial ecology. Artificial intelligence. 3-D printing. New materials. Nanotechnology. Design for environment. Cleaner production technology.
9. Industry innovation and infrastructure	Hyperloop. Electric vehicles. Flying taxis. 3-D printing. New materials. Nanotechnology. Undersea energy transmission. Floating airports etc.
10. Reduced inequalities	Technology banks and patent waivers. Technology transfer
11. Sustainable cities and communities	Pedestrian and bicycle access systems, such as "walkevators". Urban agriculture. Rooftop energy. Retrofitting buildings for energy efficiency and heat control. Mass transit systems. Multi-use buildings.
12. Responsible consumption and production	Design for environment. Recyclable and repairable products. Sharing systems using ICT.
13. Climate action	Carbon capture and storage. Renewable energy and energy efficiency. Adaptation technologies like floating houses. Recycling of plastics back to oil.
14. Life below water	Improved fishing technology to reduce by-catch; Biodegradable fishing gear. Electric or sail-driven vessels. Reef restoration technology. Alternative biodegradable plastics.
15. Life on land	Satellite imagery and monitoring. No till crop cultivation. Precision farming. Drone forest planting. LIDAR mapping.
16. Peace and justice, strong institutions	ICT. Artificial intelligence. Surveillance systems
17. Partnerships for the goals	ICT. Artificial intelligence. Blockchain technology. Technology matchmaking platforms.

Source: Authors.

This list also suggests that it is not easy to strictly classify particular technologies under particular SDGs, and that there could be synergies or trade-offs between SDGs. For example, technologies to promote decoupling might reduce jobs. Jobs could be created through responsible consumption and production technologies like recycling and design for environment. Pollution reduction technology could improve life below water as well as life on land and in cities and improve health and sustainable agriculture.

4.3 Asian Initiatives on Technology for the SDGs

In Asia, the role of technology in achieving the SDGs is a consistent theme in countries' voluntary national reviews (VNRs). For example, Japan's VNR notes that one of its eight

key priorities is to create "Growth Markets, Revitalization of Rural Areas, and Promote Science Technology and Innovation (related to SDGs: 2, 8, 9, 11)"[5]. The Japan Science and Technology Agency is promoting SDGs in line with "Society 5.0" under the Fifth Science and Technology Basic Plan[6]. While Japan has had a science and technology promotion policy for decades, it is too early to judge how successful this will be in promoting innovation in relation to the SDGs. China is preparing to help developing countries with support in financing, technology and capacity building under its new Assistance Fund for South-South Cooperation. The fund will tackle famine, refugees, climate change, public health and other challenges, and is designed to foster partnerships and build a community of common development and a shared future.

China has a strong industrial policy and increasing R&D funding, so it can fairly quickly shift to new areas like environmental protection. Under China's 2016 VNR, one of nine priorities is "implementing innovation-driven development strategies and generating momentum for sustainable, healthy and stable economic growth"[7]. In India, innovation and entrepreneurship is being encouraged through initiatives like the Atal Innovation Mission and launching an India Innovation Index for ranking innovations in the country[8]. Indonesia is intensifying agricultural R&D to "create agricultural technology innovation"[9]. Thailand's 4.0 policy "will boost value added in manufacturing sector through promoting greater utilization of creativity, technology and innovation while ensuring environmental friendly practices"[10].

5. CASE STUDIES ON NATIONAL PLANS FOR INNOVATIVE, SUSTAINABLE TECHNOLOGIES

Many countries in East Asia have put a high priority on technology for many years, long before the development of SDGs. Governments have developed national action plans, and companies in the region have also increased their efforts on technology and R&D. Technology related spending has been steadily increasing in the region. Until recently, these efforts have been mainly aimed at promoting traditional economic growth, but in recent years, interest in technology for sustainable development has been increasing. This section surveys key trends in three countries which have been leading technology development in the region: China, Japan, and Singapore.

5.1 China

China became one of the world's top 25 most innovative countries in 2016, according to the global innovation index survey conducted by the World Intellectual Property Organization and is currently ranked just ahead of Australia (Dutta, Lanvin, & Wunsch-Vincent, 2017). Based on patenting data, one of the most innovative clusters of cities globally is the Shenzhen-Hong Kong area, ranked second after Tokyo-Yokohama. China has more than doubled its gross domestic expenditure on R&D since 2008. China's increasing innovation ranking is due to top scores in domestic market scale, firms offering

formal training, patents by origin, utility models by origin, high-tech exports less re-exports, industrial designs by origin, and creative goods exports.

China's National Guideline on Medium- and Long-term Plan for Science and Technology Development (2006-2020) calls for R&D to reach 2.5 percent of GDP by 2020. In the 13th National Five-Year Economic and Social Development Plan (2016-2020), China planned an annual R&D investment growth rate of 10.3 percent (although is probably achieving just over 7 percent currently) and intends to "grow into a world-class science and technology innovation power by 2050" (Jung, 2016).

In 2016, China released its national plan on the implementation of the SDGs (Government of China, 2016). It states that "effective implementation of the 2030 Agenda will not only pave the way for China to complete the building of a moderately prosperous society and achieve the "Two Centennial Goals" and national rejuvenation, but also inject strong impetus into international development cooperation and elevate the global development level". A key strategy is innovation-driven development as documented in the National Outline for Innovation-Driven Development Strategy, the National Sustainable Agricultural Development Plan (2015-2030), and the National Outline for Information Technology Development Strategy.

The targets are "by 2020, transform China to an innovative country with a national innovation system with Chinese characteristics. By 2030, become a leading innovative country and realize the transformation of driving force for development". The plan also proposes "enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States" and development of domestic R&D in developing countries, especially in areas like marine technology. China also proposes to actively engage in a global technology facilitation mechanism and explore the possibility of setting up the technology bank on implementation of the 2030 Agenda.

China has also emphasised the development of technology to promote environmental protection and environmental protection industries. The Blue Sky Science and Technology Project, started in 2010, which aimed to develop and commercialise air pollution control technologies with 100 billion RMB of funding (Lin & Elder, 2014). For some years, China has strengthened its auto emission standards much faster than other developing countries in an effort to strengthen the competitiveness of its auto producers while reducing domestic pollution (Saikawa, 2013). Energy efficiency and renewable energy have long been Chinese research priorities. Another recent priority is the development of electric cars, which aims to combine the promotion of more environmentally friendly transportation with strengthened global trade competitiveness of China's auto producers (Clover, 2017).

In addition to cooperation with developing countries, China has formed cooperative arrangements with developed countries to further technological development for the sustainable development agenda. For example, the European Commission is funding URBAN-EU-CHINA cooperation on sustainable urbanisation which will match up to 30

cities from each continent by 2019[11]. Another example is the UK-China Sustainable Agriculture Innovation Network[12]. Achievement of the SDGs is a primary goal of the Digital Belt and Road initiative, which relies on big Earth data and similar technologies, although there are some concerns over China's real intentions (DBAR, 2017).

5.2 Japan

Japan's technological growth was initially based on adopting and improving on technology from overseas, reducing costs, building customer relations, and then improving quality and technical superiority (Economist, 2009; Ikeda & Morita, 2016).

Japan's technology policy has aimed in part at promoting environment related technologies since the early 2000s. These included various "intelligent transportation" systems and "clean energy" vehicles (Elder, 2003).

A little appreciated aspect of Japan's technological prowess is that Japanese companies control a large market share of niche markets globally. For example, 75 percent of zippers (YKK), 60-70 percent of bicycle gears and brakes (Shimano), 75 percent of hard disk drive motors (Nidec), 90 percent of motors for rear-view mirrors (Mabuchi), 80 percent of etchers for LCD panels (TEL), and 60 percent of containers for silicon wafers (Covalent). According to the Ministry of Economy, Trade and Industry (METI), Japanese companies share more than 70 percent of 30 global technology sectors, largely because they invest a lot in R&D and in managing customer relations. Accordingly, Japan could set the trend towards sustainable technology and capture a large market share, if the appropriate enabling environment was created.

In this connection, in 2009, METI established the Innovation Network Corporation of Japan acting as a national private-equity fund, with assets and credit guarantees totalling USD 9 billion to invest in promising intellectual property and creating spin-off companies. Interestingly, part of the motivation for this organisation was to "address environmental and energy issues in Japan and worldwide" although there is little evidence of this in the portfolio to date[13].

Japan has had an Environmental Technology Association (JETA) since 1979 partly dedicated to promoting international cooperation regarding environmental measurement techniques[14]. Focused mainly on air and water quality monitoring equipment, JETA's international operations appear to have mainly addressed East Asia.

The United Nations Industrial Development Organization (UNIDO) and Japan launched the Green Industry Initiative in 2009 to accelerate the transition to sustainable development (UNIDO & Government of Japan, 2012). In 2011, the Tokyo Green Industry Conference provided opportunities to match environmental technology needs of developing countries with best available technologies. The Green Industry Initiative addresses greening of existing industries and creating new green industries. A compendium of Japanese environmental technology is included UNIDO's technical

cooperation portfolio. Green Industry is "seen as an important and practical pathway towards achieving sustainable development".

In relation to greening industry, the compendium includes (i) smart grid engineering; (ii) mobile Ozone depleting substances reclamation and decomposition; and green chemical management. For new green industries, the highlighted technologies are (i) rainwater storage and usage; (ii) wastewater purification; and (iii) gasification power generation. Additional Japanese technologies are included on UNIDO's environmental technology database[15] through the Investment and Technology Promotion Office in Tokyo.

Japan also hosts the International Centre for Environmental Technology Transfer (ICETT) in Yokkaichi City, Mie Prefecture. ICETT was set up "to transfer Japanese or international environmental conservation technology to other countries" [16]. ICETT also promotes international cooperation through the Clean Technology Business Network and the Climate Technology Initiative.

ICETT should not be confused with UNEP's International Environmental Technology Centre (IETC) established in 1991 and located in Osaka[17]. Currently, IETC focuses on waste management technology. IETC intends to be "a global centre of excellence on environment technology with a focus on waste management by responding to capacity building needs in the overall context of achieving sustainable development".

5.3 Singapore

Singapore has an aspiration of becoming the smartest city in the world, through technological advances and a cooperative society. The Government has invested heavily in R&D for smart city technologies, with USD13.9 billion allocated in 2016. The Sustainable Singapore Blueprint provides a national vision and plans for a more liveable and sustainable Singapore (Government of Singapore, n.d.).

Technological elements of the Blueprint include (i) integrated planning using digital planning tools to model future land use scenarios; (ii) an underground Deep Tunnel Sewerage System to channel used water to centralised water reclamation plants; (iii) a satellite-based electronic road pricing to manage traffic congestion; (iv) "smart" public housing, using new technologies to enable residents to live with a lighter environmental footprint; (v) retrofitting housing with solar panels, bicycle parking to encourage green mobility, pneumatic waste systems, and rooftop and vertical greenery; (vi) the "Active, Beautiful, Clean Waters Programme which builds community spaces around water bodies, integrates canals with the urban landscape, and improves water quality by using natural cleansing features"; (vii) an electric vehicle car-sharing programme with 1,000 passenger cars and investments in electric vehicle charging infrastructure; (viii) an Integrated Waste Management Facility with state-of-the-art technologies for handling multiple waste streams and optimising resource and energy recovery; (ix) waste to energy plants and an offshore landfill site for incineration ash; (x) solar energy systems installed on the rooftops of about 6,000 public buildings (public housing, schools, police stations and utility plants).

Singapore's Research, Innovation and Enterprise 2020 Plan (winning the future through science and technology) plans to invest S$19 billion from 2016 to 2020, on top of S$16 billion from 2011 to 2015 to establish Singapore as a global R&D hub (Government of Singapore, 2016). Under the Urban Solutions and Sustainability domain, priorities are "urban mobility solutions, creating and optimising liveable space, building the next generation smart grid, and lowering the energy consumption of used water treatment, seawater desalination, and NEWater production".

In 2017, the Nanyang Technological University and Singapore Maritime Institute launched a S$15 million research centre aimed at developing sustainable solutions for the maritime industry (Nanyang Technological University, 2017). Research will be focused on energy management, emissions management and sustainable maritime operations. In 2018, the Singapore Maritime Institute announced that it will invest S$12 million to set up a Centre of Excellence in Modelling and Simulation for Next Generation Ports at the National University of Singapore (Tanoto, 2018).

In 2017, Singapore launched a new Sustainable Development Programme under the ongoing Singapore Cooperation Programme (SCP), which has conducted 300 courses for 7,000 officials from developing countries each year. The Singapore Sustainability Academy is a People, Public and Private initiative in support of the SDGs and Singapore's national goals to tackle climate change[18]. In addition, the Sustainable Energy Centre of Excellence (SECOE) is the first training centre of its kind, formed by the Asian Development Bank, IE Singapore and SEAS, to bring key policy makers together and build capacity in the fields of renewable energy, energy efficiency and energy access[19].

Accordingly, Singapore is well placed in Asia to provide leadership on sustainable technology. The Committee on the Future Economy Report states that "given the threat of climate change, Singapore should play its part in contributing to global efforts to improve environmental sustainability" (Committee on the Future Economy, 2017). To be a "model city in sustainability" the Committee recommended that Singapore should aggressively invest in R&D, test-beds, and commercialisation of new energy solutions. It recommends creating "a city that is a live model of sustainability, showcasing cutting-edge urban solutions".

6. CONCLUSIONS AND RECOMMENDATIONS

6.1. Conclusions

The availability of technology may not be the main bottleneck in ensuring that technology contributes to the SDGs. There are already many types of "sustainable technology" which potentially could contribute to sustainable development and the achievement of the SDGs. Much of it is not fully implemented. Moreover, many of these technologies, however, also could be used in other unsustainable ways. As a simple example, consider the use of

drones. Used in the cause of sustainable development, drones can contribute to improved mapping, identification of pollution sources, tracking of wildlife, and monitoring wildfires. The same technology can also be used for spying, warfare, or drug trafficking.

There is no technology "silver bullet" that will ensure sustainable development. When faced with a choice between changing human behaviour and adopting a new technology, many governments and companies will opt for the latter. Technology must be understood as extending the capabilities of human hands, eyes, and ears, and other senses. If the human dimension is not oriented towards sustainable development and the appropriate enabling environment is not created, then no technology can provide a "silver bullet" and solve humanity's problems.

Major (transformative) change is not necessarily enough to lead to sustainability and could lead in the other direction. Innovative technologies may disrupt existing entrenched sectors. Although disruptive technology may be necessary to cause transformative change, not all disruptive technologies will lead society in that direction. For a simple example, think of nuclear technology which could, through fusion energy, make a major transformative change and address energy for all and climate change or under other circumstances lead to a nuclear winter.

Government regulation will still be needed to ensure that any specific technology contributes to the SDGs, rather than undermining them. Innovative policies may be needed in all sectors to cut investment in unsustainable technologies and shift investment to more sustainable technologies. Government investment is also needed in R&D directed towards contributing to achievement of the SDGs.

6.2. Recommendations

Expand investment in R&D for sustainable technologies. There is still considerable potential for more and better technology to promote sustainability. Government policies should ensure that R&D investment is focused on developing sustainable technologies, not unsustainable ones. China's recently doubling of R&D expenditure and goal of reaching 2.5 percent of GDP by 2020 is indicative of the level of commitment that all countries should be making, provided that the R&D is directed towards sustainable development. In developing countries, "reverse innovation" may be one way to engage the private sector (Govindarajan, 2009). Reverse innovation means developing and proving the technology in developing countries and then marketing these technologies to developed countries, as exemplified by developments in China and India, among others.

Remove unsustainable technologies. Innovative technologies may help to replace unsustainable technologies, through natural processes of disruption. Governments, however, might have to provide the necessary triggers, such as removing unwarranted subsidies, phasing out or banning certain technologies (such as the phase out of nuclear power in Germany), or developing policies that will opt in new technologies (such as solar and wind power and battery storage in South Australia).

Use life cycle sustainability assessments to direct investment and adoption of new technologies. Sustainability impact assessment of new technology is needed, covering the life cycle from initial commercialisation to final disposal or decommissioning. Assessment needs to take a systems approach and cover economic, social and environmental dimensions in an integrated manner. Technologies need to be assessed in their national and local context, as well as any global implications (like contribution to climate change). These assessments should be incorporated into decision making processes in business and government, using the precautionary principle, in order to ensure that new technologies are more sustainable than the ones they replace.

Expand investment in education. Education (SDG 4) may be one of the keys to promoting (developing/diffusing) sustainable technology and educating personnel in the use and development of sustainable technologies. For developing countries, a major barrier is still human and institutional capacity to absorb technology and the necessary policy environment to guide technology towards sustainable development. Significantly greater investment in education is needed to strengthen technology absorption and enhance developing countries' ability to generate their own technology.

Mobilize finance to support sustainable technology. Finance is important, but not always the main issue, although initial costs for sophisticated technologies is often a barrier. As the banking system tends to be rather cautious when new technologies are proposed for a new or expanded business venture, governments may need to consider innovative finance mechanisms, such as incentive awards or start-up funds. Green bonds are also an increasing source of funding for sustainable development opportunities.

Provide a technology matching platform. Technology matching platforms need ground-level demonstration and capacity building, not only online information dissemination. While it is relatively easy to demonstrate energy or cost savings at the theoretical level, it is a different matter to ensure that the recipient companies and their staff in developing countries can understand detailed operational and maintenance requirements and achieve optimal sustainability outcomes.

Address barriers to technology transfer. In relation to intellectual property rights that can act as a barrier to adoption in least developed countries, waiving patents for sustainable technologies, with appropriate compensation for developers, may help to overcome initial cost/transfer barriers. Global technology facilitation mechanisms may also consider innovative financing and technical assistance schemes to encourage more rapid adoption of sustainable technologies. Matchmaking platforms need to expand from passive web-based systems to on-the-ground technical and financial assistance.

Notes

1 For further information see: https://toplink.weforum.org/knowledge/explore. (Accessed June 15, 2018.)
2 Information about SATREPS can be found at: https://www.jst.go.jp/global/english/about.html. (Accessed June 15, 2018.)
3 See: https://sustainabledevelopment.un.org/sdg17. (Accessed June 15, 2018.)
4 For further information see: https://sustainabledevelopment.un.org/TFM. (Accessed June 15, 2018.)
5 See: https://sustainabledevelopment.un.org/index.php?page=view&type=30022&nr=420&menu=3170. (Accessed June 15, 2018.)
6 See: https://www.jst.go.jp/EN/about/sdgs/index.html. (Accessed June 15, 2018.)
7 See https://sustainabledevelopment.un.org/index.php?page=view&type=30022&nr=81&menu=3170. (Accessed June 15, 2018.)
8 See: https://sustainabledevelopment.un.org/index.php?page=view&type=30022&nr=507&menu=3170. (Accessed June 15, 2018.)
9 See: https://sustainabledevelopment.un.org/index.php?page=view&type=30022&nr=479&menu=3170. (Accessed June 15, 2018.)
10 See: https://sustainabledevelopment.un.org/index.php?page=view&type=30022&nr=428&menu=3170. (Accessed June 15, 2018.)
11 See the website's list of activities at: http://www.urban-eu-china.eu/en/activities/.(Accessed June 16, 2018.)
12 See the website available at: http://www.sainonline.org/English.html. (Accessed June 16, 2018.)
13 See: https://www.incj.co.jp/english/performance/list/index.html. (Accessed June 18, 2018.)
14 See: http://www.jeta.or.jp/jeta127/pdf/English_1.pdf. (Accessed June 18, 2018.)
15 See: http://www.unido.or.jp/en/activities/technology_transfer/technology_db/. (Accessed June 18, 2018.)
16 For further information see: http://www.icett.or.jp/english/gaiyou/organization.html. (Accessed June 18, 2018.)
17 See: http://web.unep.org/ietc/. (Accessed June 18, 2018.)
18 The website is available at: https://www.seas.org.sg/index.php?option=com_seasarticles&view=article&id=182&nav_button=0&article_layout=0&Itemid=514. (Accessed June 19, 2018.)
19 The website is available at: https://www.seas.org.sg/secoe. (Accessed June 19, 2018.)

References

Clover, C. (2017, October 24). Subsidies help China sell the most electric cars. *Financial Times*. Retrieved from https://www.ft.com/content/18afe28e-a1d2-11e7-8d56-98a09be71849

Committee on the Future Economy. (2017). *Report of the Committee on the Future Economy: Pioneers of the Next Generation*. Singapore. Retrieved from https://sustainabledevelopment.un.org/content/documents/16265Committee_on_the_Future_Economy_Report.pdf

David, M. (2017). Moving beyond the heuristic of creative destruction: Targeting exnovation with policy mixes for energy transitions. *Energy Research and Social Science*, *33*, 138–146. https://doi.org/10.1016/j.erss.2017.09.023

DBAR. (2017). *A Science Plan for Digital Belt and Road Program (DBAR): An International Science Program for Sustainable Development of the Belt and Road Region Using Big Earth Data*.

Dutta, S., Lanvin, B., & Wunsch-Vincent, S. (Eds.). (2017). *The Global Innovation Index 2017 Innovation Feeding the World* (10th ed.). Ithaca, Fontainebleau, and Geneva: Cornell University INSEAD, WIPO. https://doi.org/979-10-95870-04-3

Economist. (2009, November 5). Japan's Technology Champions: Invisible but Indispensible. *Economist*. Retrieved from https://www.economist.com/briefing/2009/11/05/invisible-but-indispensable

Elder, M. (2003). METI and Industrial Policy in Japan. In U. Schaede & W. Grimes (Eds.), *Japan's Managed Globalization: Adapting to the Twenty-First Century* (pp. 159–190). M.E. Sharpe.

Elder, M., Bengtsson, M., & Akenji, L. (2016). Making SDG Implementation Easier: Thinking about Goals as Means. Retrieved from http://sdg.iisd.org/commentary/guest-articles/making-sdg-implementation-easier-thinking-about-goals-as-means/

Government of China. (2016). *China's National Plan on Implementation of the 2030 Agenda for*

Sustainable Development. Retrieved from http://www.fmprc.gov.cn/mfa_eng/zxxx_662805/W020161014332600482185.pdf

Government of Singapore. (n.d.). Sustainable Singapore Blueprint. Retrieved June 18, 2018, from https://www.mewr.gov.sg/docs/default-source/module/ssb-publications/41f1d882-73f6-4a4a-964b-6c67091a0fe2.pdf

Government of Singapore. (2016). Research Innovation Enterprise 2020 Plan: Winning the Future Through Science and Technology. Retrieved June 18, 2018, from https://www.nrf.gov.sg/docs/default-source/default-document-library/rie2020-publication-(final-web).pdf

Govindarajan, V. (2009, October 23). How GE Does Reverse Innovation. *Harvard Business Review*. Retrieved from https://hbr.org/ideacast/2009/10/how-ge-does-reverse-innovation.html

IETC. (2003). *The Seven "C"s for the Successful Transfer and Uptake of Environmentally Sound Technologies*. Osaka, Japan: International Environmental Technology Centre, United Nations Environment Programme. Retrieved from http://www.unep.or.jp/ietc/techTran/focus/Technology_Transfer_v6.pdf

Ikeda, D., & Morita, Y. (2016). *The Effects of Barriers to Technology Adoption on Japanese Prewar and Postwar Economic Growth* (Institute for Monetary and Economic Studies (IMES) Working Paper No. 2016- E-1). Tokyo. Retrieved from https://www.imes.boj.or.jp/research/papers/english/16-E-01.pdf

Industrial Research Institute, & R&D Magazine.com. (2017). *2017 Global R&D Funding Forecast*. Retrieved from http://digital.rdmag.com/researchanddevelopment/2017_global_r_d_funding_forecast?pg=1#pg1

Jung, J. (2016, December 15). China's Innovation-Driven Development Strategy and Prospects. *KIEP Opinions*. Retrieved from https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0ahUKEwjz6_aogdrbAhVShbwKHZZ0B1QQFggtMAE&url=http%3A%2F%2Fwww.kiep.go.kr%2Fcmm%2Ffms%2FFileDown.do%3Bjsessionid%3D745uhHg9uXpzAwFHnRbpbM6L6ki1fQEEVS57oDFiL6Sv7cYxgA8fvhMLaCiaSMY3.KIEPWEB_

Lin, X., & Elder, M. (2014). *Major Developments in China's National Air Pollution Policies in the Early 12th Five-Year Plan*. Hayama, Japan. Retrieved from http://pub.iges.or.jp/modules/envirolib/view.php?docid=4954

Mulder, K. F. (2007). Innovation for sustainable development: From environmental design to transition management. *Sustainability Science*, *2*(2), 253–263. https://doi.org/10.1007/s11625-007-0036-7

Nanyang Technological University. (2017, November 1). NTU and SMI launch S$15m research centre to develop sustainable energy and maritime solutions. *Nanyant Technological University Media Release*. Retrieved from http://media.ntu.edu.sg/NewsReleases/Pages/newsdetail.aspx?news=3b0d34ca-c1c1-44e6-b3f4-3e9ae6254933

Onat, N., Kucukvar, M., Halog, A., & Cloutier, S. (2017). Systems Thinking for Life Cycle Sustainability Assessment: A Review of Recent Developments, Applications, and Future Perspectives. *Sustainability*, *9*(5), 706. https://doi.org/10.3390/su9050706

Rabhi, A., Doll, C. N. H., Groen, L., & Suzuki, M. (2017, July). Low Carbon Technology Transfer: Insights on Linking Phases and Matching Stakeholders. *IGES Discussion Paper*. Retrieved from https://pub.iges.or.jp/pub/low-carbon-technology-transfer-insights

Saikawa, E. (2013). Policy Diffusion of Emission Standards: Is There a Race to the Top? *World Politics*, *65*(1), 1–33. https://doi.org/10.1017/S0043887112000238

Sheppard, D. (2017, November 17). Norway wealth fund proposes end to oil and gas investment. *Ft.Com*. Retrieved from https://www.ft.com/content/611c2e9e-cad9-11e7-aa33-c63fdc9b8c6c

Tanoto, B. (2018, January 12). Blueprint for sea transport industry promises more than 5,000 new jobs by 2025. *Channelnewsasia.Com*. Retrieved from https://www.channelnewsasia.com/news/business/blueprint-for-sea-transport-industry-promises-more-than-5-000-9856716

UNIDO, & Government of Japan. (2012). *Selected Japanese Environmental Technologies for Green Industry*.

Retrieved from http://www.greenindustryplatform.org/wp-content/uploads/2013/07/jgi_final-highres-web.pdf

United Nations. (2015). *Transforming Our World: The 2030 Agenda for Sustainable Development*. Retrieved from https://sustainabledevelopment.un.org/post2015/transformingourworld/publication

World Economic Forum. (2017). *Harnessing the Fourth Industrial Revolution for Sustainable Emerging Cities*. Retrieved from http://www3.weforum.org/docs/WEF_Harnessing_the_4IR_for_Sustainable_Emerging_Cities.pdf

Chapter 8

Conclusion: Realising the Transformative Potential of the SDGs

Peter King and Mark Elder

Chapter 8

Conclusion: Realising the Transformative Potential of the SDGs

Peter King and Mark Elder

1. INTRODUCTION

"Transforming our world" is the title of the 2030 Agenda; a goal that is easy to say but much harder to achieve in practice. This report examines a range of measures which could increase the level of ambition of the implementation of SDGs and how such transformation could take place in Asia. It addresses the key actors (national governments, cities, and business) and key means of implementation (primarily technology and finance).

The 2030 Agenda will also be pivotal in achieving the goals of the Paris Agreement on climate change, as well as other multilateral environment agreements (MEAs), which will also be crucial to achieving transformation. Although climate change is a single goal in the Sustainable Development Goals (SDGs), SDG 13, many other SDGs could play key roles in addressing climate change: SDG 7 (renewable energy and energy efficiency), SDG 12 (sustainable consumption and production), Target 8.4. (on decoupling), Target 9.4. (on sustainability upgrading and resource efficiency), Target 2.4. (on sustainable agriculture), etc. Other than the Paris Agreement, few MEAs are specifically referenced in the SDGs, although meeting the goals of MEAs are crucial to achieving the SDGs.

Like many other MEAs, the SDGs are voluntary and non-binding, although universal (i.e. all countries), with compliance essentially through voluntary national reviews (VNRs) submitted to the High Level Political Forum in New York. The reporting requirements may

be onerous for many smaller or least developed countries, with 17 goals, 169 targets, and so far, more than 230 indicators. The temptation, therefore, is to set aside the intention of all 17 goals being implemented as a comprehensive, indivisible set of SDGs and either report on pre-existing sustainable development programmes (such as Agenda 21 or the Millennium Development Goals) and their indicator sets, or worse, select a few of the SDGs as priority goals that fit current national agendas and ongoing data collection.

The UN's Sustainable Development Goals Report 2017 concluded that "while considerable progress has been made over the past decade across all areas of development, the pace of progress observed in previous years is insufficient to fully meet the Sustainable Development Goals (SDGs) and targets by 2030". Moreover, "faster and more inclusive progress is needed to accomplish the bold vision articulated in the 2030 Agenda" (United Nations, 2017).

So, what needs to change if the SDGs are to become truly transformative? The first step is to recognize the need to greatly accelerate action and progress. When the SDGs were adopted in 2015, fifteen years may have sounded like a long time, but 2030 is not far away, and there are barely 10 years remaining. It has been 6 years since it was agreed to develop SDGs at Rio+20 in 2012, and implementation has barely started. Time is running out to avoid catastrophic climate change. Several "planetary boundaries" which provide the foundation for the Earth's life support system for humanity have been crossed, and several more are at risk of being crossed.

Voluntary approaches are the nearly exclusive focus of most efforts on SDGs as well as the Paris Agreement and most MEAs. Of course, voluntary approaches are important and may be the only option if other approaches are not available. However, it is becoming increasingly clear that voluntary approaches will not be enough, and that it is necessary to find a way to accelerate progress.

National governments should use their considerable regulatory and fiscal powers to accelerate implementation plans for the 2030 Agenda, not only to enable actions by stakeholders who are already working to be more sustainable, but also to mobilize the many stakeholders who have not been engaged. Governments need to take the lead to require resources and investments to be shifted from unsustainable to sustainable activities. For many countries, sustainable development is still being addressed as a marginal concern, while unsustainable development continues at full speed. Cities also need to take the lead, as more than half of the world's population will be living in cities by 2030. Cities need to become the shining examples of how sustainable development can be achieved. Of course, governments cannot achieve the SDGs by themselves. Unsustainable production and consumption by businesses and consumers need to stop being the main drivers of unsustainable development. Innovative technology will be a major contributor to sustainable consumption and production, but it needs much stronger guidance in this direction; it will not happen by itself. Finally, transformative change needs some initial investments, and continuous refocus. Existing planned finance needs to be redirected towards sustainable development and away from unsustainable activities, and

some additional financing may also be necessary. Each of these elements is explored below.

2. TRANSFORMATIVE POLICIES

Scoring the sustainable development goals is not just about record keeping or chasing small wins; it is essential to have broad strategies with ambitious and potentially transformative policies and comprehensive institutional reform if the potential of the SDGs is to be realized. However, much of the current discussion has emphasized data and indicator development. Of course, accountability has been another major theme, but this has led to an emphasis on data and indicators as the means of accountability, rather than focusing on what actions are needed to accelerate implementation of the SDGs.

Many ambitious and potentially transformative policies and measures have been suggested in the past, since the issues raised by the SDGs are not new. To be sure, whether or not particular policies will actually be transformative can rarely be assessed *ex ante*, but some of the key policy approaches that are generally considered to be more ambitious and appear to have potential to accelerate transformation include the following.

- Give much higher priority to climate change adaptation and disaster prevention and preparedness, through enhancing the resilience of key economic sectors and infrastructure, including erosion and flood protection, irrigation, drainage, and beach nourishment, as well as promoting alternative livelihoods and developing markets for new adaptation products and services.
- Develop early warning systems and the ability to implement mass evacuations to significantly reduce the effects of disasters, and affordable insurance for the inevitable disasters that will occur no matter how well the country is prepared.
- Stabilise per-capita emissions of greenhouse gases (GHGs) at significantly lower levels. This offers a great leapfrogging opportunity for the region, and would yield multiple benefits, including enhanced energy security, improved air quality, reduced water demand, and green jobs.
- Implement decarbonization policies that combine increasing energy efficiency, shifting to renewable energy sources, and sequestering carbon in biomass.
- Scale back the region's consumption of materials through a radical transformation of production and consumption systems, thus improving the environment for human welfare, and helping to address poverty eradication, sustainable livelihoods, equity, thriving small and medium size enterprises, energy security, food security etc.
- Implement sustainable consumption and production policies, including: (i) green tax reforms that shift taxes from income to resource consumption and pollution; (ii) promotion of less materialistic lifestyles focused more on well-being; (iii) shifting emphasis to social relations and work-life balance and away from material possessions; (iv) education that provides life skills for self-provisioning, such as do-it-yourself, gardening, craft-work and sewing; (v) regulation of consumer loan schemes and advertising that contribute to consumerist mind-

sets; (vi) business models based on leasing and sharing, which can limit the need for private ownership of products; (vii) requirements for long product warranties, reparability, and take-back provisions for end-of-life treatment; and (viii) multi-purpose and shared buildings, which can limit the overall demand for floor-space.

- Scale up sustainable land use planning and management, prohibiting activities that are known to cause environmental degradation in vulnerable areas, such as watersheds and national parks, along with massively strengthened compliance and enforcement and recognition of the economic value of ecosystem services.
- Strengthen pollution standards and regulations, enforce them effectively, and promote cleaner production and the 3Rs.
- Provide regulatory advantages to companies with cleaner production processes, such as increasing the costs of waste collection and treatment, imposing high waste discharge fees, or providing subsidies for cleaner production.
- Ensure safer management of chemicals through: (i) stricter requirements for corporations to conduct testing and to disclose information; (ii) expanded bans of especially problematic substances; (iii) proper inspections and enforcement of regulations; (iv) education and awareness raising among key stakeholders, such as farmers and workers in chemicals-intensive industries; (v) promotion of effective substitutes, such as biological pest control methods; and (vi) expanded monitoring systems for tracking the environmental fate and impacts of chemical substances.
- Strengthen data generation systems and capacity for environmental monitoring and data analysis and use the results for science-based policies.

To be truly effective these policy directions will not be able to fully rely on voluntary approaches. They will need greater regulatory and fiscal measures.

The Asian region will not be starting from scratch to implement the SDGs. Existing innovative strategies show an emerging understanding of the risks to long-term development associated with a deteriorating natural environment. For example, Japan's national development strategy includes a vision of a Sound Material Cycle Society, interpreted in practice through the 3Rs: reduce, reuse, and recycle. China intends to build an Ecological Civilisation, one which is "frugal in their use of energy and resources and protects the environment". Thailand has developed the Sufficiency Economy approach to guide its development, with a vision to build "a happy society with equity, fairness and resilience". Bhutan measures national development progress through a Gross National Happiness Index, rather than GDP. Nevertheless, the level of current efforts, despite good intentions, does not seem sufficient to realize the transformational potential of the SDGs.

3. NATIONAL GOVERNMENTS

National governments can, and should, raise their level of ambition and take stronger actions to achieve the transformative potential of the SDGs. The SDGs were developed and agreed by national governments, all the key means of implementation are in the hand

of national governments, particularly financing, regulation, and formulating national plans coordinating a range of stakeholders, and national governments have unique and powerful tools. These tools include taxation and spending, allocation and enforcement of property rights, coercive dispute settlement (through courts), and regulation, with accompanying enforcement mechanisms.

Many are sceptical about the ability and willingness of national governments to take very ambitious actions to implement the SDGs, much less to achieve their transformative potential. Therefore, in discussions on implementing SDGs, recommendations for national governments commonly focus on creating enabling conditions through incentives and assistance for voluntary initiatives, rather than regulation, compliance and enforcement, or other strong measures. Most recommendations avoid calling directly for large amounts of spending or mandatory revenue generation mechanisms such as increased taxes (or even borrowing) which will be required to support the SDGs. In a way this view is understandable as national governments have not been able to deliver on sustainable development in the past four decades, despite multiple attempts.

It is too early to evaluate countries in Asia on their progress since the adoption of the SDGs, as the SDGs are wide-ranging and highly complex, and the development of implementation structures will take time. The two assessment reports of the VNRs presented at the High Level Political Forum show that countries have generally moved quickly on establishing or strengthening institutional structures for implementation, in many cases linking the SDGs to existing national plans. A caveat, however, is that integrating SDGs into national plans and processes may motivate additional action and resource allocation or could become no more than a marginal exercise in relabelling existing policies and plans.

Governments should not be let off the hook so easily. Most governments have very large potential financial resources, and most countries in Asia have potential to raise taxes further and could increase their level of debt. For example, a one percent increase in the share of taxes in GDP could raise USD 2 to 4 billion in some ASEAN countries.

As noted above, at the policy level, a comprehensive whole-of-government approach is needed, to coordinate horizontally and vertically between different policy areas and sectors, as well as between the various levels of government and governance (local, national, global). Coordination is necessary to maximize the synergies and minimize the trade-offs between goals and targets. National governments should establish sustainability criteria, linked to SDGs, to be applied to all government decisions, including new policies and regulations as well as budgets. Existing policies should also be reviewed according to these sustainability/SDG criteria. Actions of other stakeholders will be much more effective and scaled up if the enabling policies by national governments create multiple niches for innovation and experimentation, rather than locking in specific technologies or consumption and production systems.

Three important measures governments could take to significantly accelerate the speed of transformation, moving beyond encouragement of voluntary actions, are (i)

strengthening regulation—a traditional "means of implementation" for domestic economic and development policies; (ii) generating additional financing through taxes, or through budget reallocation; and (iii) establishing a new "progress" scorecard to replace GDP.

4. CITIES

Cities are already important and generate a high percentage of GDP from a small proportion of the national land area and are very energy intensive. In addition, they accommodate a large proportion of the national population, and this is growing fast. Because of the pace of development, even previously well-planned cities are not sustainable, and most cities are growing haphazardly in the absence of effective planning.

SDGs should play an important role in helping cities to get on a more sustainable track. Virtually all the SDGs and about two thirds of targets are relevant to cities, but they need to be localized to enable effective implementation. Some larger, more developed cities have been working on a sustainability agenda well before the SDGs were agreed but smaller cities and cities in developing countries lack the necessary resources to fully implement the SDGs and may choose to pick a few goals which match their current priorities. However, the SDGs may be too complicated for most cities to implement as city administrations tend to focus on practical day-to-day concerns and will be challenged to scale up at a pace that has never been achieved before. It is probably too early to draw definitive conclusions about the ability of the SDGs to trigger a transformation in cities, but it seems unlikely.

For countries experiencing incipient urbanization, it may be possible to stave off the worst outcomes of city growth by learning from other cities. For intermediate urbanization (e.g. China, Indonesia, Philippines, Thailand, Vietnam) there is an urgent need to address sub-standard housing, poor service delivery, and social exclusion. Even in countries with advanced urbanization and large cities like Beijing, Jakarta, Manila, and Bangkok, there are still pockets of slums and inadequate infrastructure and service delivery. In some cases, the unsustainable city backlog seems so daunting that governments are creating new cities, often with sustainable development objectives incorporated in their planning.

Sustainable cities would include basic amenities, mass transit systems, parks and green spaces, clean air and water, walking and biking accessibility to local facilities like schools, shops, and parks etc. They also need to embrace social goals like the right to housing, civic engagement, cultural and artistic expression, inclusion, safety, gender equality, and care of the aged among others. Economically, future cities need to provide sustainable economic growth, decent jobs for all, and sustainable transport systems that link people and economic services.

Transformation to a sustainable future will depend on disruptive solutions to food security, water conservation, low-carbon energy supplies and energy efficiency, mass transit and

pedestrian access, affordable housing, decent, safe employment, and social and cultural cohesion.

Lessons can be learned from various versions of sustainable cities that have been implemented prior to the SDGs: India's eco-cities; France's eco-quartier; Japan's eco-model cities; and the United Kingdom's future cities. Two factors seriously impeding the scaling up of sustainable policies and practices are short election cycles and relatively low project management capacity of public officials at the city level. Scaling up transformation requires sustained actions far longer than the typical local election cycle.

Therefore, the first step to enhancing the sustainability of cities is to significantly raise the capacity of their leaders/managers and staff. This requires proper incentives (payment and motivation) and training. Capacity building in planning and legislation (development of local ordinances and regulations, enforcement and coordination with the stakeholders) is essential. Capacity building through co-designing, co-planning and co-management with national agencies is also essential, particularly for city planning (zoning, land-use, urban area), energy management (promotion of energy efficiency and renewable energy) and disaster risk management.

Improving cities' funding capacity is also essential through (local) tax collections, disbursement of national budget, collecting fees for municipal services (water supply, wastewater treatment, solid waste management, public transportation (and road tax), public housing), etc. Reasonable estimates of the costs in achieving the SDGs in Asia's cities amount to more than USD 10 trillion. Current expenditure is an order of magnitude less. The Asian Development Bank estimates that at least 6 percent of GDP should be invested in infrastructure, much of it in cities. In many cases, cities are dependent on national governments directly for funds, or indirectly for legal authority to raise funds.

Land value capture is one of the principal means of financing urban infrastructure, capturing the appreciation of land prices for subsequent re-investment in infrastructure, with prominent examples in Japan, South Korea, and China. Many cities have turned to urban bonds or green bonds for financing critical infrastructure. Credit worthiness is a key requirement for local governments to unlock capital investments through (i) credible accounting; (ii) sound financial management; (iii) independent auditing; and (iv) performance evaluation. Also, central governments should contribute more to creating sustainable cities as the cumulative costs of "business as usual" easily outweigh the investment costs of making them sustainable.

Cities have different jurisdictions in different countries. Nevertheless, many cities in many countries have jurisdiction over certain areas such as land use and building regulations, waste management, and public transport. They often do not have jurisdiction over areas such as energy or finance, which are typically under the jurisdiction of national governments. Therefore, to promote sustainable cities, a strong role for national governments will be very important, not only for funding, but also for national policy frameworks and policy coordination in areas such as energy and even waste management.

5. BUSINESS

For the SDGs to be truly transformative, business at all levels needs to be fully engaged. Agenda 2030 calls upon "all businesses to apply their creativity and innovation to solving sustainable development challenges". Most existing efforts to promote business involvement in the SDGs rely on voluntary approaches, often picking out one or two SDGs that are in alignment with the company's existing business model. As this approach is not transformative, governments need to move beyond voluntary measures and establish more mandatory directions, through policies, laws, regulations, standards, and their stricter enforcement.

However, the enormous business opportunities provided by the SDGs for companies at the cutting edge of the "green" business sector should be the most important motivating factor. According to the Business and Sustainable Development Commission, the SDGs will create USD 12 trillion in market opportunities in the food and agriculture, cities, energy and materials, and health sectors alone, accounting for 60 percent of the real economy. The World Business Council on Sustainable Development (WBCSD) estimates that implementation of the SDGs could create 380 million new jobs by 2030, almost 90 percent of them in developing countries. As USD 5-7 trillion will be needed to be invested annually in the SDGs if the agenda is to be fully realized by 2030, investment in the SDGs should become the new normal.

There is a gap, however, between this potential opportunity and current business practice. The business consultancy PwC surveyed the sustainability reporting of 470 companies in 2017 and found that 37 percent of companies selected priority SDGs, while 25 percent merely mentioned the SDGs, and 38 percent made no mention of the SDGs. Few companies have comprehensively mapped their current activities against all 17 SDGs.

Japan's Implementation Guidelines for the SDGs place a large emphasis on business and areas where business can invest. The Guidelines cover 8 priority areas: (i) empowerment of all people; (ii) achievement of good health and longevity; (iii) creating growth markets, revitalization of rural areas, and promoting science, technology and innovation; (iv) sustainable and resilient land use, promoting quality infrastructure; (v) energy conservation, renewable energy, climate change countermeasures, and sound material-cycle society; (vi) conservation of environment, including biodiversity, forests and the oceans; (vii) achieving peaceful, safe and secure societies; and (viii) strengthening the means and frameworks for the implementation of the SDGs.

In response, Japan's Keidanren (Japan Business Federation) has revised its Charter of Corporate Behaviour to call on its members to deliver on the SDGs through realization of Society 5.0. "Corporations should encourage behavioural changes not only within their own corporations, but also in their group companies and supply chains, and, by fostering partnership and collaboration with a diverse range of organizations, act toward the realization of Society 5.0 and through that, deliver on the SDGs".

In other Asian countries, there is little evidence that the transformative power of the SDGs has been realized among local large corporations or small and medium enterprises, despite rather enthusiastic efforts by national governments through mainstreaming SDGs into development plans and creation of dedicated institutions. To move companies towards accelerated implementation of the SDGs, the following steps are recommended.

First companies should conduct a comprehensive mapping of their business activities against all SDGs, as the Coca Cola company has done. Second, each company should look for strategic business opportunities as the SDGs are implemented and begin to affect each sector. Third, once the company has been able to find the gaps and identify potential value-added opportunities, then the possibilities of new strategies, products, or services, or those that need to be excised from the company's repertoire, may be triggered. Fourth, companies should provide internal training of staff and management, so that these emerging opportunities are grasped quickly. Finally, companies should use their corporate sustainability reporting to demonstrate their willingness to adopt the SDGs.

Governments should (i) use regulation to shift investment, curb unsustainable activities, and promote sustainable production and consumption practices; (ii) promote extended producer responsibility, cleaner production, green procurement, and directed research and development; (iii) strengthen corporate governance laws and regulations to mandate sustainability considerations; (iv) provide incentives and disincentives to motivate companies to focus on the SDGs and turn away from unsustainable activities; and (v) foster international cooperation to create a level playing field.

In addition, shareholder activism is an important means of influencing company decisions towards the long term and improving its social and environmental performance. Shareholders can convince company management to adopt "green" policies and take on new green business opportunities, through shareholder resolutions at annual meetings or through regular communication with company management. Activists should work with large institutional investors (like pension funds) to divest investment from companies that are not acting sustainably and redirect those funds to invest in more sustainable companies supporting the SDGs. If all else fails, consumers can consider actively using boycotts or other public campaigns to force companies to change their behaviour and implement the SDGs.

6. FINANCE

From a global perspective, there are already sufficient resources to fund SDGs and climate change efforts embodied in global GDP and accumulated wealth. Therefore, the relevant question is how existing resources and already planned financing could be shifted toward more sustainable uses and away from unsustainable uses, given that a large part of the available resources is in the private sector. The basic task is to shift global investments

from unsustainable to sustainable production methods, as well as from unsustainable to sustainable goods and services.

As it turns out, the shift may not be as large as some people might fear. The total additional investment for SDGs, beyond already planned investments, was estimated to be between USD 2 and 3 trillion per year (Schmidt-Traub, 2015), which is about 2.5-3.8 percent of world GDP of USD 78 trillion in 2014—slightly more than current military spending. While USD 2 to 3 trillion per year may sound like a great deal of money, if compared to global GDP and financial assets, it is rather modest, and should be manageable.

How might such a significant shift in financial allocation be managed? First, efforts should be made to raise greater awareness among investors and businesses of the high and increasing financial risks of current business models tied to unsustainable development as well as the large potential business opportunities that the SDGs offer. Second, institutional investors need to be convinced to direct their investments in a more sustainable direction, and especially to divest from investments related to fossil fuels (e.g., by following the Principles for Responsible Investment). Third, new financial products that offer alternatives for ethical investors (i.e. green financial instruments) need to be more accessible and widely promoted. Fourth, blended finance (i.e. combined government and private finance) may have applicability if the projects funded are truly aimed at sustainable development. Fifth, disclosure of risks—whether voluntary or mandatory—should lead to more sustainable behaviour, but it is not clear to what extent this will happen in practice.

Most existing discussions of the way forward on finance emphasizes that governments should create enabling conditions to support voluntary approaches by the private sector. However, voluntary approaches may not be sufficient to achieve the necessary shift in the focus of investments and are not likely to be transformative, so a more regulatory approach by governments may be needed. Also, governments have the power to raise the funds and invest on their own, if they think it is important. Why they are not doing so, or what are the obstacles to doing so, could be the focus of future research.

7. TECHNOLOGY

In this report "sustainable technology" means technology which contributes to sustainable development; it does not necessarily mean that the technology itself is sustainable. Technology is prominently highlighted in the SDGs as a means of implementation. Greater use of "sustainable" technology is generally recognized as necessary to achieve a transformation to sustainability. While technological solutions are often preferred to more difficult solutions such as governance reforms, technology is never likely to be a "silver bullet". Nevertheless, many technologies already exist which could help to achieve sustainable consumption and production and the SDGs, if only the right enabling environment existed, or if they were required to be used. Still, new, innovative technologies specifically designed for the SDGs are also needed.

SDG 17 (targets 17.6., 17.7., 17.8.) specifically addresses technology as a key means of implementation, building on earlier technology facilitation mechanisms introduced at Rio+20 in 2012 and the Addis Ababa Action Agenda. Moreover, technology is also mentioned 8 times as means of implementation targets under six other SDGs (5.b, 7.a, 7.b, 9.a, 9.b, 11.c, 12.a, and 14.a) (Elder, Bengtsson and Akenji, 2016). However, these technology facilitation mechanisms are rather weak. The technology related indicators are also weak, focusing on information and communication technology (ICT) and development assistance for technology transfer. Overall, the SDGs have incorporated a rather outdated view on North to South technology transfer, so relying only on the SDGs to guide technological progress is not very ambitious or likely to significantly contribute to transformation.

While sustainable technology is mostly directed at production systems, the potential for technology to change consumption, such as recreation, should not be forgotten. In addition to technological innovation, policies may also need to be directed towards "exnovation", which is the deliberate attempt to remove technologies that no longer meet society's needs.

Technologies are inextricably embedded in social and cultural systems, so some "sustainable" technologies may fail to be adopted if they require significant behavioural change and adoption of sustainable consumption patterns. On the other hand, some countries may opt for technological solutions because the alternative of changing consumer behaviour or governance structures is perceived as more difficult to achieve.

Some of the potentially transformative technologies identified, with possible environmental implications, include gene editing, nanotechnology, artificial intelligence, artificial photosynthesis, robotics, 3-D printing, carbon capture and storage, fusion energy, biodegradable plastics, blockchain technology, among others. Each of these can be matched against the 17 SDGs.

Some of the barriers to adopting technology which is readily available include: (i) insufficient ability to absorb technology (especially in developing countries); (ii) some companies do not want to sell because of competitiveness issues; (iii) intellectual property rights are needed to promote innovation, but hinder diffusion; (iv) matching sellers and buyers is often difficult, where cheapest is not often best available technology; (v) financing of technology is not necessarily the most important problem; and (vi) appropriate technology (less advanced is better) vs. leapfrogging (more advanced is better) is not always an obvious choice.

There is abundant potential to develop more and better sustainable technology, but governments and companies need to ensure that new technology development efforts are focused on sustainable uses. New technology might have unexpected sustainability problems (e.g., nanotechnology, gene editing, robotics, artificial intelligence, new materials, synthetic life), so careful testing regimes are necessary but should not hold up

adoption of promising technologies. One way to test new technology is through life cycle assessment based on the precautionary principle.

Countries in Asia already place a high priority on technological development, which is reflected in their VNRs. Japan's voluntary national review (VNR) on implementation of the SDGs notes that one of the eight key priorities is to create "Growth Markets, Revitalization of Rural Areas, and Promote Science Technology and Innovation". China is preparing to help developing countries with support in financing, technology and capacity building under its new Assistance Fund for South-South Cooperation. China's 2016 VNR prioritises "implementing innovation-driven development strategies and generating momentum for sustainable, healthy and stable economic growth". India has funded the Atal Innovation Mission and is launching an India Innovation Index for ranking innovations in the country. Thailand's 4.0 policy "will boost value added in the manufacturing sector through promoting greater utilization of creativity, technology and innovation while ensuring environmental friendly practices".

Three case studies were examined in China, Japan, and Singapore, arguably at the forefront of research and development (R&D) in Asia. The Asia-Pacific region has no shortage of funding for research and development, so the challenge is to direct this funding towards sustainable development.

China is becoming one of the most innovative countries in the world with massive increases in R&D expenditure. The emphasis on innovative technology is documented in the National Outline for Innovation-Driven Development Strategy. China also plans to explore the possibility of setting up a technology bank on implementation of the 2030 Agenda.

Japan controls many niche markets and could set the trend towards sustainable technology and capture a large market share, if the appropriate enabling environment was created. Institutionally, Japan has had an Environmental Technology Association (JETA) since 1979 and the Innovation Network Corporation of Japan was set up in 2009 acting as a national private-equity fund. Japan also hosts the International Centre for Environmental Technology Transfer and UNEP's International Environmental Technology Centre (IETC) established in 1991.

Singapore has invested heavily in R&D for smart city technologies, with USD 13.9 billion allocated in 2016. Singapore's Research, Innovation and Enterprise 2020 Plan (winning the future through science and technology) plans to invest S$19 billion from 2016 to 2020 to establish Singapore as a global R&D hub. In 2017, Singapore launched a new Sustainable Development Programme under the ongoing Singapore Cooperation Programme, which has conducted 300 courses for 7,000 officials from developing countries each year. The Singapore Sustainability Academy is a People, Public and Private initiative in support of the SDGs and Singapore's national goals to tackle climate change.

How to promote technology has long been a popular focus. Some typical key general recommendations reiterated by this report are (i) expand investment in sustainability-

related R&D; (ii) expand investment in education (SDG 4); and (iii) mobilize finance to support sustainable technology. Governments are generally willing to invest in this area, though not always in the direction of sustainability. Other common, very important recommendations to promote sustainability of technology are to (iv) require life cycle sustainability assessments to be conducted; and (v) address barriers to technology transfer, although these are often not done, so they need to be repeated and reemphasized.

A newer idea promoted by IGES to promote North-South technology transfer is the idea of a matchmaking platform. One of the main obstacles to North-South technology transfer is difficulty in matching supply and demand. Sometimes it is difficult for businesses in developing countries to know what is available, and it is difficult for businesses in developed countries to understand the needs of local markets. In these cases, a matchmaking platform could be utilised with the following elements: (i) direct interaction among stakeholders to conduct market assessments, feasibility studies, project proposals, demonstration projects, technical assistance and capacity building, loan syndication, training of trainers, promotion and outreach; and (ii) collection, mapping and online sharing of relevant information (online databases on technologies, policies, and financing options), along with dissemination of lessons learnt from ground-level matching. This solution will not necessarily work quickly or on a large scale, but this is one of the more intractable problems, so if it could be solved, it might make a big difference.

One less commonly cited recommendation to raise the level of ambition and help to make technology more transformative is the concept of exnovation, or removing unsustainable technologies, and restrict the development of new unsustainable technologies. This may require fiscal or regulatory approaches. It will be difficult to make progress if new technology to promote sustainable development is offset by new technology to promote unsustainable development.

Ultimately, there is no technology "silver bullet" that will ensure sustainable development. When faced with a choice between changing human behaviour and adopting a new technology, many governments and companies will opt for the latter. Technology must be understood as extending the capabilities of human hands, eyes, and ears, and other senses. If the human dimension is not oriented towards sustainable development and the appropriate enabling environment is not created, then no technology can solve humanity's problems.

8. OVERALL CONCLUSION

Solutions to implement the SDGs, as well as key means of implementation including finance and technology are readily available. More than two years have passed since the SDGs were agreed, and now it is time to focus on solutions and means of implementation. Data and indicators are important and work on these should continue. Nevertheless, it is important now to shift the global focus to transformative, action-oriented solutions and

not to wait until all indicators have been developed and/or monitoring programs have been put in place.

References

Elder, M., Bengtsson, M. and Akenji, L. (2016) 'An Optimistic Analysis of the Means of Implementation for Sustainable Development Goals: Thinking about Goals as Means', *Sustainability*, 8(9), pp. 962–986. doi: 10.3390/su8090962.

Schmidt-Traub, G. (2015) *Investment Needs to Achieve the Sustainable Development Goals: Understanding the Billions and Trillions*. Available at: http://unsdsn.org/wp-content/uploads/2015/09/151112-SDG-Financing-Needs.pdf.

United Nations (2017) *The Sustainable Development Goals Report 2017*. New York: United Nations. Available at: https://unstats.un.org/sdgs/files/report/2017/TheSustainableDevelopmentGoalsReport2017.pdf.

ISBN 978-4-88788-204-1

IGES Institute for Global Environmental Strategies

2108-11, Kamiyamaguchi,
Hayama, Kanagawa, 240-0115, Japan
Tel: +81-46-855-3700
Fax: +81-46-855-3709
E-mail: iges@iges.or.jp
URL: http://www.iges.or.jp/