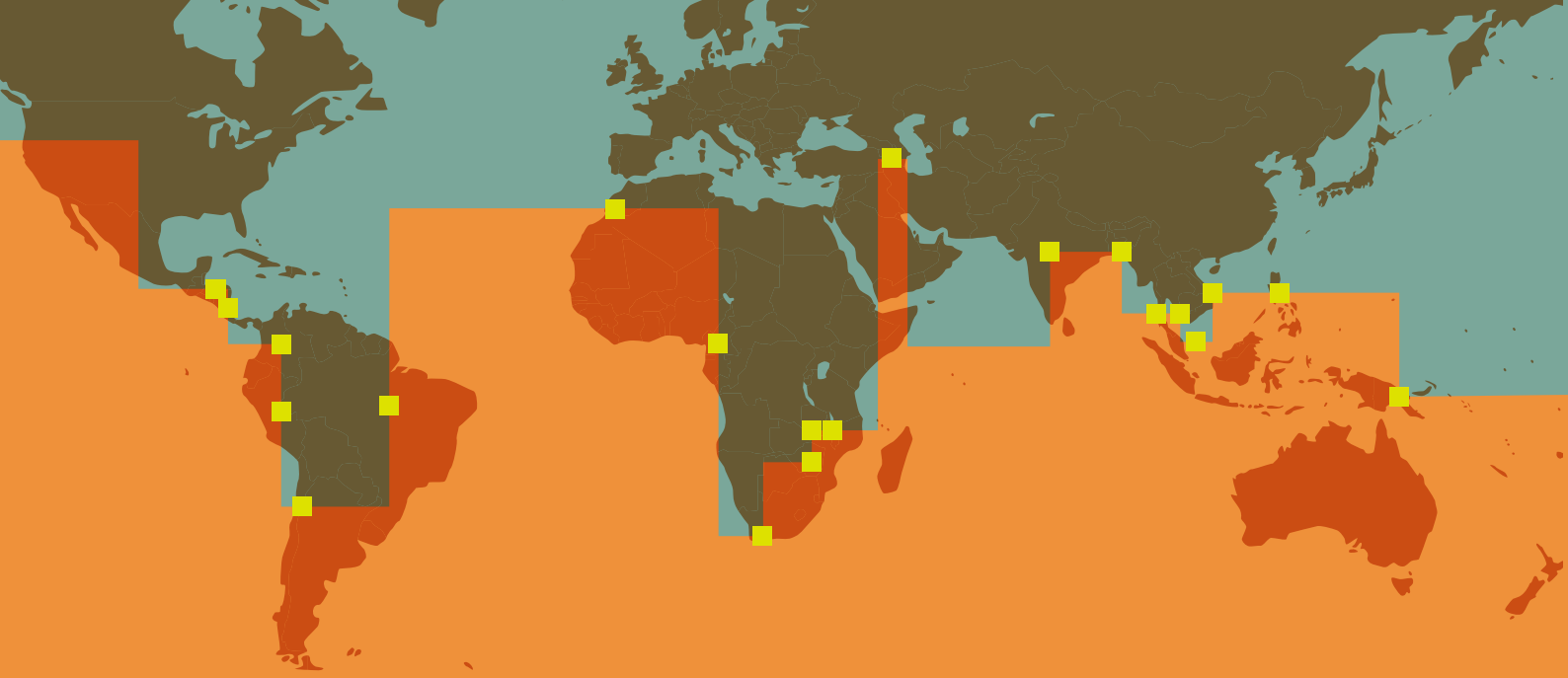

Co-Creating Sustainable Ways of Living

2nd Edition

24 Stories of On-the-Ground Innovations

One planet live with care
IGES Institute for Global Environmental Strategies
SEI Stockholm Environment Institute

Co-Creating Sustainable Ways of Living

24 Stories of On-the-Ground Innovations

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Please cite as: Atsushi Watabe, Simon Gilby, Ryu Koide, Caixia Mao, Mizuki Kato, Patricia Vilchis-Tella, Stefanie Chan 2021. Co-Creating Sustainable Ways of Living: 24 Stories of On-the-Ground Innovations, Institute for Global Environmental Strategies, Hayama, Japan

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ISBN 978-4-88788-255-3

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Acknowledgements

This report is based on the experience of the One-Planet Network Sustainable Lifestyles and Education Programme (SLE Programme) in collaboration with 24 projects that were financially supported by the Government of Japan through the 10YFP Trust Fund administered by the United Nations Environment Programme. We would like to thank the Government of Japan and the United Nations Environment Programme and the project implementers as follows:

01	**Brazil**	Alana Institute
02	**Cameroon**	Resource Centre for Environment and Sustainable Development (RCESD)
03	**Chile**	Universidad de Chile
04	**India & Bangladesh**	South Asian Forum for Environment (SAFE)
05	**Malaysia**	Forum Air Malaysia
06	**Zimbabwe**	Development Aid from People to People (DAPP)
07	**Armenia**	Armenian Women for Health and Healthy Environment (AWHHE)
08	**Colombia**	El Bosque University
09	**Peru, Nicaragua & Honduras**	National Council for Sustainable Development of Honduras (CONADES), World Resources Forum and WRAP
10	**South Africa**	Environmental Learning Research Centre (ELRC), Rhodes University
11	**Viet Nam**	Asian Institute of Technology Center in Vietnam (AITCV)
12	**Viet Nam**	Da Nang University of Science and Technology
13	**Zambia**	The Copperbelt University
14	**Asia and the Pacific**	United Nations Environment Programme Regional Office for Asia and the Pacific (UNEP/ROAP)
15	**Morocco & Colombia**	United Nations Environment Programme and El Bosque University
16	**Thailand**	Provincial Electricity Authority
17	**India**	Centre for Sustainable Agriculture
18	Armenia	Armenian Women for Health and Healthy Environment (AWHHE) & Universidad de Chile
19	Colombia	UTA Foundation (Fundación Para la Producción Agropecuaria Tropical Sostenible)
20	Malawi	Seeds of Opportunity
21	Peru	Fondo Verde
22	Philippines	ICLEI Southeast Asia
23	South Africa	WRAP (Waste and Resources Action Programme)
24	Papua New Guinea	Foundation for People and Community Development (FPCD)

Executive summary

Our lifestyles, through the impacts of our day-to-day activities such as eating, moving and commuting, heating and cooling our homes, taking work and care responsibilities, and so on, have become major threats to the sustainability of the environment. We are living beyond our ecological means and experiencing both very serious impacts on biodiversity, on a stable climate, on ecosystems, as well as facing difficult challenges related to vast social inequalities and reduced mental and physical health. While continued economic development and increased urbanisation in many countries are expected, it is imperative to consider how we could shift our current consumption-intensive ways of life into more responsible ones which produce fewer negative impacts. At the same time, people in many societies suffer from instability or insecurity in their ways of living, associated with rapid changes in environmental, economic and societal conditions. We need to continue our efforts to create a society where everyone can meet their needs in more resilient and reliable ways. Given these multi-dimensional challenges, we need to find and create pathways that enable diverse patterns of living which reduce negative impacts from our everyday lives on the environment and society, and realise more secure and stable means of meeting day-to-day needs.

In this context, the Sustainable Lifestyles and Education (SLE) Programme was launched in 2014 as one of the six programmes under the UN 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns (10YFP, which is now known as the One-Planet Network). The SLE Programme has supported 24 projects that are fostering the shift to more sustainable ways of living. Based on the unique contexts of local societies, the 24 projects identified the needs and opportunities for creating contexts where local people can live more sustainable and resilient lives, and carried out a diversity of actions toward achieving their goals. They faced many unforeseen situations such as the COVID-19 pandemic which made it difficult to fulfil some of the planned activities. However, these challenging situations enabled the project teams and partners, as well as the SLE Programme Coordination Desk, to revisit the meanings of their efforts to enable sustainable and reliable ways of living.

This report elaborates on the essential points of these projects, including the challenges of sustainable lifestyles, opportunities utilised, actions taken, learning, and other achievements. Highlights include:

- **Challenges of sustainable lifestyles:** Reflecting the various and specific conditions of society, economy, and environment of the countries or regions, the projects identified a diversity of challenges that pose threats to sustainable ways of living. These included increasing demand for water, energy and food, as well as the wasting of food and other products, and the insecurity and instability of livelihoods and meeting basic needs such as food, water, health, and housing. Most of the 24 projects addressed these challenges. Thus, we can understand efforts aiming at sustainable lifestyles as the (co-)creation of alternative means and contexts of living that enable people to live more responsibly (with mitigated negative impacts), and to live in a more stable way (through securing their livelihoods and basic needs).
- **Opportunities utilised:** In addressing the challenges, projects took advantage of unique opportunities, including raising awareness/recognition of the issues among local stakeholders such as citizens, local governments and the private sector, availability of untapped resources that may help fulfil people's needs with reduced negative impacts, and accessibility of tools or methodologies.
- **Actions taken:** Projects took multiple actions combining some of the following approaches: visualisation of the impacts of the current patterns of consumption and livelihoods on the environment or stability of livelihoods, visualisation of the benefits of choosing alternative means of living, provision of tools, equipment or facilities that help them fulfil their needs in alternative ways, and development of capacities (skills and knowledge) of individuals and organisations (including governments)

for effectively utilising information, tools and facilities in creating alternative patterns of living. Visualisation of the benefits of alternative practices can support people more effectively when they are combined with the opportunities to collectively try and intake new practices. Therefore, some projects set up spaces for co-learning and co-creation by participants in generating new social norms and alternative contexts of living. Schools, community spaces and workplaces served as the basis for setting up such co-creating spaces, and sometimes arts and music were used to bring people together in these spaces. The majority of the projects applied more than one of these approaches in growing the capacities and aspirations of the people, organisations, and the local society and economy toward co-creating alternative patterns of consumption and livelihoods.

- **Learning:** No project can understand thoroughly the contexts of local living conditions and the most effective means of changing them prior to implementation of the project. All projects faced some unexpected conditions that emerged in their implementation phase, such as relationship building with their partners and participants who brought in different ideas and demands, compatibility or incompatibility of the knowledge, skills, tools and so on with local cultures or environments, and unforeseen changes in external conditions such as the economy, society or climate. Confrontation with unexpected conditions like these was an inevitable part of the efforts to promote sustainable lifestyles since this enabled the projects to gain a deeper understanding of the issues of living and living conditions, and thus design more effective implementation processes.
- **Achievements:** Projects were urged to reconsider their action plans in response to any unexpected conditions; despite such conditions, they achieved more than the outputs and outcomes originally planned. Actions for creating and spreading alternative means of fulfilling needs and creating livelihoods needed to reflect ever- changing local conditions, and thus the project teams and their partners were urged to co-create knowledge about the living conditions, technologies, skills and capacities of the local people, with strengthened organisations or communities.
- **Scaling:** Informed by the learning obtained through implementation, some of the projects reconsidered their goals – or the visions of the desired conditions of lifestyles and societies – and adapted them into something different from their original plans. Some projects started building partnerships with stakeholders such as local government, educators, or business, although this had not been planned at the start. Therefore, scaling deep, which refers to '(c) hanging relationships, cultural values and beliefs' (Moore and Riddell, 2016) in addition to scaling up (changing institutions at the level of policy, rules and laws) and scaling out (replication and dissemination, increasing number of people or communities impacted), started even before the completion of the projects and still continues.

The above lessons suggest that we must broaden our perspective to better understand the needs and approaches to sustainable lifestyles. First, while past understanding and practices in pursuit of sustainable lifestyles focused on the negative impacts deriving from ever-increasing consumption by high-consumers including those in the industrialised world, not enough attention has been paid to the various other conditions that jeopardise day-to-day living. There are many underconsumers, who are unable to meet their basic needs. Moreover, even the lives of people who manage to fulfil their necessities may be easily endangered with societal level changes, as was illustrated by the disruptions caused with the COVID-19 pandemic. Linkages between these two conditions – impacts from overconsumption and vulnerability of living – should also be addressed to enable alternative contexts of living both for high-consumers and those under vulnerable living conditions. High-consuming lives are being supported at the cost of others being able to live dignified and sustainable lives. Those living less impactful lives have also great wisdom to share in how to live in less wasteful, resourceful and sustainable ways. Second, we should keep in mind that there is no one definitive understanding of desirable and sustainable patterns of living and approaches, and that the project teams did not have a clear roadmap prior to implementation. Through learning-by- doing, project teams and partners gradually gain a deeper understanding of their desirable patterns of living as well as their

capacities to enable them in stronger collaboration with their partners. The unforeseen challenges to the local living conditions such as the pandemic have prompted the project teams and partners to deepen their understanding of the meaning of sustainable and reliable means of living, as well as the capacities they need to develop. Thus, the essential part of the efforts towards sustainability lies in the self-belief that they can shape or maintain alternative contexts for livelihoods and lifestyles, which they then developed through collaboration and co-creation. With this in mind, partners such as donors or programme coordinators could effectively support such ground-level initiatives through a flexible mode of monitoring and evaluation that encourages adaptive planning and implementation instead of merely checking progress-as-planned, as well as facilitating dialogues toward creating and sharing narratives of changes and empowerment. In other words, co-producers, rather than supervisors are required to make the best of these efforts toward sustainable lifestyles.

In summary, the project teams, partners and the SLE Programme learned that sustainable, secure and reliable ways of living are not predetermined goals based on assessments of individual lives, but rather a process of collective learning and co-creation by all partners to develop aspirations and capacities that can envision and shape alternative living contexts. The 24 projects also shed light on the limitations of exploring sustainable living through the lens of high-consumer lifestyles. There are also critical insights to be gained by focusing on alternative ways of living and livelihoods, the relationships between high-consumer and lower income and consumer ways of living, and extending considerations beyond ecological sustainability and inclusivity to the security of everyday lives.

Part 1

Co-Creating Sustainable Ways of Living

Introduction

Today, our global footprint is about one and half times the Earth's total capacity to provide renewable and non- renewable resources to humanity. If nothing changes, in 35 years, with an increasing population that could reach 9.6 billion by 2050, we will need resources equivalent to almost three planets to sustain our ways of living when we only have one Earth (United Nations 2016)). Moreover, recent studies revealed that our daily activities such as eating, moving, heating and cooling homes, and purchasing consumer goods, have become one of the significant sources of the greenhouse gas emissions that cause global climate change. Therefore, changing our ways of living is imperative to limit global warming below 1.5 C above pre-industrial levels (Intergovernmental Panel on Climate Change 2018). Rethinking the ways in which we produce, consume and exchange is crucial to move towards a society where we can all live well within the boundaries of our planet.

However, societies also suffer from other challenges associated with the incumbent patterns of economy and ways of living. Despite remarkable growth in income and the progress in poverty reduction, a massive number of people still have difficulty meeting their daily needs. For instance, 785 million people lack access to safe drinking water (World Health Organization n.d.). Some 55% of the population are not covered by social protection schemes (International Labour Organisation 2018). Such threats are not limited to the developing countries – UNDP's Human Development Reports 2019 pointed out that 1.3 billion people are considered 'multi-dimensionally poor', two-thirds of those being in medium-income countries (United Nations Development Programme 2019). Even in the wealthier countries, people suffer from various risks such as health, employment and natural disasters. Growth of income does not automatically ensure a safer or more secure living. We need to continue our efforts to create a society where everyone can meet their needs in a more resilient and reliable manner.

In this way, it is broadly considered that unsustainable lifestyles and harmful consumption patterns constitute a central "problem" threatening the sustainability of the environment, society and economy. The Sustainable Lifestyles and Education (SLE) Programme also shared such a recognition when it was launched in 2014 as one of six programmes under the UN 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns (10YFP, also known as the One-Planet Network). To gain deeper understanding of Sustainable Lifestyles and to take actions to support promoting them, the SLE Programme has selected and supported more than 20 projects in developing countries and countries with economic transitions. Led by local organisations including governments, not-for-profit organisations, and educational institutes, these projects addressed the multitude of challenges in changing lifestyles and livelihoods as well as their context and shifting situational conditions. Once the projects started, the project teams, partners and the Programme Coordination Desk gained a wide range of learning opportunities that enabled them to gain deeper understandings of the needs of and approaches to enabling sustainable living in the locally-specific contexts. Additionally, many unforeseen situations hit the project implementation, which also helped us reconsider the meanings of sustainable and secure living. Above all, the COVID-19 pandemic made all partners aware of the diverse conditions causing vulnerability of everyday living and even survival. However, project teams and participants exercised remarkable creativity to overcome the challenges caused by the pandemic, which enabled them to grow their aspirations and capacities to work together to support contexts for more resilient living. This report summarises the essential learning obtained by the SLE programme and projects through their efforts to create the conditions of sustainable living. We aim to offer some useful points for others seeking to create more sustainable lifestyles and livelihoods globally.

01 The Sustainable Lifestyles and Education Programme and Projects

1.1 Call for Projects under the Sustainable Lifestyles and Education Programme

We need to mitigate the negative impacts on the environment, economy and society associated with our ways of living. We need to enable ourselves as well as future generations to live decent and secure lives. Thus, we need a shift unsustainable lifestyles. Recognising this, the Sustainable Lifestyles and Education (SLE) Programme was launched in 2014 as one of six programmes under the UN 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns (10YFP, also known as the One-Planet Network). The SLE Programme raised the vision of a world where sustainable lifestyles are desirable, beneficial and accessible for everyone, and carried out initiatives boosting the efforts by stakeholders to facilitate the shift to sustainable lifestyles globally through, for instance, knowledge creation and sharing, capacity development, development of policy, business, and community actions. More specifically, the SLE Programme adopted two approaches to realise this vision. Firstly, the programme's Coordination Desk and its advisory members ran a series of global-scale initiatives in close cooperation with a wide variety of stakeholders (see BOX 1). Secondly, the programme called for proposals of projects aimed at fostering sustainable lifestyles based on the unique needs of local societies. To gain a better understanding of the various needs and opportunities of sustainable patterns of living, and to provide adequate support to the efforts globally, it was imperative to learn from those carrying out various actions. The programme has administered four calls for proposals since 2015 and has selected and supported 24 projects in total by 2021 (BOX 2). All of these projects adopted unique approaches for changing lifestyles, livelihoods or the conditions which enable them, based on the concrete needs of the local society, and in cooperation with local partners.

BOX 1. 10YFP/One-Planet Network and the Sustainable Lifestyles and Education Programme

The 10YFP was a UN-wide framework of programmes adopted at Rio+20 in 2012, that enhances international cooperation to accelerate the shift towards Sustainable Consumption and Production (SCP) in both developed and developing countries. It supports the implementation of regional and national policies and initiatives, and builds capacities for the mainstreaming of SCP into sustainable development policies. It also facilitates access to financial and technical assistance for developing countries, as well as serving as an information and knowledge platform on SCP to enable all stakeholders to share tools, initiatives and best practices. The United Nations Environment Programme serves as the Secretariat of the 10YFP and administers the 10YFP Trust Fund. Over 700 organisations including international and regional organisations, national and local governments, private sector, and civil society organisations participate and contribute to the operationalisation of the six thematic programmes of 10YFP, and the network of these partners is now known as the One-Planet Network.

The Sustainable Lifestyles and Education (SLE) Programme aims to foster the uptake of sustainable lifestyles as the common norm, to ensure their positive contribution to addressing global challenges, such as resource efficiency and biodiversity conservation, climate change mitigation and adaptation, poverty eradication and social well-being. Measures taken towards achieving such objectives include multidisciplinary research and multi-stakeholder cooperation, through the promotion of participative and bottom-up approaches, innovative policies, economic instruments and technologies, awareness-raising, as well as through all forms of education. Experts from a variety of institutions worked together to operationalise the programme activities, including the governments of Japan and Sweden as the programme co- leads, the Institute for Global Environmental Strategies (IGES) and the Stockholm Environment Institute (SEI) as the coordination desk, and the multi-stakeholder advisory committee comprising 24 expert organisations globally, including international organisations such as UNEP, UNESCO and OECD, as well as the European Commission, national governments, civil society and the private sector. Highlights of the initiatives taken by the SLE Programme include but are not limited to the following:

The SLE Programme has acted as a platform for partners with diverse expertise to contribute to these unique initiatives. The programme co-leads, coordination desk, advisory committee members, and its partners have collaborated to support these initiatives, elaborating an understanding of the various needs and potential options for sustainable lifestyles as well as suggesting actions to facilitate the necessary changes to achieve these.

- The Envisioning Future Sustainable Lifestyles project has been carried out for two phases. The first phase was devoted to understanding the current situation for sustainable lifestyles and to imagining scenarios of future low-carbon sustainable ways of living. The project collected cases of tools, instruments, and policies enabling and promoting sustainable lifestyles and scenarios of future lifestyles to this end. The second phase built on the results and integrated an analysis of carbon footprints associated with the daily practices carried out in several countries, to gain further understanding of the options of sustainable and decarbonised living in the cities. The project teams in four countries worked with six cities, and co-created future scenarios of decarbonised living through citizens' workshops and household experiments testing the feasibilities of adapting options to reduce carbon footprints associated with our day-to-day living.
- Global Search for Sustainable Schools is carried out in nine countries across the world. National competitions require teachers and students to submit plans for making their schools sustainable. About 50 winning schools were given grants to implement their ideas from the beginning of 2020, turning their dreams into reality with the support of experts from their country and around the world. The COVID-19 pandemic and the associated measures such as lockdown and school closures posed serious challenges to the implementation of school activities. However, teachers, students and parents have managed to continue their actions with closer partnerships.
- Good Life Goals is created through a collaboration among the partners of the SLE programme and several other organisations. They highlight a handful of concrete actions available in our day-to-day contexts which guide us so that our behaviours contribute to the achievement of the 17 Sustainable Development Goals (SDGs). The Good Life Goals have been translated into more than 10 languages.
- Anatomy of Action is a global campaign involving the innovative use of social media. The participants commit to actions via their social media accounts that contribute to a sustainable environment and society and carry these actions out. Thousands of participants have committed to unique actions for sustainable ways of eating, purchasing goods, moving, and spending and investing money. They have fun doing these actions and are motivated by encouraging multi-media materials and being connected to a massive number of people.

BOX 2. SLE Projects in Brief (Project MAP on Page 50)

01	**Brazil: Education for Sustainability and Consumption** The project raised awareness of consumerism and sustainability among educators and students of several municipal and state primary public schools, as well as their respective communities. It intends to develop training courses for educators, reaching five municipal districts in five geographical regions: Belém, Brasília, Porto Alegre, Salvador and São Paulo.	2017–2019
02	**Cameroon: Promoting Environmental Best Practices in Cameroon through Music** This project aimed at mobilising musical talent across the 10 regions of Cameroon to develop creative and educational content in the form of music, with participants competing for the 'Camer-Green Music Award'. The objective here was to influence lifestyles and contribute to environmental sustainability. The three winners were endorsed as music ambassadors for the environment and worked with implementing partners to promote using music for the environment.	2017
03	**Chile: Direct Use of Geothermal Energy for the Promotion of Sustainable Production Model in Rural Areas in Chile: Implementation of Pilot Projects in Firewood Drying and Greenhouse for Agricultural Farming** The project tested the potential of geothermal energy to reduce greenhouse gases and local pollutant emissions in one of the most polluted regions of Chile. The pilot involved the local community in the design, installation and management of a heating system with a geothermal heat pump for firewood drying, and a connected greenhouse that harnesses the energy losses of the dryer for vegetable production.	2017–2018
04	**India & Bangladesh: SCRIPT (Sustainable Consumption and Recycling Interventions for Paper and Textiles) for Reducing Urban Climate Footprints** This project aimed to tackle climate change through sustainable consumption of paper and textiles. In two cities, Kolkata and Dhaka, the project helped women and young adults who live in poor conditions and work in unsafe circumstances to create micro-enterprises and establish a sustainable loop of paper and textile recycling.	2016–2017
05	**Malaysia: Upscaling Sound Food Waste Management Practices through Youth and Community Education in Schools and Institute of Higher Learning – Malaysia** The project aimed to encourage the behavioural transition to responsible food consumption and preparation, reducing food waste, as well as improving source separation and composting of food waste. Activities included the development of tools and materials for responsible food consumption, preparation and waste management, which will eventually allow for replicability in the future. The project covered different target sectors such as households, schools and the hospitality industry.	2017–2018
06	**Zimbabwe: Sustainable Lifestyles among Rural Families in Zimbabwe: Small-scale Conservation Farming to Change Lifestyles in Africa and Beyond** The objective of this project was to promote sustainable farming, living and climate change adaptation in rural areas through capacity-building activities and the organisation of self-support groups. The project organised farmers and provided training on nutrition, additional crops, processing and marketing. The participants received hardware, such as pumps and animals, to support the initiation of this work.	2017–2018
07	**Armenia: Solar Energy for Low-Carbon Sustainable Lifestyles in Solak, Aygavan and Malishka Rural Communities of Armenia** This project aimed at promoting sustainable lifestyles in rural communities in Armenia through the use of solar energy technologies (public lighting, solar water heaters, cooking stoves and food dryers). Local communities and different stakeholders are actively involved in developing and implementing local sustainable development strategies and plans.	2017–2018
08	**Colombia: How Emerging Urban Youth can be an Engine for More Low-carbon, Sustainable Lifestyles: Beginning in Bogota** This project aimed at enhancing and harnessing a better understanding of low-carbon lifestyles at the city level. Emerging approaches were tested in Bogota to catalyse action and create replicable urban models. The project adapted research to the Bogota context, working with local partners to build upon existing policies, initiatives and networks, as well as using a youth survey to identify how and what to effectively communicate.	2017–2018

09	**Peru, Nicaragua & Honduras: Better by Design – Replicating Promising Practices, Tools and Methodologies to Support and Enable Companies in Latin America to Improve the Sustainability of their Food and Beverage Products** The project worked with major retailers operating in Nicaragua, Honduras and Peru and their value chain partners to implement tried-and-tested sustainable product design tools into new product development (NPD) processes. A 'Consumer Information Lab' was used to build capacity and best practices in Latin American organisations for sustainability-led advertising of consumer goods.	2018
10	**South Africa: Food Waste in South Africa: Capacity Building through Research, and Trial of a Cellular Phone Application, to Reduce On-farm Food Waste and Increase Food Redistribution (Food for Us Project)** This project involved the trial of a mobile phone application to reduce food loss and waste from the food supply chain in South Africa. A mobile app was developed to connect fresh produce growers in South Africa (Western Cape and Eastern Cape) with secondary markets to divert surplus crop that might otherwise be sent to low value markets or be discarded. The mobile app was tested with several groups of farmers and consumers, demonstrating the potential of the mobile phone-based platform for both reducing environmental impact and addressing food security.	2017–2018
11	**Viet Nam: Upscale and Mainstream Green Office Lifestyles in Viet Nam** The project here aimed at upscaling and mainstreaming low-carbon sustainable consumption patterns and behaviour amongst employees in offices and business premises. The project sent trainers to enterprises to help develop and implement customised action plans contributing to key consumption domains (energy, waste, water and food), and monitored the impacts of reducing environmental impacts and mitigating climate change in office settings.	2017–2018
12	**Viet Nam: A New Approach of Reducing Greenhouse Gas (GHG) Emissions through Changing Lifestyles toward Water and Electricity-saving in Urban Households in Da Nang** This project in Viet Nam promoted water and energy smart lifestyles as an effective strategy towards low-carbon development. The project blended research, demonstration, and education to motivate residents to act on climate change mitigation by leading a low-impact lifestyle.	2017–2018
13	**Zambia: Showing the Sustainable Lifestyle Behaviour and Technologies for Efficient Households in Zambia** With the objective of promoting the use of energy-efficient technologies among the general public, the project focused on enhancing the roles of higher education and professionals. Education and capacity-building for teachers and students in a university included the introduction of energy efficiency simulations. This has increased the knowledge of decision-makers and policymakers on the economic viability of energy-saving technologies.	2017–2018
14	**Asia and the Pacific: Asia Pacific Low-Carbon Lifestyles Challenge** The project in this area supported youth with innovative ideas of solutions for sustainable and low-carbon ways of living. More than 10 young engineers and entrepreneurs from Asian countries obtained financial and technical support and worked on the development of new technologies and business models enabling people to live more sustainably.	2017–2018
15	**Morocco & Colombia: Sustainable Lifestyles in the Workplace** This project collaborated with the tourism and hospitality sectors in two countries to develop and implement actions for reducing resource and energy use in the unique contexts of their workplaces. About 20 companies joined the trial and carried out collaborative actions for reducing food waste, sustainable food consumption, energy saving, etc.	2017–2018
16	**Thailand: Promoting Household Energy Conservation through Feedback Services and Home Energy Audit on Residential Sustainable Lifestyle Programs** The project aimed at promoting electricity saving behaviours among urban households. Based on a large-scale survey of household energy use, it provided two services (home energy audits and feedback) to more than 1000 households. These services made households aware of their current patterns of electricity use and enabled them to take actions to reduce electricity while keeping their quality of life.	2018–2019

17	**India: Sustainable Urban Food Production and Connected Ecological Rural Farming for Reducing Climate and Environmental Impacts of Food Demand** This project aimed at promoting sustainable food production and consumption in a city and its vicinity. Through the introduction of the food-info-mart, a car with information and food, it provided information about healthy and sustainable food to urban households, and supported local farmers to produce organic food.	2018-2019
18	**Armenia: Encouraging young specialists to power the agri-food value chains and building sustainable business models** The project supported young specialists in working with rural Armenian communities to mitigate food loss, build robust food markets, and promote healthy lifestyles. Specifically, university students, along with government authorities and academic institutions, created innovative solutions aimed at updating the country's irrigation and farming infrastructure through mutual learning and collaboration with farmers.	2019-2020
19	**Colombia: The recovery of traditional rice and wheat cultivation for food sovereignty in integrated agroecological production systems** This unique project aimed to building food sovereignty and resilience of rural and mountainous communities by recovering Colombia's sustainable, traditional practice of rice and wheat cultivation and combining it with modern agricultural technologies. To this end, the project worked with local family farms to equip themselves with "basket of technologies" from which they can identify the controllable tools and skills to make their livelihoods and lifestyles resilient.	2019-2021
20	**Malawi: Polycentric Infrastructure and Community Development Paradigm for Sustainable Urban Transitions (PICD-SUT)** Many homes in Malawi are built with wood fired bricks. As the wood used to create these bricks comes from natural forests, and as the country experience rapid urbanisation, new home construction is a big contributor to deforestation and greenhouse gas emissions. In such a context, the project built experimental low-cost sustainable houses that reduce negative impacts to the environment, save costs and thus enable people to contribute to GHGs reduction and forest protection.	2019-2021
21	**Peru: Solar energy for improved rural livelihoods in Peru** Seeing an opportunity to promote sustainable energy sources and environmental conservation, the project supported more than 40 farm households in the construction and installation of eco-efficient stoves and solar panels. By curbing the need for wood, gas and charcoal, the initiative encouraged community people to play more active role in protecting the forest.	2019-2021
22	**Philippines: Active City-Community Engagement to Leverage Emissions Reduction through Activities that Transform Energy-use (ACCELERATE)** The project led by ICLEI Southeast Asia worked with several cities in the Philippines and provided practical guidance and training programmes on energy efficiency in the building, tailored technical support to enable energy saving in residential or office buildings.	2019-2021
23	**South Africa: The South African Plastic Pact** Building on the success of the UK Plastics Pact, the South African Plastics Pact hopes to transform the plastics packaging sector into a more circular plastics system. In doing so, it will help keep plastics in the economy and out of the environment. With a focus on reducing the use of unnecessary product packaging and increasing recyclability, the pact is working with businesses to extend producer responsibility.	2019-2020
24	**Papua New Guinea: Sustainable Livelihoods-Sustainable Landscapes pilot project in two communities of Usino-Bundi district in Madang province** This project aims to help rural communities continue their traditional lifestyles and maintain a relationship with their land and its resources. Through workshops and direct community engagement, the project demonstrated, created and shared the capacities among communities to conserve their environments and improve their standard of living using local resources in sustainable ways.	2019-2021

1.2 The SLE Programme's Collaboration with the Selected Projects

Hybrid of Monitoring and Support

Projects supported under this programme aim at addressing pressing challenges, such as resource efficiency, climate change mitigation and adaptation, poverty eradication and health improvements. To systematically measure and track the contribution of programme activities in addressing these challenges, the programme needed to develop and apply consistent and integrated tools. The SLE programme has developed a collaborative monitoring framework to highlight changes in lifestyles and monitor the sustainability of the projects. The framework was originally designed to monitor the progress of the projects, and to evaluate the impacts generated through their implementation, such as the reduction of resource use, waste generation or GHG emissions. However, once the programme coordination desk started the monitoring process, it became clear that the framework for these objectives was not sufficient. The programme and projects gain insights from observing what is happening on the ground, adjust some of the actions, and add more partners, or even reconsider the objectives of their activities. Therefore, the programme and projects would need tools facilitating continuous learning, adaptation and scaling, through clarifying and exchanging insights obtained through the actions, and taking careful consideration of possible ways forward at all stages of project implementation. For such reasons, the SLE programme's coordination desk and its advisory members reworked the monitoring framework into the "Assessment Framework" which puts more emphasis on the collaborative exercises between the project implementers and the programme coordination desk, toward continuous learning and scaling (Watabe and Koide 2018).

BOX 3. Call for Proposals

The programme has administered calls for project proposals four times since 2015 and selected 24 projects which met the following criteria:

- The projects should support the individuals and organisations in their efforts towards sustainable lifestyles, based on the unique needs and opportunities in each society.
- The projects should produce tangible impacts in terms of reducing negative effects on the environment, such as resource use, waste, pollution, and Greenhouse Gas emissions. (*21 out of 24 projects were requested to measure the impacts of CO_2 emissions reduction, due to funder requirements, namely, the contribution to the 10YFP Trust Fund from the Government of Japan.)
- The projects should be carried out through multi-stakeholder partnerships led by governments, research institutes or schools, or civil society organisations.
- The projects should be carried out in developing countries and countries with economic transitions.
- Projects which showed promising potential to continuously create impacts after the implementation period, or of scaling into broader impact generation, were evaluated highly.

While all the above criteria are critical, the technical review committee which evaluated the project proposals took into account the ways in which the background contexts of the society were linked to the goal-setting and action plans of the project proposals. This recognises the fact that lifestyles, behaviours or individual or organisational choices are formed in contexts affected by personal situations, socio-economic conditions, cultural and societal norms and the natural and the built environments (Akenji and Chen 2015). Needs to address lifestyles – to reduce the negative impacts or to enable reliable means of living – become manifest in these contexts. Therefore, in-depth consideration of the background contexts is fundamental for designing and implementing practical actions towards sustainable ways of living, and influencing the context surrounding them. Many proposals delineated complex challenges in different societies striving to meet their daily needs while decreasing negative impacts on the environment. Twenty-four projects that were supported addressed various challenges in the different contexts of socio-economic changes and adopted a broad range of approaches to collaborate with stakeholders in creating conditions for sustainable ways of living.

Collaboration methods between the coordination desk and the projects also evolved. Programme coordinators took every opportunity to visit the project sites, and hold discussions with project partners and participants, thereby gaining a better sense of local contexts. The coordination desk members frequently participated in discussions by project teams, or were involved in the negotiation between them and their partners, such as local governments, thereby contributing to revision of actions, or construction of partnerships. When the programme coordination desk members were not available on-site, they regularly communicated online to discuss the status of the project, whether or not activities should be modified, and any possible assistance the coordination desk could provide. Since early 2020, the coordination desk was unable to visit the project sites and organise in-person workshops due to travel restrictions arising from the COVID-19 pandemic. The coordination desk and project teams held more frequent online communications to share the project status under the pandemic situation and discussed possible measures to move projects forward. Finally, their collaboration resulted in a few knowledge products, including a discussion paper and policy briefs to highlight key learning points. In this way, the projects were able to play more significant roles in the SLE Programme's work even in the midst of a global pandemic.

With such aims and tools, the programme collaborated with projects working on the ground to achieve a shift in lifestyles and a shift in the contexts of living. All projects provided us with meaningful lessons in terms of the demands and opportunities for sustainable living, as well as the approaches adopted and partners.

BOX 4. GHG Monitoring

The majority of the projects supported within the SLE programme are funded by carbon tax of the Japanese Government through the 10YFP Trust Fund and thus are mandated to visualise the impacts of CO_2 emissions reduction (or equivalent) deriving from their activities. The projects across the globe cover a wide range of sectors and apply various methodologies to work with people, communities, governments, business and civil society organisations. Therefore, their approaches to GHG emissions reduction are diverse, as are the methodologies to measure the GHG reduction impacts. Considering the diversity of methods, the SLE Programme initially developed individual measurement plans. Project implementers proposed their schemes of measuring CO_2 emissions reduction including methodologies, data and data collection plans, and these were discussed with the coordination desk to decide on feasible plans for the individual projects. This approach was effective in applying reasonable methods for individual projects on account of their varying actions and scales. Project budgets ranged from USD 50,000 to 400,000, thus it did not seem feasible to apply strict and uniform methodologies for GHG measurement. However, feedback to the coordination desk suggested there would be value in providing project teams with general guidance and various suitable methodologies for estimating GHG reductions impact. Therefore, a GHG Monitoring Sheet was prepared that enabled projects to select an appropriate method to measure the reduction impact from a few different methodologies, using background data as a starting point. Methods were simplified to be practical given the resources of project implementers.

02 Learning from the SLE Projects

In the following sections of this report, we outline the challenges of sustainable living addressed by the projects, the approaches taken, and the insights obtained through collaboration with partners, based on the short stories submitted by the implementers of the 24 projects (Part 2 of the report). The recognition of the urgent need for a more sustainable lifestyle dates to the late 20th Century, associated with concern about resource depletion and climate change. In the early 21st Century, governments including the United Kingdom (Defra 2011) and international organisations such as the European Union (European Union 2011) embarked on studies and policies focusing on lifestyles in view of addressing climate change and resource issues (Collins 2015; Evans and Jackson 2007; Jackson 2008). However, lifestyle shift is not as easy as it is imagined. On the one hand, our day-to-day living is deeply constrained by societal structures of mass- production, mass-consumption and mass-disusing, with various conditions such as the available options of goods and services, infrastructures, norms, and so on (Akenji and Chen 2015). On the other hand, those who adopt (environmentally) sustainable living often do not do so out of concern for resources or climate (Cohen 2017; Evans and Abrahamse 2009), indicating the possibility of other conditions in areas such as the community and work place that make people reconsider their mass-consumption lifestyles. Researchers have argued that habits and practices of daily living are not only made up of personal attitudes and knowledge, but also emerge from a choice architecture that includes infrastructure, technologies, institutions and social norms (Reckwitz 2002; Schatzki, Knorr-Cetina, and Savigny 2001; Warde 2005; Welch 2017; Welch and Warde 2014). In other words, our needs and capacities for everyday practices are shaped by the web of entangled elements (Backhaus, Wieser, and Kemp 2015; Dijk et al. 2019), such as the relationship with families, neighbours and colleagues, goods and services available, and technological and institutional conditions (Watabe and Gilby 2020). Furthermore, the COVID-19 pandemic created a huge shock to the socioeconomic system and caused disruptions in our daily lives. A broad range of transformations in the patterns of production and consumption have been observed both at the societal and personal levels, highlighting huge gaps in the capacity of societies and people to absorb shocks and adapt to rapidly changing conditions. Because of these diverse lived experiences and societal adaptive capacities, it is not effective or helpful to demonise some "unsustainable" behaviours of individuals, such as personal habits of energy use or wasting and try just to modify them through addressing individuals and their isolated efforts, if we aim to work with people to create more sustainable and secure living. Changes in ways of living are more effectively enabled through changes of the underlying contexts of living (Barr, Shaw, and Coles 2011) and collective approaches that engage individuals within their communities and collective groups such as neighbourhoods and workplaces (United Nations Environment Programme 2016). Niche or community-scale collaborative actions have been recognised as effective in changing the local contexts of living through networking of small-scale actions (Anantharaman 2018; Beckie, Kennedy, and Wittman 2012), or engaging with or influencing a broader range of stakeholders such as policymakers or the private sector (Kennedy 2011; Micheletti and Stolle 2012).

The SLE Programme has supported 24 projects working on to enhance local stakeholders' knowledge and capacity or the institutional or technical elements formulating the incumbent living contexts of the local society, to co-create alternative contexts of lifestyles or livelihoods. To look back on these projects, this report applies the following logic.

Firstly, we should understand the challenges addressed. As was mentioned above, various challenges including but not limited to resources and climate change might have brought the necessity of sustainable lifestyles to the local stakeholders' attention, and then prompted them to take action.

Secondly, we should understand the opportunities identified and approaches utilised in addressing these challenges. What kind of conditions such as the capacities of the stakeholders, state and dynamic trends of the environment, society, or economy, have made them realise that they can change the current patterns?

Thirdly, we examine the actions taken. The analysis of the actions tackling the unique challenges of living, taking advantage of the opportunities, provide us with insightful answers to our question "what does it entail to make the shift to sustainable lifestyles?"

However, collaborative efforts for co-creating alternative contexts of living will face a wide variety of difficulties or unexpected conditions in the implementation phase. Contexts of living are not just unique in each country or region, but also are affected by local conditions such as social relationships, technologies, the economy and policies. Therefore, stakeholders will gain a better understanding of these conditions through taking actions and learning more about the dynamics of these contexts through acting within the systems. Thus, for all projects, what they learned by doing, and how they reflected them in their actions, were the most critical points in understanding their efforts for sustainable ways of living.

Finally, we re-cap the most salient achievements of the projects, and their ways forward, including follow-up actions already taken. The projects delivered more than the initially planned outputs and outcomes, having co-created additional outputs with their partners as a result of learning-by-doing. These emergent achievements highlight the importance of continual learning as a foundation for project delivery and scaling.

2.1 Addressing Challenges

The SLE Programme selected and supported 24 projects aiming at enabling sustainable lifestyles in one or more "domains" or sectors of everyday living, such as energy consumption, water use, waste disposal and recycling, food production and consumption, housing (including heating and cooling houses), purchasing of consumer goods, and earning a living. However, we should pay attention to the fact that our behaviours and the surrounding contexts cannot be separated into those "domains". For instance, we do not 'choose' if we own a private car and use it regularly only by our 'preference' for personal mobility or 'affordability' of the costs of purchasing and managing an automobile. Our mobility needs are closely tied with the other domains, e.g. on which days of the week and which hours our family members go to work; when we can go grocery shopping; how often we must take our family members to schools or hospitals. Additionally, our 'choice' is also constrained by geographical conditions such as the distance from home to shops, work places, schools, and hospitals, as well as infrastructure

concerns such as the 'design' of our communities such as their walkability and the 'availability' of other means of transportation such as rental cars or car-sharing, buses and trains. Societal norms, such as whether it is considered safer or more desirable to use private cars in commuting to work places or schools rather than using the bus, or the availability of formal or informal parking accommodations, also affect our 'choice'. Institutional rules also affect travel, such as if we are required to travel for work. The availability and accessibility of specific technologies or behaviours (in this case, driving a private car) also shape the options available to us, and which choices are considered acceptable or preferable. Thus, people's needs and behaviours are influenced by a wide range of conditions such as natural and built environment, socioeconomic stability, options of infrastructure, goods and services, as well as individual conditions such as family structure, age, health and working environment. All these conditions exercise influence across the boundary of the "domains" of transport, food, housing, goods and leisure. Given the crosscutting nature of lifestyles and their enabling condition, an analysis of the projects' approaches that focused strictly on domain-based interventions and impacts does not serve us well if we are to obtain actionable and transferable knowledge from the experiences of the projects. As such, we start with examining the objectives identified by the SLE projects in a holistic way, recognising the importance of context in determining the availability of the choices for individuals and groups in each project location. It is also important to examine how the background conditions present unique challenges or threats to the sustainability of the environment, economy and society.

Negative Impacts of Lifestyles on the Environment, Economy and Society

The SLE programme's first call for project proposals welcomed submissions of ideas contributing to a shift to sustainable lifestyles. The second, third and fourth calls for proposals added the term "low-carbon" and called for projects enabling "low-carbon and sustainable lifestyles." Thus, all projects addressed the challenges of living or lifestyles, causing negative impacts on environmental sustainability. The majority of the projects dealt with the impacts of boosted and sometimes harmful consumption and production resulting from rapid economic growth and urbanisation. The following are some of the cases where projects addressed this challenge:

- A project in Malaysia tackled food waste in the phases of processing, transportation, and consumption at home and schools. It has been estimated that food waste in Malaysia comprises 45% of solid waste generated, with 20% of this food waste being avoidable. This waste is not only a solid waste management issue, but also has contributed to the depletion of agricultural land due to excessive use of pesticide, fertiliser, and water, leading to soil erosion over the longer term. In addition, organic waste sent to unsanitary landfills leads to methane emissions that contribute to climate change, as well as an issue with leaking leachate as over 70% of landfills are located less than 100m from rivers. This problem has been recognised at the national level with policies and the establishment of relevant agencies, but a lack of tools and information is an on-going problem addressed by the project. Against this backdrop, the project developed guidance for the food system actors to reduce food waste, and conducted school programmes to monitor and reduce the food wastes produced there together with students.
- The impact caused by the massive amount of plastic packaging has become increasingly recognized globally. In South Africa only 29% of all waste is sent to landfill and dumping is the predominant waste disposal. In urban areas only 30-40% of household waste is sent to landfill sites, where much of the plastic is recovered by informal waste pickers either at landfill or kerbside. WRAP, WWF South Africa and SAPRO (South African Plastics Recycling Organisation) initiated the South African Plastics Pact, building on the success of the UK Plastics Pact, which has been initiated in the UK and several other countries and proved effective in bringing together the knowledge and capacities of the private sector across countries.
- Projects in Thailand, Philippines and Zambia aimed to reduce the household energy consumption in the growing urban areas. The ever-increasing energy use in the urban middle-class population are putting pressures on the local and national governments, power utility companies, and the owners of buildings and houses. Therefore, such

projects addressing home energy use were carried out in close partnerships with these key actors in the energy systems.

Almost all the projects addressed the challenge of an increase in negative environmental impacts. They include but are not limited to the two projects that worked on the reduction of food waste (Malaysia and South Africa "Food for Us"), and the two projects that collaborated with companies to introduce sustainable workplace behaviours (Viet Nam "Green Office" and UNEP "Workplace"). These cases illustrate that economic growth and urbanisation, associated with the expansion of the middle class enjoying an affluent lifestyle, are crucial factors contributing to the challenges in achieving sustainable lifestyles.

Studies reveal a direct link between increased energy and material consumption and increases in income (Gore, Alestig, and Ratcliff 2020; Oswald, Owen, and Steinberger 2020). The consumption behaviours of these expanding urban, middle class populations result in a leap in the use of energy and natural resources both through direct impacts (when they use specific products and services) and indirect impacts (when someone produces the products and services to fulfil their demands), as well as the amount of waste generated. Thus, many projects focused on the increased environmental impact caused by economic growth, urbanisation, and the expansion of the middle class.

Instability and Vulnerability of Living

Negative impacts on the environment in association with economic growth and urbanisation are not the only challenges for sustainable lifestyles. Societies isolated from growth often suffer from negative environmental impacts related to shifting geographical, political or economic conditions. Furthermore, societies with economic growth, as well as those with a stagnant economy, may also face myriad threats to stable livelihoods and consumption patterns. Economic growth in material and energy throughput is inherently unsustainable, and sustainable ways of living require a shift in economic development models (Jackson and Victor 2019; Rees 2020). The majority of the SLE projects tried to create contexts of living whereby people could live more reliable, secure lives, while at the same time mitigating the negative impacts to the environment:

- The expanding tourism sector in Da Nang, Viet Nam has driven economic growth, as well as a construction boom in the sea front area, with other areas of the city also seeing an influx of population. As a result, a significant number of hotels have opened in coastal areas and require an enormous amount of water to provide services to their guests. This leap in water demand in the tourism sector destabilised the water supply to citizens including those living in high-altitude areas. Furthermore, the increasing tendency of severe flooding and

storms pushed the city to develop a more stable water system with both supply-side and demand-side measures. The project led by DUT introduced information and guidance on water-saving measures to selected households in the city, based on a survey of water usage patterns conducted in each participating household. The project also installed several simple tools supporting water-saving actions, such as water-saving taps in the pilot households. The tools and information provided made it easier for people to understand their current water-usage and costs, and take concrete actions in changing their water-using behaviours. Interestingly, the project's kick-off workshop spurred discussions about how the project could more effectively influence citizens' behaviours if it also carried out education or actions in schools whereby knowledge is transferred to families via children. It also gained the cooperation of a critical organisation, namely, the women's union. The project team took these suggestions seriously and started discussions with educators to explore the potential of activities in primary and secondary schools or kindergarten.

- In spite of the expansion of timber and mining exports that enabled the economic growth of Papua New Guinea, rural communities representing 82% of the population are kept in vulnerable socioeconomic conditions. Most of them depend on subsistence agriculture and fishing for sustenance, and yet are exposed to cash-based economies and increasing consumption demands. Rapid changes have resulted in degraded land and natural resources management. Some communities have sold their land rights and resources to foreign developers, leading to widespread deforestation while reducing their capacity to adapt to the economic and climatic risks. The project organised farmers in community-driven land use planning and management, and promoted the improvement of livelihood options such as climate-resistant agriculture, community forestry and non-timber forest production. Additionally, the project introduced some alternative tools such as sawdust cookers for households and street lights, on account of the incumbent practice of fuel-wood use accelerating the deforestation and carbon emissions.

In addition to the two listed above, many other projects tried to secure more reliable, adaptable and resilient means of fulfilling the day-to-day needs of participants and society. They include a project in Chilean Patagonia which aimed to use geothermal energy in producing firewood and leaf vegetables to mitigate air pollution and provide balanced diets; the "Farmers' Club" in Zimbabwe which provided capacity training to farmers on conservation agriculture and healthy diets; the community resource management projects in Peru or Papua New Guinea which empowered the marginal people in the communities toward the enabling actions to improve local livelihoods; and the organisation and training of recycling sector workers in India & Bangladesh. Having analysed these cases, we can understand the challenges of unsustainable lifestyles from two perspectives, namely, an increase in the negative impacts of our behaviours on the environment, economy and society, and the destabilisation or vulnerability of our lifestyles due to changes in environmental, economic and social conditions. In other words, efforts towards supporting the shift to more sustainable lifestyles encompass the pursuit of situations where people can adopt responsible ways of living that minimise the negative outgoing impacts, gaining a reliable and secure living which provides people with the capacity to prepare, withstand and recover from external shocks and stresses. Importantly, these two elements are interconnected with each other in several ways. First, specific economic conditions, namely the dependency on a high-cost energy source, endangered both household economies and health, as well as limiting their participation in basic services, thus leading to high impacts, as shown in a few cases such as Armenia and Chile. Second, participants in the projects in Zimbabwe, India and Bangladesh, Papua New Guinea and Peru suffered from instability of their livelihoods and thus could not choose alternative options for livelihoods or participate in collective actions to conserve and improve their natural environment. Third, increasing overconsumption or the sharp rise in demand for goods or services among specific groups in society often caused insecurity or instability for other vulnerable groups. For instance, the rapid growth of the tourism sector in Da Nang, Viet Nam caused a sharp rise in water demand in coastal resort development zones. This resulted in an increasingly instable water supply for the residents living in inland

areas. Both those who have lived in the city for many years and the newcomers who tend to live in the hilly zones are equally affected.

Moreover, the COVID-19 pandemic has shone a light on the vulnerability of people's living conditions globally. Multiple unexpected challenges have hit communities and cities where projects were ongoing since 2020, including access to education, food and water insecurity, and decline in income. People and communities are not able to develop and exercise their full capacity to participate in collective actions to shape more sustainable and reliable living if their livelihoods and survival conditions are at risk. However, the pandemic has also enabled the project participants to reconsider carefully the real need for more sustainable and resilient lives through their actions, as is the case in many parts of the world where there were calls for a just and green recovery from the pandemic.

Taken together, the efforts to create and share the behavioural options to reduce the negative impacts of living and those to establish reliable access to basic needs such as food, water, health and livelihoods are two halves of the same whole. Since the two elements of sustainable lifestyles are interconnected in such ways, most of the SLE projects addressed both, with differing emphasis depending on local conditions. In short, SLE projects worked to foster responsible and secure ways of living.

BOX 5. Sustainable and Resilient Living beyond the COVID-19 Pandemic

The COVID-19 pandemic has a range of implications in terms of our understanding and actions for sustainable and resilient ways of living. While it is beyond the scope of the report to cover all of them, we identify a couple of points relevant to the learning we obtained with the 24 projects. Firstly, although the direct cause of the COVID-19 is still under investigation, it is largely considered that ever-growing economic activities and extraction of natural resources have increased the human-animal interactions and thus have something to do with the sharpened risks of outbreaks of zoonotic diseases. Therefore, we need to reconsider the present patterns of our economic activities that depend on increasing natural resource extraction. We should ensure that the recovery processes lead us to alternative socioeconomic systems to enable better living for all without depending on "more" resource use and emissions. Secondly, the pandemic caused the stoppage or slowdown of economic activities globally, resulting in the noticeable mitigation of some negative impacts such as air pollution and GHG emissions during the first half of 2020 (International Energy Agency 2021), while simultaneously causing new negative impacts such as the massive increase in the amount of medical and household waste. Such direct consequences tell us that the changes in our ways of living certainly generate both positive and negative impacts to environmental sustainability. Thirdly, people were impacted by the pandemic in diverse ways, including but not limited to the threat to health (World Health Organization 2020), job & income loss (ILO 2021) and lack of access to education (UNESCO 2020). Human impacts were notably different reflecting both personal and societal conditions including gender (UN Women 2020), race and ethnicity (Hardy and Logan 2020), occupation and economic conditions (ILO 2021; Serafini et al. 2020). The pandemic brought the structural inequalities of our societies into plain view and requires us to focus our attention on transforming structural factors constraining and enabling certain patterns of living. Fourthly, the pandemic has triggered a rapid change in living conditions, including both physical settings (e.g. living spaces, transportation and network infrastructures) and societal norms and practices (e.g. communication, learning, working, caring, eating). While these changes may continue for years, some people might have much more difficulty securing their basic needs than others. Thus, it is important to keep an eye on differentiated implications to sustainability and resilience experienced by different groups of people, and consider how we can take into account the concerns and aspirations of these groups, in particular those who are more vulnerable to sudden changes of the living conditions, and make sure they are reflected in the recovery and reshaping of society after the pandemic. Increased vulnerability due to health challenges, job loss and concern about continued societal uncertainty are also leading to unprecedented levels of mental health challenges and anxiety which need to be taken into account in engaging people in sustainable living initiatives (Echegaray 2020, 2021). With the above points in mind, sustainable and resilient living beyond the pandemic should be considered as a matter of what people's capabilities are when it comes to creating more sustainable and safer contexts of life through collective learning and collaboration (Watabe et al. 2021).

2.2 Tapping into Opportunities

To respond to the challenges above, 24 projects identified and took advantage of a range of opportunities. These include the conditions of the stakeholders, local societies and economies, and the experiences and knowledge of the implementers. We can break down these opportunities into three broad categories.

Awareness of the Challenges

First, some projects start from the perspective that local key stakeholders already recognised the difficulties stated above in advancing sustainable ways of living, and recognise the necessity to respond to these difficulties. In such cases, the projects smoothly introduced a range of measures with those stakeholders including governments, private sector and citizens:

- Governments often are well aware of the specific challenges and introduce measures to tackle with them. In Malaysia, local and national governments introduced actions to promote food waste reduction at the local or household level, including the promotion of composting to make use of wasted food as a resource and to reduce the amount of waste going to landfills. Their further attention to the necessity to introduce measures in the earlier phases of processing, transportation and consumption led to the project initiation. In the case of the household energy project in the Philippines, the governments have enacted specific legal frameworks to address energy saving in the cities. However, their effective implementation at the local level remained challenging, which inspired the project team to consider the project combining capacity development and provision of the information platform. The water saving project in Da Nang, Viet Nam, gained strong support from both the local government and the local utility company because of their recognition and understanding of the issues being addressed.
- Private sector actors are also proactive in addressing specific challenges. The South African Plastic Pact partnered with large producers to prepare and launch an innovative voluntary agreement in the country. Some other projects worked with companies who were well aware of the issues associated with their business practices and production patterns and were interested in finding solutions. The cases where private sector actors were already interested and ready to engage include but are not limited to the Green Office in Viet Nam, Better by Design in Peru and Nicaragua, and Sustainable Workplace project in Morocco and Colombia.
- Citizens' awareness was also essential for some projects. The "Food-Info-Mart" in India is such a case where the project tapped into a pre-existing high level of awareness among civil society – in this case among urban residents – to encourage farmers to promote sustainable agriculture. Such awareness provides an advantage at the launch of the project, given that all initiatives contributing to the promotion of sustainable lifestyles should address complex challenges with local people and organisations.

On the other hand, some of the other projects had a different starting point: understanding and interest in the challenges they addressed were not shared well with their local counterparts. In such cases, the project teams had to put tremendous efforts in building collaborative relationships in their launching phase and needed to make the case for why the issue and action are important. Interestingly, the COVID-19 pandemic provided an opportunity for some projects to build a stronger and more meaningful collaboration with the local people who gained a keener recognition of the necessity to work together to, for example, build better sanitation and food security in their communities.

Untapped Resources

Second, some projects identified resources which were available in the local society, workplaces or other settings, but were not fully utilised to meet local people's day-to-day demands, or to enhance their livelihood options, and thus could be usefully built upon and deployed for addressing challenges:

- Rural communities in Peru are located in remote areas in the Amazon rainforest. People live below the poverty line and have limited access to basic needs, such as water and electricity. Despite the legal framework supporting the rights of the indigenous communities over their traditional

territories, only limited attention and support has so far been given to meeting these basic needs and enabling their quality of life. This is unfortunate for these communities as well as the entire country, as disadvantaged living conditions are a major obstacle for people to use their abundant knowledge to protect the forest and biodiversity, which may in turn contribute to the climate change mitigation and the resilience of Peruvian society and beyond. Recognising this challenge, the project led by Fondo Verde engaged with indigenous farming communities to improve community and household economies by building capacity to enable good environmental practices, installation and maintenance of solar photovoltaic panels, sustainable agriculture and livestock production, and forest protection and surveillance. Most of the 40 participants were semi-illiterate women, thus the project was an attempt to enable the most disadvantaged people to play the central role in combating local as well as national sustainability challenges of poverty reduction, forest protection and climate change mitigation.

Similarly, several other projects took advantage of the available local natural resources to address challenges. For instance, since there is abundant sunshine in the Armenian highlands, the project planned to introduce relatively cheap tools to tap into solar energy to improve living conditions in rural communities. The geothermal project in Chile also took advantage of the abundant potential of geothermal energy in the local production of some commodities supporting local societies, namely firewood and leaf vegetables. In these cases, the untapped resources were materials or energy that had not been paid sufficient attention, despite their potential usages. However, we can broaden our perspective here and also consider people's knowledge, skills, time and efforts as resources benefiting people and society to be properly leveraged.

- Under the Asia-Pacific Low-Carbon Lifestyles Challenges, 20 youth entrepreneurs from nine Asian countries were provided with a small fund to support training on sustainable lifestyles, business development and CO_2 calculation techniques to expand their start-ups on low-carbon lifestyles. The selected youth came up with unique business ideas to effectively utilise resources and skills available in addressing the challenges facing their own society. They approached low-carbon lifestyles from three aspects -– energy, mobility, and plastic waste. Other than contributing to CO_2 reduction aspects, their solutions also provided benefits to broader aspects of social concerns, such as meeting basic needs, food safety and women's empowerment. In addressing the energy sector, a group of Pakistani youth developed energy efficient module homes that are affordable and accessible for displaced people. In the case of mobility, a young social enterpriser in China turned gutter oil into sustainable fuel, which prevents the unsafe re-use of cooking oil by restaurants and provides environmentally-friendly transportation. In terms of plastic waste, a female entrepreneur from Samoa developed reusable sanitary pads to reduce waste, and to provide sanitary pads to disadvantaged women through a "buy one give one" business model.
- A project in Zambia focused on enhancing the roles of higher education institutes and young professionals. As higher education institutes, universities have various potentials and roles in mainstreaming sustainable lifestyles, e.g.: training young professionals, conducting scientific and policy relevant research, influencing policies and societies and contributing to social discourses. The project, which was implemented as a partnership between a local university in Zambia and a research institute in Finland, developed a curriculum, introduced an energy-efficiency simulation, and built capacities among teachers, students, and professionals for promoting energy-efficient housing and lifestyles.

In these ways, projects took advantage of the knowledge, skills and willingness of the people to create conditions for a more secure household economies, as well as to make more effective and sustainable use of waste, or of the natural environment such as forests and farmland. Organised training sessions are often provided to this end.

Resources do not benefit us only by existing. Something becomes a resource only when people pay heed to it, and apply knowledge, skills or socio-economic measures so that a functional relationship is built between that resource and people or society. It is in this way that its value serves a purpose (Zimmerman

and Hunker 1964). Similarly, people's knowledge, skills, time or thoughts are utilised only when they are connected to specific objects, such as a person, item or occasion. Thus, identifying the potential for creating such connections between untapped resources and the opportunities for taking advantage of these resources in mitigating the negative impacts and stabilising livelihoods is a prerequisite for efforts promoting sustainable lifestyles.

Methods and Tools

The availability of informative methods and tools based on previous actions, either of the project implementers themselves or of other actors, is the third opportunity that bolstered the SLE projects. Projects often learned from the experiences of similar initiatives in other countries, or from their own experiences on different topics to develop concrete policies, business cases, or community actions building on the awareness or concerns of the stakeholders, or to introduce tools or training sessions for utilising untapped resources:

- The project team in AIT worked for the Green Office project in Viet Nam. The team had accumulated data on environmental impacts from the daily behaviours of urban people, the potential of behaviour changes, as well as approaches in providing knowledge to the target audiences for facilitating behaviour changes through a past project supported by the EU. Based on this data, they conducted training of those responsible for developing and implementing specially designed action plans, and for participatory auditing of the results. The trainers gained basic knowledge on sustainability issues, including climate change and resources, as well as the impacts of practices in workplaces, and possible actions to mitigate them. Then they reflected this knowledge in planning developed by participating companies. At the same time, the project trained auditors who took responsibility to monitor the impacts alongside staff members of the participating companies. In addition, the project implementers developed the GO Lifestyle toolkit, instruction materials and a database, covering topics including energy, water, paper, stationary and waste management, which were useful both in offices and at workers' homes The GO Standard was also finalised

to include calculation methods, monitoring, reporting and certification processes, and a GHG emission calculator. The project received over 60 applications from companies showing keen interest. However, ensuring full engagement by the partnering companies were not always easy as some of these companies were unable to commit the time and staffing required. Thus, appropriate resource allocation and stakeholder management would be strongly needed in similar projects working with many participating organisations.

Many other projects also introduced methodologies they have developed and used in the past or tested in the other contexts. For example, the Farmers' Club in Zimbabwe took the "farmers' club" model which they have developed over decades and applied it in the current context where climate mitigation and adaptation have become more critical for the survival of rural societies in Africa. The South African Plastic Pact was itself inspired and informed by an existing model: the UK Plastic Pact voluntary agreement.

Of course, no project could simply apply the experiences, approaches or tools from one project to a new initiative in another country or another sector. The project teams needed to identify the points where these approaches or tools should be tailored to fit the specific context of the current implementation best and to build partnerships with key local stakeholders in applying them. Additionally, it was essential for these projects to facilitate and enlarge the roles played by local organisations and participants in the process of tailoring these approaches or tools to fit local contexts, to ensure sustained impacts. Particularly in the challenging situation of a global pandemic, projects mobilised all sorts of available tools and methods, combining both traditional cultures and local knowledge with the digital communication measures. Local people, especially the younger generation, played a vital role in realising the potential and creative use of tools and technologies.

2.3 Taking Actions

So far, we have seen that the 24 projects addressed the challenges of living with fewer negative environmental and social impacts and in a more reliable and sustainable way, and identified opportunities such as raising awareness about difficulties with stakeholders, taking full advantage of under- utilised resources such as materials, energy and human skills, as well as being inspired and informed by experiences, approaches or tools from previous actions responding to these challenges. To put it another way, the opportunities that the projects tapped into were the possible ways of connecting materials, resources, human knowledge and skills, and market channels, etc. to create alternative conditions for resilient and sustainable ways of living with reduced negative impacts. The actions taken by the SLE projects to utilise such opportunities include the following categories.

Visualisation of the Current Status and Associated Impacts

Almost all the projects worked to take those living conditions or associated impacts which were not visible to the stakeholders and make them visible. Once people have a clear vision of what they are doing currently, how much financial cost they pay, and what impacts these behaviours will cause, they have the chance to reconsider or even redirect some of their behaviours and embrace efforts by policymakers, markets and other actors to change the conditions that influence how they live their lives.

- The rapid growth of the economy and continued urbanisation in Thailand resulted in an expansion of the middle-class population taking advantage of the increased affordability of home electric appliances. Research shows that Thailand's household energy consumption in urban areas has already reached the same level as those in developed countries. Furthermore, while future improvements in living standards and urbanisation trends are expected, a reduction of residential energy use among the urban population has become an urgent issue. The Provincial Electricity Authority (PEA), the public utility company and its partners analysed the electricity usage of over 4,200 households in the four provinces where average consumption was among the highest in the country. They established a comprehensive database of the status of energy use in urban households, covering household type, housing characteristics, equipment possession, and so on. Then the project delivered a visible feedback service to families. Feedback reports were sent to the families informing them how each household compared to energy-efficient households with

similar energy usage patterns. A Home Energy Audit was also provided, giving the information on home energy performance indexes in comparison with other pilot households, a breakdown of annual energy consumption by end-use, energy cost, GHG emissions, no-cost/low-cost energy saving measures, and medium-/high-cost energy savings measures. These services and comparisons to peers led to an increase in awareness and motivated behavioural changes of the target households to renovate the house, switch to energy-efficient equipment and so on.

Visualising the current behavioural status and its implications as well as possible alternatives were introduced by several other projects. One project focusing on energy issues was initiated in the Philippines. The project team dispatches Energy Advocates to highlight energy-saving actions. Projects addressing other issues also utilised similar approaches, such as the Malaysian project which measured the amount of food wasted in schools and homes, and then introduced collective actions for reduction; and the "Food Info Market" in India showing the benefits of sustainable diets and farming. Such actions enable people to gain a better understanding of the status of current patterns of living and the costs and impacts associated, to compare their status with others in their community, and to consider the possibility and benefits of alternative patterns of behaviours or practices. A better understanding of the current conditions stimulates people to think there may be a different way of behaving and acting, and provides a benchmark for measuring the impact of actions taken. Thus, visualisation works as the first step to create an alternative connection between people, resources or practices that may stabilise their living conditions with fewer negative impacts.

Introduction of the Tools, equipment or Facilities Enabling Alternative Practices

Visualisation of current behavioural patterns is more effective at supporting people to adopt alternative practices to meet their day-to-day needs when they are combined with new connections to people, resources and skills, when specific suggestions or guidance follows, or when people can take part in collective actions in groups to experiment with alternative behaviours. Some projects introduced tools, equipment or facilities that enabled wider and deeper changes to current patterns of behaviour.

- In Colombia, rice and wheat have long been considered basic staples. However, the official statics reveals trends of constant decrease in wheat production. Under the context of free trade agreements, the government has cut back its support for wheat production. The project led by UTA foundation aimed to recover traditional rice and wheat production to strengthen the social fabric, i.e. people, families and community, by applying appropriate technologies, exchanging knowledge, and introducing an agroecological approach in integrated systems. The project applied a unique approach of "Technology Baskets" which provides both equipment and knowledge applicable to many aspects of the farm production, such as threshing rice and wheat, polishing rice, grinding for family and animal feed, incubation of eggs, soil preparation and strengthening of family gardens. Community members jointly managed the community fund to maintain and enrich the baskets. A training course called "School of Sustainable Lifestyles" also took place to build capacity among the villagers. However, when the COVID-19 pandemic hit the country it became impossible to continue in-person training workshops. The project team adapted by combining mobile, web-based and social media engagement in order to continue mutual learning. Their traditional custom of morning coffee time was also utilised. As it turned out, older people often did not have sufficient skills to utilise these technologies, so younger villagers supported the older generations to engage using alternative communication means. The online communication channels allowed villagers to share their experiences of project activities, such as the growth of traditional crops, more frequently with their peers and also with supporting experts.
- Africa's urban population is projected to increase from a baseline of 409 million in 2010 to over 1,300 million by 2050. The continued population growth and urbanisation places significant pressure on ecosystems and climate, through the increased use of wood and rising emissions of CO_2 when constructing houses to accommodate them. The project in Malawi led by Seeds of Opportunity proposed a unique framework integrating the construction of affordable and sustainable urban

houses along with schemes to mobilise finance. The project built five modular sustainable dwelling units which are affordable for urban people and which also reduce negative impacts on the environment during construction and usage. The model houses were built with cement blocks instead of conventional kiln bricks burned with firewood. They also set up solar photovoltaic panels and solar water heaters to reduce the electricity demand. Moreover, while these technologies enable the house owners and residents to reduce costs, the framework offers the opportunity to use the saved costs (e.g. construction costs and rents) to support afforestation schemes. With the five model units, the project engaged with urban residents and schools to organise training sessions on sustainability issues such as climate change and deforestation. The construction workers engaged also gained skills in producing cement blocks to improve their income sources. Furthermore, the project team explored the potential of connecting to the international carbon offset schemes to finance this initiative. If successful, this additional funding would enable further strengthening of local actors in creating sustainable urban communities.

Introduction of small tools and more extensive facilities were carried out in other projects, including a project in Armenia. The Armenian project team introduced cheap tools such as solar fruit driers and water heaters to turn sunshine into energy, and provided other benefits for local living. A project in South Africa used a mobile app to connect farmers and consumers so they could make use of surplus food. Such actions have several effects. Physical tools work as an interface between individual or families and the resources to meet their needs. For instance, through the use of such tools, project participants are able to adopt cleaner ways of using water, food and energy, or even turn something they have wasted into a useful product. They can also connect with others and benefit from addressing these lifestyle challenges in supportive groups. Information tools, such as apps, connect people with different knowledge and resources through the facilitated exchange of information on, for instance, surplus food, available water or recyclable paper, and enable them to avoid waste, reduce costs and gain additional income.

We tend to think of tools as means to fill specific but separate needs, such as access to stable electricity or to nutritious food. However, sometimes two or more needs are closely entangled in our real life. For example, instable access to energy has hindered access to education and opportunities for social activities in the rural Armenia. Needs of multiple people are also often entangled, as was illustrated during the recent pandemic by school closures that caused difficulties across the whole world for parents who were working from home. For this reason, “the best” tool introduced from outside for meeting specific needs may not automatically suffice to address local demand. Tools work only when local people and communities manage them and creatively translate them to attach meaningful values for their real life and adapt their use to the local context. If successful, local people utilise tools or facilities as a centre for knowledge creation through which they can share their daily experiences, challenges or concerns, thereby finding good opportunities. This then contributes to the development of capacity and can boost the aspirations of local people in collectively creating alternative ways of living.

Creation and Transfer of Knowledge and Skills

Projects worked to grow the capacities of participating individuals, companies or governments, ensuring that the knowledge they provided or the tools and facilities they introduced could benefit and influence the sustainability of daily behaviours and practices. Thus, most of the project carried out some actions to train the participants in these areas.

- The EcoAtivos project in Brazil aimed to promote healthy and sustainable habits among children between 7 and 12 years old. To this end, the project designed courses for children between these ages and carried out training sessions targeting teachers and pedagogical coordinators, since the knowledge and practices in relation to consumption and environment would play a key role. The teachers undertook a face-to-face lecture and online training course on sustainability education, covering six modules – water, ecosystems and species, energy, food security, human interaction, and local economy and consumption.
- The Better by Design project was carried out in three countries in Latin America – Peru, Nicaragua

and Honduras. The project aimed to promote eco-efficiency, sustainable product design and packaging, and improved means of providing sustainability information to consumers. They prepared toolkits for sustainable product design and development, and a sustainability advertisement and consumer campaign. The project supported companies producing food and cleaning items by analysing hotspots in the value chain to generate environmental impacts, and improve the design of products and packaging, as well as carry out better advertising. Some of the participating companies have introduced new products with improved packaging, leading to a reduction in material use and waste, and resulting in fewer CO_2 emissions.

- Energy demand in the Philippines has been rapidly increasing over several decades. This trend is likely continue given the expected urbanisation in the country and continued dependency on imported fossil fuel for its primary energy source. The government has enacted legal frameworks for energy efficiency but they are mostly for larger buildings and not for the residential sector. The project led by ICLEI Southeast Asia conducted capacity building of local government actors with a view to introduce mainstream energy efficiency into local policies. It also launched an online platform providing information on sustainable buildings, energy efficiency and conservation practices to more than 16,000 unique users. Furthermore, the project planned to train and deploy "Energy Advocates" who would provide tailored suggestions on energy efficiency and conservation practices for households. Due to the COVID-19 pandemic, it became impossible to send advocates to citizen's households, so the project targeted 500 staff members of the city hall instead.

- The project in Bogota, the capital city of Colombia, aimed to inspire and empower young people to identify opportunities that would make their urban lifestyles more sustainable through collaboration. The project team focused on the ways young people connect and engage through social networks. The project started with a scoping phase to identify the areas of living with high potential to reduce environmental impacts. Then a communication campaign, "En Modo Acción" (In Action Mode) took place with media agencies and young leaders from different universities and professional careers, gaining 8,000 followers on Facebook as of December 2019. They collaborated on developing communication materials and channels, as well as organising 30 physical events. According to the follow-up questionnaire survey to event participants, 50% of the respondents reduced their car use, 62% reduced their meat consumption, and 76% changed the way they buy goods.

Many other projects including the ones we have mentioned so far, such as the "Green Office" in Viet Nam and the training of recycling sector workers in India and Bangladesh, placed training or capacity building as the central component of their projects. The training programmes provided by the SLE projects cover a wide variety of knowledge and skills. These include: specific changes in daily behaviour to meet demands to reduce negative impacts (e.g. energy or water saving, nutritional diet); introduction on how to use tools and facilities (e.g. usage of water- saving taps, equipment for production, or communication tools); and knowledge required for continuous and constructive use of the knowledge, skills, tools and facilities (e.g. organisation management, marketing). It is also worth noting that participants create and make use of the knowledge and skills most effectively by way of collective actions and in groups, instead of learning and performing these actions on their own individually. As was shown above, people and communities try and adopt appropriate tools and knowledge to take more advantage of untapped resources to improve the living conditions. Such experimentation is not feasible by individual efforts alone. It requires collaborative learning and co-creation across groups of people to translate the tools, knowledge and available resources into alternative means to meet the day-to-day needs of communities and families. Sustainable ways of living can never become a reality without collaborative learning and co-creation. Some of the SLE projects attempted to develop capacity for a group of people, instead of for individuals, for example in classrooms, in workplaces, at experimental sites in farming or urban communities, and among youth groups.

Establishing Spaces for Co-learning and Co-creation

The role of institutions or groups of people in facilitating the co-creation of knowledge and skills cannot be overemphasised here. Some projects, including in Zimbabwe and India, formed participants' groups while others such as the Green Office in Viet Nam and EcoAtivos in Brazil utilised existing organisations such as schools, kindergartens, offices or housewives' groups. They provided training sessions to these groups or encouraged them to take collective action for tangible changes in their lifestyles, such as in the household or workplace. Some projects introduced physical (e.g. experimental fields) or virtual spaces (e.g. mobile apps) where people can meet and exchange their different needs, offers, skills and knowledge.

Such an approach takes advantage of the frequent communication among participants for active reflection and uptake of knowledge transferred. Behaviour changes can be fostered through the collective creation and sharing of knowledge as well as via peer influence. For example, capacity building in institutions or groups of people can enhance their capabilities to collectively aspire to and realise alternative ways of living.

- The project in India by CSA focused on the co-creation of information through participatory monitoring and sharing between urban consumers and food producers through the "Food-Info-Mart". These actions enhance consumer understanding about nutrition and safety of food grown through sustainable farming practices. At the same time, it informs the farmers of specific demands from consumers and enables them to exchange feedback comments directly. Furthermore, this participatory monitoring aimed to have the participants "own" the knowledge about their practices and the conditions surrounding them.
- The UN Environment Sustainable Lifestyles and Education (SLE) team piloted and promoted sustainable lifestyles in the workplace in Marrakesh, Morocco and Bogota, Colombia. The project conducted research on sustainable lifestyles efforts globally, and piloted lifestyle initiatives in companies. It developed a specific menu of options for sustainable lifestyle opportunities in the workplace, such as reduction of food waste, promotion of low-carbon diets, finding alternatives to personal car ownership or to long-distance travel, as well as options for increasing energy efficiency, and sharing, reuse and repair of goods. With these options, participating companies piloted collective actions engaging their staff members. The actions included but were not limited to the launch of low meat consumption challenges, modification of commutes and schedules, and goods exchanges. Companies and staff members cooperated in the design, implementation and evaluation of some alternatives for healthier and more sustainable working behaviour as well as work conditions.

This approach led to the broader adoption of alternative behavioural options that could not have been achieved if these had been recommended to individual staff members (Timmer, Appleby, and Timmer 2018).

- The CamerGreen project in Cameroon, which worked to boost environmental awareness through a nationwide music competition provides micro-grants to the three winners of a contest to implement mini projects. One of them used their grants to promote sustainability among a network, leading to a training workshop for 10 artists. The other winner assisted street children by showing them how they could gain an income from environmental cleanliness such as offering to clean people's homes or collecting recyclables. These three grants show how with the right facilitators, it is possible to work with those previously not engaged with sustainability to develop solutions and reach new communities.
- A project in Armenia enabled the collaboration between young engineering students and farmers in rural communities to develop sustainable food supply chain in the region. The project organised the academic course for master students where they visited the communities with their supervisors and learn the local needs and opportunities from local people. They then collaborated with the local Women's Resource Centre and other local activists to conduct 20 micro-pilots to utilise the solar energy for local food production, such as the solar-powered pumping and irrigation systems. The project also enhanced its network by engaging with other universities, private sector companies and NGOs to prepare a full educational package that can continue to be implemented by other actors after the project period.
- Collaborative learning and co-creation are not limited to individuals in communities. Collective action and learning among institutions and organisations, such as companies and government agencies, set the foundation for greater progress by catalysing socioeconomic changes that enable more sustainable ways of living. The ACCELERATE programme in the Philippines accumulated the knowledge for energy savings in public, commercial and residential buildings, and built a platform to share their insights across multiple organisations and individuals. The South African Plastic Pact promoted exchanges among private companies to learn from one another, establish ambitious targets, and take bold actions to reduce the use of plastics across the country. The project team then promoted this model to several more countries in Africa and other regions.

All projects combined the above three types of action, visualisation, the introduction of tools and capacity building, with differing degrees of emphasis. As was stated in the first paragraph of the chapter, our personal needs and capacities are not the only determinants of our patterns of living and behaviours. Availability of goods and services, opportunities to acquire decent skills, and the legitimacy or validity of specific choices for specific occasions, are other conditions and drivers that determine the range of options for how we live. If we are to support people in a specific local society to shift from unsustainable patterns of living with massive negative impacts and instability, we need to take approaches that break free from the conditions that confine people into their current patterns and aim instead to create alternative patterns by connecting between people, knowledge, resources and actions. Alternative ways of living that are sustainable and resilient require a holistic approach that connects the needs of a person or family, goods and services, skills and technologies, tools, facilities and infrastructures, in a range of supportive institutional and economic contexts.

2.4 Learning-by-doing

Even if a project addresses a definite challenge, identifies opportunities to tap into, and is built on abundant experience distilled from and inspired by similar cases or initiatives, it is still not possible to create a perfect implementation plan which anticipates all eventualities. The implementing teams were urged to periodically reconsider the contexts in which they were operating and to change some of the planned actions in response to shifting conditions and new knowledge.

Project implementation processes that focus exclusively on delivering the initially planned outputs could view the development of a learning-by-doing series of reflection and readjustment as signs of a flawed initial design. However, as the

experiences of the 24 SLE projects have illustrated, building in a process for intentional reflection and course correction can help to identify where action plans needs to be adjusted, or where a lack of implementation capacity can hinder project success. Such revisions are valuable opportunities for learning and adaptation toward more effective actions. Local people, as well as knowledgeable experts, can have a thorough understanding of the conditions that put people into current patterns and can identify opportunities to emancipate themselves and adopt alternative strategies, skills or resources. Alternative lifestyle practices cannot be transplanted perfectly from one project or place to another, but they are eventually formulated as a patchwork of existing and new knowledge, skills, technologies, needs and aspirations. The COVID-19 pandemic has accelerated changes in technology, infrastructure, social norms and practices, making it more important than ever to continuously seek alternatives through co-creating skills and knowledge to fulfil the changing needs of the people. There are some facilitating conditions for combining these various sources of knowledge and resources, including the economy, policies, weather or culture. These conditions may also change at any time through interaction among the stakeholders. In this way, people gain a better understanding of these conditions, including any changes over time, and then they are able to translate what they learn into a deeper consideration of pre- conditions, actions and goals of the projects. This then provided opportunities for the projects to work with partners to create alternative contexts of living. Highlights of this learning process for the 24 projects were as follows.

Identifying and Collaborating with Partners

As we saw earlier, projects were better able to smoothly build cooperative relationships with partners when they were already aware of the existing challenges to changing current living patterns that have a negative impact on the environment or society, or that have created or perpetuated unstable and insecure livelihoods. If this was not the case, projects found it hard to find participants, or identify the principal collaborating organisations in order to set up facilities to introduce sustainable technologies, or implement training sessions, etc. Where initial recognition of the

issue and pre-existing interest in finding solutions was not present, it often took time to make the decision on where to locate a project and who to engage with.

- Being a volcanic country, there is a lot of potential in Chile for geothermal energy. However, lack of information on its advantages and high initial costs prevented the broader utilisation of geothermal energy in the country. The project team from the University of Chile focused on direct use of geothermal energy in the form of Geothermal Heat Pumps (GHPs). The project planned to tackle both environmental and socioeconomic challenges in the highland regions. For instance, geothermal could contribute to better quality firewood on the market and could mitigate serious air pollution. It could also be used at local vegetable farms to provide energy for delivering produce to nearby cities that currently import vegetables from lowland areas at considerable cost. Unfortunately, due to a change in local administration, there was a pause in coordination with the local government about the site conditions. After several months of consultation, the project selected a farm near the city which could produce leafy vegetables, such as lettuce, that could be sold in the city. These facilities brought together local farmers in the experimental production of firewood and vegetables. The local authority also showed an interest in the experiments, exploring their potential to contribute to the local economy. Despite the consultation process taking longer than expected, the geothermal heat pump eventually became the stimulus for local actors including governments, farmers and firewood producers to explore the possibility of tackling long-standing problems through better utilisation of untapped resources.

Some of the other projects also faced difficulty in partnering with key local stakeholders. The project in Armenia faced rather unwelcoming attitudes from local authorities in two of the three villages at the beginning, discussed below in the subsection "unforeseen challenges". PEA, the project implementer of the Thai electricity-saving project, noticed that most participating families were not aware of the need to save energy. Thus, awareness-raising was necessary to introduce the project's primary activities of a feedback service and home energy audit. When awareness is lacking, the development of a relationship with partners tends to be difficult in the initial phase of the project. Projects should therefore take into account that it could take quite a long time to identify project partners and participants, coordinate with partners on the specific terms of collaboration, build trust, and carry out communication and decision-making processes by the lead implementer and others. It is highly recommended to consider the time needed for coordination when developing an implementation plan, and to start discussions with potential partners such as local authorities, community groups and schools, well in advance of the official launch. A few projects faced a reduction in support and engagement from their key partners such as local governments, due to the pressing need to prioritise public-health issues during the pandemic.

Creation and Transfer of Knowledge, Skills and Tools

Once key partners had been identified, the projects took further steps to organise participants and initiate training courses or introduce tools. At this stage, projects often had difficulty in improving the knowledge and skills of participants or supporting them in using the tools introduced.

- The development of a mobile application in the Food for Us project in South Africa faced a number of challenges. These included the technical difficulties of developing the application with limited time and resources, as well as adjusting the functions for users to ensure that it responded to local context and needs. The project adopted a learning method to start with, so as to develop a minimally viable product, and then gradually evolved functions while testing with potential users. The project team engaged with several local communities to test the prototype applications, and collected useful findings based on a social learning framework. As a result, the project team became aware that smallholders, which they expected to be the primary users, consumed a significant part of the surplus food, along with their neighbours. Thus, the project team needed to reconsider the target users and objectives of the application with more emphasis on food security, and adapted their plan to establish a sustainable model for the initiative.

Similarly, some other projects became aware that knowledge and skills did not necessarily spread or

benefit their participants as planned, and subsequently changed their approaches. Some introduced different knowledge and skills while others gained support from those local participants with a stronger influence in sharing knowledge with their peers. Example of such cases include the projects in India and Bangladesh to develop capacity among recycling workers, which are featured further below.

Unforeseen Situations

For projects that are required to generate outcomes in only a few years, sudden changes in external conditions, such as political and economic unrest, unusual weather conditions and disasters, can be severe challenges jeopardising plans. Projects responded to such unforeseen situations by, for example, changing their schedules or modifying the scope of their planned activities.

- The project team and farmers in Zimbabwe experienced a series of unforeseen events such as unseasonal drought, a cholera outbreak in the nearby region, and currency fluctuations. They had to postpone some of the training courses to respond to the drought and give up establishing a savings group as this proved challenging to operationalise amidst the fluctuations in currency. However, participants responded to the difficult circumstance of the cholera outbreak to improve awareness within their local society about the necessity to improve sanitation and nutrition. Participants recognised the need to create resilient and adaptive livelihoods and transfer their knowledge to their neighbours.

- Above all, the COVID-19 pandemic posed the broadest range of unforeseen challenges to the project implementation and communities. Many projects reported that restriction of travel and meetings forced them to modify their activity plans and schedules. In some cases, project teams could not communicate with the communities to understand the conditions of their partners. Facing such difficulties, project teams and partner communities worked hard to move project activities forward with recovered and enhanced means of communication and collaboration. They were also prompted to revisit the project purposes under the pressing risks of health and socioeconomic security of both individual participants and their communities.

To summarise, the SLE projects found that building a relationship with partners, and transferring knowledge, skills and tools are critically important. Many of the projects also discovered that unforeseen situations posed challenges to project implementation. However, the SLE projects responded to these challenges in dynamic ways that allowed the projects to maintain momentum and impact. Their responses are summarised as follows.

Modification of Actions

Most of the SLE projects reconsidered and modified some of their activities during the implementation period. They adjusted, for instance, the contents of the training programmes, types of tools, and the timing and locations of actions to fit the local contexts or unforeseen situations. Many of them carried out modifications more than once. They repeated changes in the entire plan as well as conducting small actions to reflect the learning obtained throughout the whole period.

- Armenia depends on imported natural gas for a large part of its energy mix. While economic stagnation has placed increased constraints on household income, a hike in gas prices has placed significant economic pressure on households and various local organisations, including the schools and kindergarten which were forced to shut down in the winter. Additionally, because rural highland areas become dark early in the evening, people were reluctant to go out and join social activities. This indicates that increasing energy costs posed a threat to socioeconomic opportunities. The project in Armenian communities planned the empowerment of the local households and communities by introducing solar-powered tools for social and economic activities. However, some of their actions did not go as planned. For instance, solar cookers in households turned out to be ineffective in the Armenian communities in the winter time due to low temperatures. Thus, they decided to install larger machines to make dried-fruit in the women's centre instead. The dried-fruit machine enabled local participants to organise training programmes in the centre, led by the leadership of local women. For the solar water heater, the staff members of the kindergarten initially used it for dishwashing. However, they had requests from teachers and parents to use the

warm water for a swimming pool which was quite unusual in rural Armenia. As for street lights, local authorities were reluctant in the beginning, but later they proposed installing lighting in the streets connected to the village's sports centre and other public buildings to make it easier for the villagers to come out and participate in social activities in the evening. Before the completion of the project, the local government promised to raise their own budget to expand solar-powered lighting.

- Projects carried out during the COVID-19 pandemic needed to adjust both their schedules and their actions to create impacts. Some of them include the above-mentioned project in the rural Colombia, where innovative communication measure were crafted to combine both traditional practices and online communication. Other projects also combined skills and resources to craft effective means of communication and collaboration in the challenging pandemic situation. In the case of the Armenian project for sustainable food supply chain, young experts and students had visited communities before the pandemic and built certain levels of trust with the community people. They had thus gained some understanding of the situation in local communities in terms of farm production and farmers' needs. This helped the young students and experts to continue working on the pilot projects mostly through online communication and with reduced visits to the community areas. In this way, many projects could achieve collaborative learning and co-creation through crafting unique hybrids of skills, technologies and resources under the emergency which hindered the ordinary project activities.

More Proactive Engagement of Partners

Even though projects have been seen to modify their activity plans to adapt to unforeseen situations, they do not usually have abundant resources and time to do so. Projects need to mobilise all sorts of available resources and skills, which in turn shifts the roles of the project teams, participants and other partners. In some cases, projects engaged with additional partners who took a leading role or provided critical resources to carry out new activities. The water-saving project in Da Nang, Viet Nam carried out additional components in its school and kindergarten programmes, adapting them to engage with educators. South Africa's Food for Us project continued multi-stakeholder discussions with the food industry. Through these conversations, the project has contributed to the development of a national programme on food surplus and waste involving different sectors and the Consumer Goods Council of South Africa.

Sometimes partners or participants undertook more proactive roles that brought about further impacts in terms of creating alternative contexts of living in the local society. The aforementioned project in Zimbabwe is just one such case where participating farmers contributed to the development and dissemination of knowledge about sanitation in the face of a cholera outbreak. Armenia is another example where the participating women's group took a leading role in organising training sessions in the women's centre and broadened the market of their products by talking proactively to supermarkets and grocery stores in the cities. Some projects could secure participation of people who had not shown strong interest in the beginning of the project, as was seen in the traditional crop project in Colombia where young people in the community supported the development of online communication in the midst of the pandemic.

Any changes to the range of partners or their roles ensure more than the active generation of planned outcomes. When the project team reconsiders the activities and functions of its partners, they are already aware that they need to take some additional measures to achieve their intended outcomes, such as the introduction of different tools or skills, organisation of participants to develop their skills and boost motivation, the introduction of policies, infrastructure, or education programmes that would ensure better enabling conditions for behaviour changes. Through revising activities and broadening the participating coalition, projects become aware that people and communities can identify new and often more productive use of their skills, knowledge and resources. They also recognise that participants can play different roles in the project activities as well as in the local society in general. Through trial and error, project activities enabled project teams and participants to cultivate alternative ways to engage with skills and resources, or with other people. Such exploration may guide them to trespass the classic boundaries of roles between project teams and

beneficiaries, experts and lay people. In other words, project teams and partners created hybrid roles and capacities among themselves that further encourage alternative ways of using skills and working with others. Such hybrid roles and capacities are essential conditions for fostering changes in unsustainable livelihoods or consumption patterns.

- The project by SAFE India took place in two cities of India and Bangladesh and aimed to empower female workers engaged in the recycling sector to reduce paper and textile waste. However, the project team found that it was difficult for their participants to combine their knowledge and skills and translate them into viable business models, due to the limited demand for recycled products and the limited capacity to continuously produce high-quality products acceptable to the market. To overcome this challenge, the project adopted a training-of-trainers approach and established a relationship between the non-governmental organisation providing capacity building and independent women's organisations which are registered as microenterprises towards seeking a more sustainable business model.

It was not unusual for projects participants – or "beneficiaries"– to undertake essential roles which were not stated in the implementation plans. The participating farmers in Zimbabwe played an active role in improving hygiene within local society. The farmers who participated in the dried-fruit production in Armenia hosted training sessions, inviting people from neighbouring villages to disseminate their skills and to expand the market for products. The trainers and auditors, as well as companies participating in the Green Office project in Viet Nam, contribute to disseminating actions to other companies. Importantly, all these actions were not planned initially. Many projects facing the COVID-19 Pandemic also gained stronger support from the participating communities who recognised that they were needed as the main actors keeping the project alive and creating alternative ways of living.

2.5 Achievements

The 24 SLE projects learned from what happened on the ground or in surrounding contexts, reflected this learning in their action plans, and made progress in generating various outcomes contributing to the realisation of sustainable lifestyles. While the detailed achievements of the projects will be described later in Part 2, this section will highlight three categories – direct outputs and outcomes of projects' activities, creation and sharing of knowledge, and formulation of the organisations or communities.

Direct Outputs, Outcomes and Impacts

All projects set some outputs that indicate their achievement of the objectives. Outputs stand for the immediate results of the project activities. Some of the typical outputs include the provision of information and recommendations and introduction of tools, facilities or applications:

- Creation of general recommendations and guides for action (e.g. recommendations for water-smart lifestyles issued by DUT's project in Viet Nam; the guidance to the food waste reduction in the food industry in Malaysia)
- Tailored information and guidelines (e.g. in the form of "Feedback Reports" and "Home Energy Audits" by the electricity-saving project in Thailand; Green Office plans and monitoring provided for the project in Viet Nam, and "Energy Advocates' advice in the Philippines; the Better by Design project's guide support food producers and retailers in delivering food and beverages with reduced material use)
- Textbooks and training materials (e.g. Sustainable Lifestyles Education in Brazil)
- Small tools installed for pilot project (e.g. water-smart tools in Viet Nam; basket of technologies enabling sustainable and resilient food production in Colombia; solar-powered tools for sustainable food production and other social activities in Armenia; solar panels in Peru)
- Larger facilities enabling collective actions and collaborative learning (e.g. geothermal-powered greenhouse in Chile; models of sustainable and affordable urban houses in Malawi)

- Mobile apps (e.g. for food exchange in South Africa; Food-info-Mart project in India)
- Training courses provided are also direct outputs (e.g. energy saving training in the Philippines; farmers' training in Zimbabwe and Colombia; training of recycling workers in India and Bangladesh)
- Policy recommendations based on the project activities (e.g. policy recommendations to utilise solar energy in rural areas issued by the Armenian project)
- Business models (business model for using geothermal energy for producing groceries with sustainable technologies by the Chilean project team)

Outputs are mostly measured in numerical terms. For example, Zimbabwe's farmers' club and Viet Nam's Green Office reported 2,000 and 1,269 participants at training sessions, respectively.

Outcomes emerge as the result of provision of such outputs thereby influencing participants, partners and their surrounding conditions. Outcomes take various forms including the following:

- Application/uptake of actions based on the knowledge created and shared (e.g. uptake of energy saving behaviours observed in the projects in Thailand and the Philippines, respectively)
- Creation of and participation to the collective actions initiated (e.g. launch of locally tailored initiatives of altering food consumption, energy use, or commuting for the hospitality sector in the Workplace projects in Morocco and Colombia; farmers' engagement in the nature protection activities in Peru and Papua New Guinea; trial and application of sustainable livelihoods options in many projects including Armenia, Colombia and Zimbabwe)

Such changes in the actual behaviours of the team and staff members are considered tangible outcomes. Outcomes are measured and reported both qualitatively and quantitatively. For instance, the project team and participants of the Feed People not Landfills project in Malaysia jointly measured the amount of food wasted in 32 participating households, 27 food service operators, and eight schools before and after the project activities. As a result, they identified a 135.28kg reduction in food waste in schools over three months, while households and food service providers were able to reduce food waste by 20.65kg and 63kg, respectively.

Moreover, as was mentioned earlier, many projects developed outputs targeted to specific audiences and fostered dialogues among key stakeholders, such as policymakers and business sectors.

- Policy and business dialogues (e.g. the forum of business in the food waste reduction project and plastic pact project in South Africa; the forum of government agencies, companies and business organisations and universities on the education for sustainable living in Brazil; dialogues among local organisations in the Chilean project; and the water saving project in Viet Nam)

The facilitated exchanges of knowledge, experiences and interests as well as the examination of potential solutions to the specific issues could be considered important outcomes.

Impacts derive from the outcomes above. CO_2 reduction deriving from the outcomes (e.g. changes in electricity use or waste) are an example of impacts which are relatively easy to measure and report. In fact, most of the SLE projects were required to monitor and report their CO_2 reduction impacts, by the Government of Japan as the funder (see Part 2). Additionally, projects made a broader range of impacts. Although they were probably more significant in terms of the changes made to the enabling conditions for sustainable lifestyles, some of these impacts are not able to be quantitatively measured. Two types of such impacts are described here, namely, creation and sharing of knowledge among stakeholders, and formulation or strengthening of organisations or communities.

Knowledge Creation and Sharing

To tackle the challenges of lifestyles in a specific society, such as safe and healthy food, energy conservation, or waste reduction, a project needs to capture any constraining or enabling conditions for the participating individual or organisations and pin down the causes of the challenges on which it will focus. Most projects carried out some research activities in their initial phases covering topics including but not limited to the behaviours of participating families or organisations and associated environmental impacts, the general status of waste generation or energy consumption in the country or region, and the potential of renewable energy sources. They used the results to elaborate action plans or enrich the materials for training sessions, publish guidance for local citizens, and to develop reports and policy recommendations for policymakers and business, as well as publishing academic papers. These outputs were shared at training programmes for citizens and business, and at workshops inviting local or national governments, educators and other relevant stakeholders.

Such knowledge on the various aspects of lifestyles and behaviours or the surrounding conditions thereof, is not the only type of knowledge the project teams created and shared. As we have seen in the previous section on learning-by-doing, projects and participants gained deeper understandings of the current and possible alternative contexts of living: what the conditions are causing the unsustainability and vulnerabilities of living; what alternative options of practices they want; what opportunities could be utilised; and what resources and skills could be developed and mobilised to these ends. They also learned lessons, such as how to tailor actions to the local context, which stakeholders to engage with and how to organise participants, and these lessons are reflected in adjustments to project activities and envision future directions. Finally, through the learning-by-doing process they developed confidence in their capacities to envision, try out and realise alternative living contexts themselves. All these aspects are valuable knowledge that the SLE projects created and shared with their partners.

Forming Organisations or Communities

Many projects reported the creation of a cooperative relationship among the project team, participants and partners such as government, business and community leaders. These stakeholders can exchange thoughts on the issues they face and work on solutions. Projects do not always have this type of relationship with their key stakeholders, where all parties share concerns on the issue and are ready to collaborate with implementers in their initial phase. Thus, they start by contacting the local governments, community leaders or business, first to exchange ideas, and then to develop some basic directions for project implementation and timelines. They continue building partnerships through information-sharing and collaboration throughout the implementation period and even after the project is completed. For instance, the Food for Us project in South Africa brought together representatives from the government and private sector with experts to discuss the status of and solutions for food waste issues in the country. In Da Nang, Viet Nam, a broader range of stakeholders than was originally planned, including not only experts, government and utility companies, but also schools and kindergartens, came together to consider the future of water usage and water systems in the city.

For some projects, active organisation of participants was a prerequisite for delivering outputs and generating outcomes. The farmers' club in Zimbabwe, and the training of trainers and auditors in the Green Office project in Viet Nam, are two such cases. Other projects also took advantage of existing organisational structures to enable behaviour change or collective actions. For instance, schools and kindergartens worked with a common purpose in the food waste reduction project in Malaysia or for water-saving in Da Nang. As teachers and students meet face-to-face every day, they are easily able to share purposes, actions and results, giving them a sense of taking collaborative action. Similar cases can be seen in the workplace projects in Viet Nam, Morocco and Colombia. Finally, informal organisations are also powerful mechanisms to mobilise and grow the collective capacities of participants as proven in those engaged in recycling projects in India and Bangladesh, and the women's groups that collaborated on the solar dried fruit making in Armenia.

Responding to the crises caused by the COVID-19 pandemic, some projects secured participation of additional partners, including experts, youth and others. The combination of online and in-person communication measures often helped these new participants to take active roles in their collaborative works. Online communication tools were effective in securing communication under the restrictive measures in response to the pandemic, however, they were most effective when they could also keep some in-person communication and collaboration, for example, at schools or community centres. Existing organisations such as farmers groups, women's groups and schools often played a key function to introduce hybrid communication modes among people.

The above summary tells us that the three categories of achievements, namely, knowledge creation and sharing, outputs and outcomes, and formulation of organisations or communities, interact with one another in a complex, dynamic way. On the one hand, gaining knowledge about the status of behaviours or lifestyles and the surrounding contexts is an essential condition for delivering outputs and outcomes. However, on the other hand, while taking action to produce outputs and outcomes, project teams and partners also need to utilise existing organisations or formulate new communities of practices, which give them a deeper understanding of the key partners they need and the outcomes and outputs that they can collaborate on. Through collaboration and communication, partners can also find ways to interpret the knowledge initially developed or brought in by the project team and experts into another form of knowledge that can be used in the day-to-day contexts of participants. Visions of desired future conditions in the local societies will emerge through such interactions.

2.6 Scaling

We have seen that the implementers and participants of projects promoting sustainable lifestyles not only learned effective measures to change people's behaviours for a more resilient life with less negative environmental impacts. They also learned about the dynamic opportunities and potentials that individuals, families, organisations, or local societies have for creating different contexts of living. They also identified key partners to work with and discovered practical means for organising themselves as well as for collaborating with partners to fully utilise their potential. Thus, they became aware of their capacity to identify such opportunities and to realise the possibilities through their efforts. In other words, they grew their capacity to aspire (Appadurai 2013) to alternative patterns of living. Scaling of ground-level initiatives for sustainable lifestyles then proceeds as local actors rewrite and elaborate on their options for living, and recognise their capacities and their relationship with other stakeholders. In this sense, projects do not scale themselves after completion. They start scaling even within the implementation period, as set out below.

Ensuring Continued Collaboration and Impact Generation

Many projects tried to pave pathways for continuous impact generation beyond the project completion date. Marketing was the most popular means of this objective. Once training on production or livelihood options succeeds in reducing negative impacts, projects would also need to secure market channels so that participants can make a secure living. Thus, the projects in Zimbabwe, India and Bangladesh, as well as in Peru, Nicaragua, and Honduras provided participants with training in marketing and bookkeeping skills. In Armenia, participants spontaneously organised themselves and brought their products to the cities, even though marketing was not covered in the project's plan. The project in Malawi mobilised local populations in producing sustainable construction materials, leading to income generating opportunities. The project also sought the potential of linking the project activities of afforestation to carbon credit schemes, which may further enhance the self-sustaining impacts of the initiatives.

Some projects resulted in work with the public sector such as local and national government agencies, and educational institutions, with project activities taken up as public initiatives. The food waste project in Malaysia aimed at providing inputs into national guidance (strategy) for food waste reduction policies. The outputs of the water-saving project in Da Nang, Viet Nam, was integrated into education and activities at schools and kindergartens, well as being incorporated into the action plan of the city government. In Armenia, although the local government was not cooperative in the beginning, it eventually agreed to secure a budget to extend the street lighting supported by the project.

Extending and Strengthening Organisations and Partnerships

Some projects scaled their actions targeting individuals and scaled them into collective or organisational actions. In Armenia and Chile, projects learned that it was essential to work with community organisations to launch project activities, identifying meaningful uses for tools or facilities, and developing the capacities of participants. Thus, they put efforts into building productive partnerships with stakeholders such as community leaders and local authorities. Similarly, the recycling projects in India and Bangladesh trained some female leaders to become "master trainers" who assumed roles of building participants capacities and improving the quality of their products. Furthermore, approaches targeting individuals were often adopted for some issues such as electricity or water consumption as they are usually considered matters of personal choice; however, the water-saving project in Da Nang, Viet Nam was successfully carried out through collective actions with groups. As stated earlier, the project team took suggestions made at the stakeholder workshop seriously and decided to add many recommended activities. In this way, projects collaborated with various intermediary organisations or critical persons who could take up and coordinate the various needs and capacities of local stakeholders.

Some projects aimed to create replicable models that support collaborative action for sustainable lifestyles. For instance, the home energy audit and feedback services were tested by the PEA, the public-owned utility company in view of application to the broader areas. Another project addressing energy use in the

Philippines also positioned itself as a model to create the capacity among the public and private sector in the cities, and then to inform other cities in the country of their success. The South African Plastic Pact is the most notable case as it led to broader replication and expansion. A number of business associations and governments in Africa, Latin America and Asia were interested in the project as the first case of a voluntary agreement on plastics reduction in a developing country, and the project team led by WRAP was asked to engage in wider cooperation even during the first implementation period.

Scaling is not limited to scaling out from successfully completed projects (replication and dissemination, increasing number of people or communities impacted) or scaling up from completed projects (changing institutions at the level of policy, rules and laws). Scaling deep (changing relationships, beliefs and cultural values) is an often overlooked and critically important factor for lasting project impact. According to Moore et al., scaling deep is about "(i)mpacting cultural roots", "(b)ased on the recognition that culture plays a powerful role in shifting problem-domains, and change must be deeply rooted in people, relationships, communities and cultures". Thus, while scaling out and scaling up are pursued through replicating or spreading programmes to gain greater numbers or building new policies, partnerships and advocacy, scaling deep is carried out through strategies such as spreading cultural ideas and reframing stories, intensively sharing knowledge and practices, and investing in transformative learning (Moore, Riddell, and Vocisano 2015). From analysis of the 24 projects, we argue that one of the vital conditions of scaling deep would arguably be the hybridisation of skills, roles, places and communication modes. Hybrids of these elements, such as advanced technologies and local knowledge, mutually supporting roles between experts and local people facilitated through the combination of online and real opportunities

of collaboration, informs all participants to revisit their needs, opportunities and capacities from different perspectives. Traditional understanding and practices are often overlooked in favour of new expert knowledge and techniques; however, the projects reveal that combining local and expert approaches is key to effective outcomes. The participants recognise and assume greater roles in envisioning and co-creating alternative living contexts with stronger confidence by embracing these different perspectives. The proactive engagement of participants resulted in more resilient project implementation in the context of unforeseen situation such as the COVID-19 pandemic, and broader and more self-sustainable impacts driven by the participants. Ultimately project participants are not only achieving impact within the context of the project, but are also building the collaborative partnerships, understanding, trust and community assets that enable future partnerships to flourish.

At all stages of project implementation, scaling can take place through learning, reflection and reconsideration of background conditions, activities, partners' roles and goals. Through learning-by-doing, participants aspire to a broader range of activities that are responsive to changing conditions. The other important aspect of scaling, captured by scaling deep, is the impact on project participants themselves. Through project activities, participants gain a better understanding of the contexts in which they are located, such as current conditions of living, the needs and capacities of partners, the benefits of taking greater responsibility for their own actions, and the enabling conditions that support sustainable ways of living. Consequently, some project activities can be replicated, expanded or taken up into policies, while others may evolve into a different type of initiative. That said, we should emphasise that all types of scaling are facilitated by continuous learning-by-doing. Thus, we cannot judge a project as a success or a failure only by seeing if it has increased in size at some point.

03 Driving efforts for Sustainable Lifestyles

3.1 Aim for Sustainable Lifestyles

The 24 projects supported by SLE through the 10YFP Trust Fund constitute just a small fraction of the thousands of ground-level actions enabling and promoting contexts for sustainable lifestyles across the world. While they do not cover all the different needs for and approaches to sustainable lifestyles, we believe the points we learned together can help us deepen our understanding of and solutions in advancing sustainable ways of living. The lessons learned from the efforts of the SLE projects suggest that we should broaden our perspective of the needs and approaches to sustainable lifestyles.

Lifestyles constitute a set of diverse behaviours and practices that help us meet our day-to-day demands, embedded in socio-economic systems. As a part of the socio-economic system, we are connected to webs of various elements such as people, products, services, knowledge, etc. that enable and constrain the range of options we could take. Once we identify issues that make our living unsustainable or vulnerable, we would examine the causes of problems in the webs of elements. Then we can modify the connection between some of elements through diverse approaches, such as utilising untapped resources in producing commodities and generating income, avoiding single-use and throw-away items, and not consuming unnecessary goods and services.

As an illustration, let us think of some food-related issues dealt by some of the SLE projects, such as secure livelihoods for farmers, nutritional improvement, sustainable farm production methods, and food waste reduction. To begin with, the ways in which we produce, consume and waste foods are embedded in networks which can be described as follows. So-called food systems consist of phases of production (at the farm or fishery site), processing, storage and transportation, retail (at shops and restaurants), consumption (at home, schools or offices), and wasting. These phases have specific regulations and rules concerning each of them, and have physical settings and technologies that enable them.

People engaged in these phases act on fulfilling their prioritised aims, such as income generation through selling vegetables at the same time as conserving the soil and protecting health. We formulate our need for food (and our recognition of what constitutes food and non-food), heavily influenced by the multitude of conditions on the network as well as our personal or family situations. What also matters is the information we gather on many issues such as nutrition, health, safety, pollution prevention, biodiversity conservation, price and employment, as well as cultural expectations and norms around food, conditions of retailers and delivery service, available time and money, and external contexts such as weather conditions. There are other elements influencing our choices connected across our network, namely, retailers, processing and delivery, producers, farmers, etc. The choice of how to best meet our needs will, in turn, affect our own personal health, satisfaction, household economy and time use, as well as that of our family.

Considering these factors together, unsustainability or vulnerability issues associated with food production and consumption are not solely ascribed to "wrongdoings" at one of the phases or elements stated above. We should consider altering the pattern on which these elements connect with each other. Such an approach is seen from the set of projects that organised training programmes on food supply or demand, such as Zimbabwe, Colombia, Armenia and Peru. They understand how current patterns of utilising available resources with their skills are causing vulnerabilities in terms of local livelihoods and placing pressures on the natural environment. Then they worked with local partners to create different pattern of utilising resources through different use of people's skills and willingness to realise more resilient ways of living with fewer negative environmental consequences.

Alternative ways of connection among elements do not function only by replacing old skills and technologies

with new ones. People need to explore and try different types of knowledge and skills such as those from local producers, consumers and experts, or resources and technologies both from within their reach and from outside, to create and adopt new patterns to meeting their food production and consumption needs. Thus, it is vital to facilitate the exchange of knowledge, skills, wishes and concerns among partners from different backgrounds to promote the creation of alternative patterns of food production and consumption through trial and error and learning-by-doing. Projects created positive new connections between people and people, people and food, people and knowledge, etc. These included the following:

- Zimbabwean farmers formed groups, undertook training courses, and participated in experimental farms to adopt new patterns for crops and small cattle production that can reduce the impact on the natural environment and stabilise their household economy. A similar approach was taken by projects in Peru and Colombia
- Farmers and consumers in South Africa and India communicated through a mobile application, and through face-to-face meetings. Through such communications, consumers could support the farmers when they faced a food surplus or when working on sustainable agricultural methods, and conversely farmers could avoid waste and could provide healthier food to consumers
- Citizens and companies alike participated in projects such as Green Office in Viet Nam, Workplace Projects in Morocco and Colombia, and the food waste reduction project in Malaysia. Through these projects, they could collaborate on studies and analyses of the status of food consumption and waste, and prepared and implemented actions together. Thus, they turned the challenges from individual ones to collaborative efforts
- In Armenia and Chile, participants worked with experts, to find ways to utilise renewable energy sources to produce foods close to the sites where they are consumed

The approaches summarised above indicate the pivotal importance of combining elements together to alter current webs that have confined local communities into unsustainable and vulnerable practices. Combinations or mixtures of elements crafted in the 24 projects include the following:

- Combination of knowledge and skills from different people, e.g. local residents and experts in Armenian food chain project, youths and old people in Colombian traditional crop production
- Combination of tools and technologies: e.g. traditional and advanced farming technologies adapted in the projects in Peru, Zimbabwe, Colombia
- Mixtures of actors' roles: e.g. project teams and participants, educators and learners in most of the projects that carried out training programmes
- Combination and mixtures of spaces of communication and learning: e.g. online and on-site workshops carried out in projects underwent under the Pandemic

Some projects tried to engage with a wider range of stakeholders who may have a more decisive influence on food production and consumption systems. It is important to note that some powerful stakeholders such as large businesses and national governments hold more power in shaping the existing food systems than others, like smallholders or local consumer groups. However, local actors can contribute to the creation of alternative systems, fully utilising their knowledge accumulated through local experimentation. For instance, the Malaysian and Armenian projects formulated political recommendations for developing nationwide guidance for actions to reduce food waste or utilise solar energy in rural settings. The Food for Us project in South Africa expanded to include the private processing and transportation sectors, and have been discussing measures to drastically reduce waste in society.

Projects and partners often face unexpected challenges. Some projects could not progress as initially planned due either to changes in local administration or a lack of willingness among the potential partners. Others could not use one of the tools they planned to introduce due to technical issues or natural conditions. Sometimes large shocks hit projects and local societies, changing local living contexts and altering what was needed for a sustainable lifestyle. Project teams and partners could not always lead the change in lifestyles or in living contexts. Protection of the participants and project activities, revisiting actions and even altering the purpose to adapt to a changing context were essential to ensure the project was effective. Project teams and partners often revisited their priorities, such as prioritising a safe supply of food, water and sanitation over other planned activities in a pandemic situation. Such difficulties prompted them to revisit their ideas of alternative living contexts and collaborate with others to put them into practice, fully taking advantage of their capacities and all available skills and resources. Project teams and participants showed exceptional creativity and flexibility, particularly in cases where careful negotiation was required with local governments or where they needed to respond to emergencies because of disease outbreak or global pandemic.

The above lessons suggest we should revisit the basic assumption about the aim of sustainable lifestyles, which we introduced at the beginning of this report. We wrote that our everyday living has negative impacts on the environment, and our life is in many cases not sufficiently reliable and resilient. These conditions suggest we need to change our current ways of living into more responsible and reliable ones. We still hold that our current lifestyles are very much linked with sustainability and vulnerability issues surrounding both the environment and society, as the COVID-19 pandemic reminded us. However, the pandemic has also made us aware that the contexts of our lives will change overnight irrespective of our wishes or intentions, posing more imminent threats to some groups of people than to others. With this dynamic context in mind and recalling what we have learned with the 24 projects, we understand that efforts to sustainable and reliable living are not just about changing our harmful behaviours or realising some factors encouraging us to adopt more sustainable ones. Keeping in mind that the needs and contexts of living are sometimes not easy to change but in fact undergo violent changes in some cases, the other vital side is the continuous questioning and rethinking of people's need for alternative ways of living and pursuing the opportunities, capacities and conditions to achieve them in an inclusive and adaptive process. Thus, the 24 projects inform us that collaborative learning and co-creation are not just the tools or instruments to achieve sustainable lifestyles. They are integral parts of sustainable and reliable ways of living in an uncertain and changing world.

3.2 Supporting Initiatives Enabling Sustainable Lifestyles

Initiatives for enabling sustainable lifestyles carry out actions that support people to create alternative ways of using resources, skills and working with partners in meeting their needs. Such actions can enable people to learn valuable lessons through their activities, and identify more effective entry points for their actions, as well as find potential partners for collaboration. This type of planning and implementation is fundamentally adaptive and embrace emergent conditions and outcomes. Support for these initiatives comes either from project partners on the ground or programme coordinators and donors. These stakeholders should take into account the fundamental necessity to incorporate such adaptive features in build productive partnerships and initiatives.

In support of Adaptive Planning and Implementation

In addressing the challenges for sustainable lifestyles or living conditions, projects often face challenges that are dynamic and specific to the local context. Promoting sustainable behaviours among different stakeholders, introducing new protocols in supply chains, and influencing government procurement policies all require consideration of systemic changes specific to local contexts. The variation among contexts means that there is no singular success model or answer in approaching these issues. These projects must be allowed to gradually evolve workable models of actions during project planning and implementation. In adaptive planning, a team defines a plan and acknowledges in advance that the plan will change. The critical principle of adaptive planning includes an emphasis on learning-by-doing, multiple experiments, moments of reflection and reassessment, and the monitoring of management actions.

As the programme coordinator, the SLE coordination desk learned and adopted two approaches to support adaptive implementation of the SLE projects. First, monitoring should serve as more than the mere verification of a project's progress in delivering outputs and generating outcomes without delay. Monitoring activity should pay attention to some of the questions that facilitate adaptation, such as: "Are there any changes in the context? Are there any observations that are contrary to your assumptions? Do you have any suggestions for better implementation?" Second, we should always keep in mind that a project plan and its assumptions are a work-in-progress which can and should be continually updated throughout the implementation phase. For instance, when an output delivery is delayed, it could turn out that certain assumptions, such as, "inputs should be timely" or "inputs should lead to outputs" are unrealistic. In that case, a careful reflection of these assumptions is a prerequisite to adjust the project plan. It would be good to consider new or altered inputs, removing the obstacles between the inputs and outputs, or aiming at producing alternative outputs. For the SLE programme, frequent discussion with the project teams was carried out utilising the revised toolkit for assessment. This helped the programme coordinators and project teams to collaborate for a better understanding of the contexts, assess the progress of the projects' actions, and reflect on lessons learned through implementation.

Facilitating Dialogue for Creating Narratives

Dialogue between all the different actors in project planning and implementation is essential for learning to enable adaptive planning and implementation. Stakeholders can exchange different perspectives on the challenges and opportunities that the project is facing. This process lays the groundwork for strong communication channels and eventually leads to the co-creation of sharable understanding among the stakeholders. A facilitated discussion and a chance to share ideas on the following topics can support a common or partially shared knowledge of different assumptions. This can illuminate local context and therefore enable effective implementation of a project on the ground at all stages. These topics include:

- Local context: What are the conditions of the leading project partner? What are the enabling and constraining conditions for supporting them in addressing the main challenges, such as the political and economic situation, natural resources and people's access to them, and the social and cultural factors that encourage or discourage specific actions by people?
- Stakeholders' resources: Who is engaged in the activities and who is not? Who are the strategic partners with whom the project implementer should collaborate? To what extent are they committed to the project? Do they have sufficient human and financial resources to respond to the

needs? Who has influencing power over what aspects of the system?

- Assumptions: What does the project assume when it envisages specific outcomes resulting from its inputs? Are these assumptions realistic from the other partners' perspectives?
- Expectations: What kind of impacts does the project implementer expect from the activities at the end, including effects on their partners, societies and environment? What does the donor expect from the outcomes and impacts of the projects that they support?
- Unexpected and emergent factors that become clear through implementation: These include socio-economic and cultural aspects (such as participant engagement) and political situations (such as the level of commitment of the local authority), as well as increased collaboration and trust among community members. These may also include unexpected outcomes of the project activities.
- Means for addressing emergent challenges: Does the new knowledge prompt the project implementer and stakeholders to identify additional activities, new strategic partners, or the reallocation of resources? Who can be contacted to realise such changes?

Sharing and co-producing these ideas will illuminate the main challenge that the project implementer must address. This will produce a clearer vision of the status of stakeholder conditions that the project seeks to support, together with the pathways that the project implementer and partners have taken to adapt to reality. In other words, a dialogue may enable the different parties to embrace shared narratives about the challenges and opportunities they face. This includes desired visions for their community futures, any concrete actions that are expected to lead to those visions, and the strategic partners they will most effectively engage with to work on these challenges and opportunities. Such narratives can encourage the project implementers and partners and help them to communicate with the relevant audience about the project.

Partners such as the programme coordinator or the monitoring team have an important role for facilitating a dialogue for co-creation and sharing of narratives among stakeholders, by actively engaging in reflecting on what is happening on the ground.

As Co-producer, not Supervisor

The programme coordinating team or the donors initially do not usually have a good collaborative partnership with the implementers of projects they support. The SLE programme's coordination desk needed to go through a period of trial and error to deal with repeated exchanges on project activities and possible supporting measures that the coordination desk could provide, and gradually deepened its understanding of the roles mentioned above. Project implementers also assimilated the changing roles of the coordination desk to support the projects and provide back-up. In fact, projects often reported that implementation had some issues, instead of writing "everything is on track". When the programme coordinator or the monitoring team sees reports stating "everything is going smoothly as planned" they should not feel at ease since this is a clear sign that the report has a fundamental omission about what the project team learned from reality. In such cases, the programme coordinators or the monitoring team should seriously consider how to strengthen their productive relationship with the project team. SLE projects frequently sent inquiries to the programme coordinators, for instance, about how to solve a difficult problem they faced with their action plan, or how to identify external experts who could help them to solve the problem, or even asking coordinators to come to the project site to help them negotiate with their strategic partners. These requests informed the SLE coordination desk on what its role should be to support ground-level efforts to enable sustainable living. Those working at the desk could reflect on how best to adapt the functions of the SLE programme to help projects, as well as how to select new projects. Thus, the SLE projects were not just part of the SLE programme. They made up a critical environment to explore the functions and shape of the SLE programme.

04 Conclusion

At all levels, we need to create and adopt alternative ways of living to strive for more sustainable societies. We need to reduce the negative impacts on the environment deriving from the ways in which we earn our incomes, purchase goods and services, and how we eat, move, and take care of our families. Recent research tells us that a fundamental shift in lifestyle is required for a majority of the population in developing and middle-income countries to mitigate the impacts of climate change. At the same time, a considerable number of people still live in conditions of vulnerability associated with classic factors such as economic fluctuation and violence, as well as with newer ones including the increasing trend of natural disasters and the impacts of climate change. As we have reiterated in this report, these challenges are two sides of the same coin and as such, they should be addressed together for us to live more sustainable lives. An increasing number of efforts are emerging around the world to enable a more responsible way of living that mitigates the negative environmental, economic and social impacts of our lifestyles, and to enable more stable or resilient living so that people can withstand shocks and stress. We can further strengthen our efforts to accelerate changes in our socio-economic systems to create the enabling conditions for alternative patterns of living for all of us, including both overconsumers and those who are currently made vulnerable by dominant systems.

The 24 cases are among many efforts globally to enable sustainable and reliable ways of living from two aspects. Their experiences tell us these efforts cover two drivers. On the one hand, they altered the webs of elements enabling and constraining specific patterns of meeting demands, including resources, technologies, skills and people to reduce the negative impacts of production and consumption, and enable more stable or reliable livelihoods. This aspect is mostly examined in terms of the outcomes generated, such as the reduction of GHGs or resource use, increase and stabilisation of basic needs, knowledge created, and equitable distribution of these results. On the other hand, they facilitated collaborative learning and co-creation for all relevant stakeholders to explore alternative uses and combinations of untapped resources, utilising knowledge and skills of people from different backgrounds, taking account of the diverse wishes and concerns of the stakeholders. This second aspect could be interpreted as the inclusiveness and fairness to ensure the voices of all actor are well recognised and taken into account in the process to envision and create desirable living conditions. Taken together, we understand that sustainable ways of living should be considered in terms of people's capabilities to co-create alternative living contexts that enable us all to live safer and happier life with fewer negative impacts through an inclusive process.

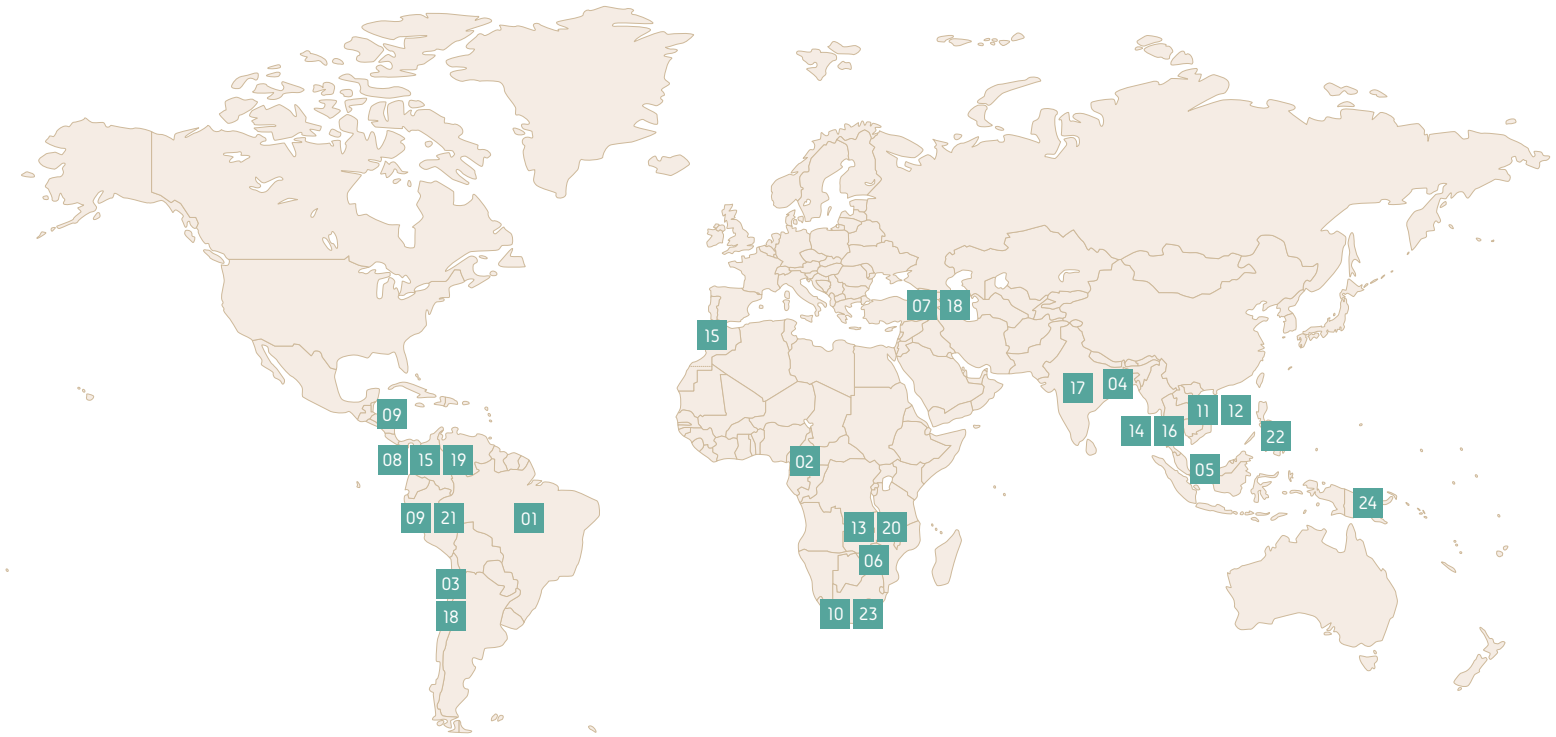
The projects introduced here will produce limited impacts compared to the total scope of any medium- to long-term changes, due to the wide variety of challenges. In the long run, we will be able to identify the perfect solution to the hundreds of complex challenges facing us as a global civilization, or even one on which all the relevant stakeholders globally agree and collaborate. However, how long must we wait until we can reach an agreement on the direction for and means of implementation to drastic socio-economic changes? While there is no question as to the importance of multi-stakeholder discussion and negotiation to such ends, we should bear in mind that we can make a start on the changes here and now. The 24 projects under the SLE programme show the significance of taking the first steps. They focused on unique challenges associated with living with the impacts of unsustainable lifestyles and vulnerability, identified opportunities such as awareness among stakeholders, untapped resources and available methodologies. Then they started working on some of the actions to visualise the status of the current patterns of behaviours and the associated costs, providing tools to support people in alternative means of living, and developing knowledge and skills. Once these steps had been taken, the projects brought together people with different knowledge as well

as coming face to face with unexpected situations, thereby deepening their understanding of practical actions, and finding means to collaborate with reliable partners. They also discovered meaning in the various changes they aim for. In short, the projects created pathways of learning-by-doing and strengthened capacities and aspirations, clearly showing us that it is essential to take small but steady steps and enhance our range of exploration through learning and doing, aiming for broader and longer-term transitions.

Although the 24 projects we have collaborated with are only a fraction of the numerous innovations on the ground, global efforts are increasing to co-create alternative contexts of living, and these inspire us to make wider transformations of our lifestyles.

We must now take it upon ourselves to drive further innovations, and continue our explorations for a sustainable way of life that will benefit everyone.

Project Map



01 Brazil
Education for Sustainability and Consumption

02 Cameroon
Promoting Environmental Practices through Music Contest

03 Chile
Geothermal energy for producing firewood and vegetables

04 India & Bangladesh
Sustainable consumption & recycling of paper & textiles

05 Malaysia
Food waste reduction with youth and industry

06 Zimbabwe
Farmer's groups for sustainable livelihoods

07 Armenia
Solar Energy for sustainable living in rural communities

08 Colombia
Youth as an engine for urban sustainable lifestyles

09 Peru, Nicaragua & Honduras
Better design and production of food and beverage industry

10 South Africa
Food waste reduction with mobile apps

11 Viet Nam
Water saving in urban households

12 Viet Nam
Green Office Lifestyles

13 Zambia
College education & researches for household energy saving

14 Asia and the Pacific
Youth challenge for low-carbon sustainable lifestyles

15 Morocco & Colombia
Sustainable lifestyles in workplaces

16 Thailand
Home energy audit & feedback for electricity saving

17 India
Food-Info-Mart for sustainable agriculture & consumption

18 Armenia
Rural Internship for Sustainable Food Chain

19 Colombia
Traditional & Sustainable Crop Production

20 Malawi
Sustainable Housing & Afforestation

21 Peru
Community Solar & Forest Management

22 Philippines
Energy Saving for Urban Households and

23 South Africa
Plastic Pact

24 Papua New Guinea
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Part 2

24 Stories of On-the-Ground Innovations

EcoAtivos da Scola (Schools' Eco-Assets)

Alana Institute

Brazil has gone through a process of social transformation over the past 15 years. Just in the past 12 years, 35 million Brazilians ascended into the middle class[1]. Although this social inclusion is desirable and praiseworthy, this growth was driven by stimulating consumption and the increased exploitation of the country's natural resources.

Brazil has very strong legal instruments regulating environmental and sustainability education in schools. However, environment protection and waste deposition, responsible advertising (especially for children[2]), among other themes, as well as the implementation of these legal instruments is still a challenge.

Against this backdrop, the project aimed to put the legislation of Brazil into practice in schools, by introducing teachers to student-centered, community-based teaching methodologies. The latter will encourage students to engage in dealing with typical problems of unsustainable lifestyles and consumption. This project aims to empower students/youth to become change-makers and ambassadors for a sustainable lifestyle and responsible consumption.

Social transformation in Brazil, in association with the economic development, has given access to millions of people to new paradigm of life, including decent education, housing and reasonable healthcare. However, on the other hand, the country faces an unprecedented increase in the production of solid waste. From 2003 to 2014, waste production increased by 29%, approximately 6 times more than the rate of population growth during the same period[3]. As social programmes continue to develop, there is an urgent need to promote education for sustainable lifestyles, responsible consumption and responsible advertising, to generate sustainable behaviours.

Brazil has made it clear that it is essential for the country to implement education for sustainable development in its Constitution and some of its national policies and plans, including the National Education Plan, National Curricular Base and National Environmental Education Programme. Among many issues associated with sustainable development, human rights, diversity and sustainability are put forward to make up the basic concept. In particular, the National Environmental Education Programme and National Guidelines for Environmental Education place environmental education as an essential and permanent component of national education, describing it as an educational process capable of building social values, knowledge, abilities, attitudes and skills directed at the conservation of the environment as a common good for the people, essential to a healthy quality of life and lifestyle sustainability. However, in spite of the advanced policies, education in Brazil does not address the issue of sustainability in a profound and interdisciplinary manner, focusing more on the idea of the importance of contact with nature rather than promoting sustainable lifestyles.

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1 https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/meet-the-new-brazilian-consumer

2 In Brazil, directing advertisement to children (>12 years old) is considered "abusive advertising", which is illegal, according to the following statutes: Federal Constitution, article 227; Statute of Children and Adolescents, articles 17 and 19; Consumer Protection Code, articles 36, 37 and 39; Resolution 163 of National Children and Adolescent Council; Superior Court of Justice precedent in a Class Action against Pandurata.

3 https://journals.sagepub.com/doi/full/10.1177/0734242X17735375

The strong legal basis of education for sustainable development in Brazil that places emphasis on human rights, diversity and sustainability, could more effectively support the sustainable development of society with specific materials and support, such as the formal curricula, texts and other resources that can be used in classrooms, as well as the training of teachers.

A project team from the Alana Institute was in a good position to pursue such an objective. The Alana Institute has over 14 years of experience in promoting children's right to integral development in Brazil. Alana has worked for many years through programmes influencing teachers and students by introducing extracurricular activities such as workshops, tours and camps. Through Alana's diverse programmes and the experience of two educators working at the institute, they could gather and adapt materials to shape teacher training that could easily adapt to the needs in different regions.

The project titled "EcoAtivos" is an intervention planned to promote and encourage healthy and sustainable habits among children aged 7 to 12. This is achieved by improving teachers' and pedagogical coordinators' knowledge and educational practices in relation to the issues of consumption, environment and climate change. It also encourages improvements in the school curriculum, and the creation of sustainability projects at the schools. The strategy to reach these goals was to develop a training for teachers focused on expanding awareness and understanding of the relationship between consumption, environmental degradation and climate change.

The activities of EcoAtivos were planned as follows:

1. Establishing partnerships with education departments and schools
2. Design of course content
3. Development of materials, website and videos
4. Training consisting of three stages:
   1st – in person lecture to present the project and its stages (duration 6 to 8 hours),
   2nd – online training 'Sustainability Education' course (duration between 32 and 82 hours);
   this includes a basic module based on the "Sustainability Flower framework" developed by one of the team members, and six modules to deepen in the following topics:

   - Water
   - Ecosystems and species
   - Energy
   - Food security
   - Human Interaction
   - Local economy and consumption

3rd – In person meeting to learn the impacts of the online course and the results of the school projects (duration 4h)

5. Development of school projects
6. External evaluation (carried out by a consultant)

EcoAtivos participants committed to navigating the "Sustainability Education" online course and completing its basic module and two others of their choosing, coming to a total commitment of 32 hours of course work, as well as conducting projects in their schools and registering these activities on the Design for Change Challenge platform.

The EcoAtivos team also made technical visits to the cities and held meetings with educators during this period, in order to collect data on location to support the qualitative results of the training and check on the projects being developed with the students.

Although the project team could use their experience to help shape education to include sustainable consumption and sustainability, this was the first time for them to work on development of the formal curricula. This work needed close coordination with the schools, and with regional and local authorities. Thus, the project faced a number of issues in its implementation.

Establishment of partnerships – During the initial phase of the project, the EcoAtivos team visited the selected cities to meet with the heads of the local Education Departments and with the school directors. Although the departments in all five regions expressed an interest in participating in the project and committed to it, it took longer to establish the actual partnerships. Additionally, there were **changes in staff in the regional education departments**, due to local or regional elections. This sometimes led to the neglect of the project that "fell between the cracks" during such changes or even the loss of interest as the political priorities of the government changed. As a result, the EcoAtivos team had to dedicate more time and effort in establishing a trusting relationship with the new contact points and reintroducing the project for them, and then convincing them of the importance of participating. In the future, it will be important to develop a mapping of political cycles in the regions to anticipate possible hindrances, thereby planning for these changes rather than simply reacting to them. **Collaboration with Education Departments** also posed some issues. Although there was interest in the project and the Education Departments of all five regions agreed to participate, there was a visible lack of participation from the regional activities, partly due to the political situation but also due to national priorities. Sustainability is not yet percieved as an essential topic in the school curriculum. Combined with the limited resources of the project, this represented a major challenge, as it forced the team to work with the municipal education departments, who were working more closely with the schools and had a better understanding of the local needs, but also required more time and effort to establish these relationships. The project team's **collaboration with School Directors and Teachers** was also challenging. The school directors and administrators had various degrees of interest in the project. The relationship showed that sustainability is important in the curriculum but it is still seen as an additional or "side" topic. However, the biggest challenge for the team was to meet all the schools' demands. Once they got engaged and understood the importance of the training, they put various requests to the team, such as more personal training sessions or more intensive guidance to develop school projects. The project team did not have sufficient capacity to cope with all their requests.

Development of the contents and putting them into use – The project has taken steps to obtain inputs from the stakeholders. Although this was certainly necessary, it was quite a challenge to **accommodate a diversity of demands into the contents**. During the first meetings with schools and teachers, the team received comments about previous courses being organised by national authorities or NGOs. Since some of these comments were too generic and did not reflect local challenges and environmental problems, participants at these meetings with schools and teachers had difficulty engaging in and taking ownership of the materials to develop their work with the students. In reaction to this, the team decided to collaborate with the local authorities and some of the more active teachers to tailor the content to different regions, as well as to support the teachers during the development of projects with their students. It was however a challenge to meet all the demands and questions that the teachers had, as the limited budget of the project only allowed for two dedicated full-time staff.

Connectivity, availability and commitment – Once the project moved forward to the training process, the project team found that most of the schools were working with limited resources. They often had poor access to the internet or did not have the right equipment. Teachers also had little time to dedicate to the training. It was decided to develop **a platform for mobile phones for the online training.** As smart phones are available to practically everyone in the country, this was one way to provide teachers with flexibility to work on the course during their commute and at home using their smart phones. However, even with the online platform, it was not easy to get the **teachers' committment**. In Brazil, basic education teachers, in particular in public schools, are poorly paid and are under a lot of preassure not only to do their job with the students but also to carry out administrative tasks, often with very few resources. The team discovered there was very little incentive for the teachers to participate in the training if it did not have formal recognition and validity for the regional departments of education, and to allow them to obtain permission from their employer to participate and also negotiate a higher salary when the course concluded. The EcoAtivos team decided to negotiate with regional and municipal education departments to give curricular value

to the training and present a certificate to those teachers who concluded the training successfully. This process took additional effort and time for the team as it was not envisioned in the working plan.

In this way, the project team coped with challenges that they did not expect before the launch. Through these experiences, they could engage in better collaborations with their partners, i.e. the education departments in the regions, and the schools and teachers.

The development of the online course on Sustainability Education was very well received, and it can be replicated countless times, with only small updates and changes. The goals related to participation in the online training and creation of projects in the schools were also met. More than 1800 teachers from 414 public schools were involved in Brazil's five geographical regions: North, South, Midwest, Northeast and Southeast.

The participants that successfully concluded the online training gave it a very positive evaluation, reinforcing their activities for raising awareness and changing behaviour, as well as reviewing their educational practices. The team proposed to make the platform available to the rest of the teachers in the schools that are creating the projects, so they can study other modules.

In relation to the development of projects, 42% of the participating schools designed projects on such subjects as water use, waste disposal and reduction, recycling, and interaction with nature. Some other schools are planning to implement projects during the next school cycle. Unfortunately, there is very little time and few resources to follow these changes within the schools. It is recommended that the donors make resources available for the Trust Fund projects to monitor long-term results and to learn about and support these transformative initiatives.

Despite the many challenges that EcoAtivos faced during 2017 and 2018, the project was a success, and it can be continued and expanded with a few adaptations, supporting the training of public and private school teachers and administrators, so that the culture of sustainability, which connects consumption to the environment and climate change, can transform their pedagogical models and support the development of a sustainable society.

Teachers participating in the training	1,800 teachers from 414 public schools
Percentage of schools designing initiatives in line with the new course	42 %

CamerGreen: Promoting Environmental Best Practices in Cameroon through Music

Resource Centre for Environment and Sustainable Development (RCESD)

The CamerGreen Project implemented a nationwide environmentally themed musical competition across Cameroon. With Cameroon's economy rapidly growing in recent years, the country is facing growing environmental impacts to its land, air, and water quality. Utilising the energy of its predominantly youthful population, the project aimed to capture their attention through running a Pop Idol style contest whereby contestants would compete to win the CamerGreen Music Ambassador Award performing their own environmentally themed songs. The contest was promoted across the country, achieving interest from all regions. Following a series of auditions and regional contests, the finalists attended a bootcamp in Douala, the music capital of Cameroon, where they further honed their compositions and skills, as well as undertaking intensive classes in sustainability to boost their knowledge, and participating in community activities to promote environmental consciousness. The last three contestants competed for the award at a public concert in Yaounde. An overall winner was announced, receiving funds to launch their own mini-project, with the runners-up also receiving smaller amounts. With widespread publicity using a variety of media and well attended concerts, the project helped creation of awareness across the country.

Improving awareness on environmental issues through the use of music can effectively engage more people to adopt a sustainable lifestyle toward the environment. Music is one of the most powerful mediums to communicate environmental messages to billions of people worldwide – irrespective of race, religion, income, gender or age. The aim of the project was to bring together individuals and entities in the world of music in Cameroon who want to be part of the solution to climate change, species extinction, freshwater crisis, pollution and other environmental issues. The project aimed to mobilise 500 youths between the ages of 15 and 35 across the ten regions of Cameroon to develop and present creative and educative content in the form of music, with the aim of influencing lifestyles that will contribute to environmental sustainability. The project participants competed for an award dubbed "CamerGreen Music Award (CGMA)".

The project had three overall aims:

- To promote behavioural changes and increase awareness on environmental challenges through music in Cameroon
- To enhance local capacity and promote ambassadors for the environment through the use of music
- To engage and strengthen media discussions and collaboration in promoting music as a tool for education awareness and policy lobbying on sustainable lifestyles towards the environment in Cameroon and beyond

The project was launched in July 2017, starting with initial project planning, partnership development and publicity. An initial call for entries led to 166 entries, with 55 being selected for a national audition concert. Following the national audition, ten finalists were selected for a boot camp where their skills and knowledge in music and sustainability were further honed. The final was held at the Buea Omni Sport Stadium on 25 November 2017 with three winners being announced. The winners then implemented mini-projects to further raise public awareness on environmental issues through music.

Project Planning and Initialisation: A variety of planning meetings were undertaken, with the project implementers, RCESD, forging partnerships with local project partners including the Ministry of Arts and Culture (MINAC), the Ministry of Environment, Protection of Nature and Sustainable Development (MINEPDED), Omega Media and Prints House (OMPH) and a local environmental music star, John Njabi as well as representatives from the ten regions of Cameroon. Communications were rolled out nationally with publicity for the project being circulated through seven television stations including Cameroon Radio and Television (CRTV), La Television du Monde (LTM), Chillen Media Television (CMTV), HiTV, Canal 2 English, Canal 2 International and Dan Broadcasting System (DBS). The project leaders also participated in popular TV programmes in order to effectively reach the targeted population and to increase public awareness on the need to use music as a tool for environmental education. The project also used radio announcements and a spot was run across most influential radio stations in Cameroon at least twice a week. The radio stations used included CRTV, Christian Broadcasting Service (CBS), Media Afrique, Equinox radio, Chariot Radio and Swelaba FM. Other methods of publicity included flyers, banners, a branded car and billboards. A project website and Facebook page were also established to further promote the project.

Initial Entries and Audition Concert: Registration for the music contest was carried out online via the project website, and manually at the project implementer head office. After enrolment of about 200 participants, auditions were carried out and 50 finalists shortlisted to participate in a national audition concert, which took place at the Chariot Hotel, Buea on 29 July 2017. Contestants performed a wide variety of compositions in different styles including Pop, R&B, Soul, and Afropop.

Bootcamp: The bootcamp ran from 8 – 17 October, 2017 at Hotel Augusta, Bonaberi-Douala. The bootcamp brought the contestants together with environmental, communication and music experts to exchange knowledge on the aspects of music and sustainable lifestyles. Each day, activities started at 7:30 am and ended at 8 pm.

Objectives of bootcamp included:

- To bring the ten national shortlisted contestants together for exchange of knowledge
- To empower environmental ambassadors to promote the concept of music for the environment
- To build the capacity of contestants to enable them be effective ambassadors for the environment
- To enhance environmental music that has great potential to influence environmental friendly behaviours

The bootcamp ran a number of different activities including training, contestant driven programmes, music sessions, a clean-up campaign, field visits, studio sessions, and career coaching. The purpose of the bootcamp

was not to simply improve the contestants' musical abilities and compositions, but also to improve their environmental knowledge, not only through lectures but also practical experiences with pro-environmental work and interaction with nature.

Training was conducted by environmental experts who enhanced participants' environmental knowledge and capacity through sessions on topics including local environmental challenges, biodiversity conservation, climate change and local environmental challenges, agriculture and the environment, and the role of women in waste disposal. Several world café sessions were held to gather participants' ideas about the environment. Contestants also had the opportunity to participate and lead in several public presentations as a way to improve their public speaking and presentation skills. Ideas developed by the contestants included facilitating proper household waste management, promoting environmental education, restoration of mangrove forests, engaging the community in environmental care and sustainability, community collection of food peels and remains as feed for pig rearing, mobilising school communities and households for plastic bottle collection, reuse and recycling, and community composting. In addition, the team undertook a local public clean-up campaign, singing environmental songs while collecting litter that called the attention of the public on the need of cleaning up the streets. Many local people during this campaign asked how they could be part of the project team, as well as asking about the reason for the campaign. The team also visited local nature spots such as Bakingili (volcano eruption site), Limbe Wildlife Centre, and Limbe beach to view the impact of plastic disposal on the environment.

There were several sessions with music experts, focusing on improving their writing styles and musical content, making sure it did not deviate from its original point of focus, which is awareness raising and education. During these sessions the contestants had trainings in vocals, music content, originality and many others aspects that could strengthen their music in order to pass on their message effectively. Contestants also had a day-long studio session to expose the contestants to working in a studio and enable them to work as a team to record the CamerGreen team song.

Caravan: Following the bootcamp, the final ten contestants conducted a public caravan in Douala on the 11 November 2017 to raise awareness on environmental issues and best practices, visiting a number of locations across the city. The activity drew a lot of attention from the audience as the contestants sang about environmental protection. Flyers were distributed to the audience, and there was an interactive quiz with the audience with prizes given to winners consisting of CamerGreen block notes and pens carrying environmental messages. Over 1,000 questionnaires were distributed to the audience, 20 participants received prices for answering environmental questions, more than 1,000 inhabitants were made more aware, and about 300 copies of newsletters about the project were distributed.

Final: The grand concert took place on Saturday 25 November 2017, at the Buea Omni Sport Stadium. Following a public caravan around the town of Buea, the final contest was held. The event ended at 6pm with the proclamation of results from the secretary of the juries. Amongst the three winners, the first, Lesline EwiMbong, was from the south west region, the second, Wams (Ajaianjei Constatine), from the littoral region and the third, Philson Dikembo, from the centre region. They were all awarded symbolic cheques of 1.5 million FCFA, 1 million FCFA and 750 thousands FCFA each. These funds were then used for the implementation of mini projects by the winners.

- **Lesline EwiMbong:** the overall winner used her funds to identify three top urban music artists to voluntarily support the project by singing the project's songs, record one environmental preservation-themed songs similar to 'Heal the World' by Michael Jackson, and perform the songs in a series of concerts around the country where the star power of the artists involved would attract the population and get them to listen to the message. She collaborated with three top urban music Cameroonian artists namely Blaise B, Ewube and Magic to record a song about sustainable lifestyle in Cameroon. The message in the music focused on the need to preserve the environment. The music also advocated the need for peace as a requirement for a sustainable lifestyle. She also recorded "Stand For Peace" with four urban artists. In addition she has performed at a number of public concerts, and was selected as a guest artist during 2018 Africa Fashion week.
- **Wams (Ajaianjei Constatine)** used his funds in order to help ten aspiring musicians create a sustainable music career. Wams is part of a network of young Cameroonian musicians called JeuneArtiste, which comprises over 100 artists. He utilised the JeuneArtiste WhatsApp group to engage in discussions about the challenges they face as young artists and how singing could contribute in solving the challenges, using his experience as CamerGreen Ambassador as evidence. He regularly shared materials promoting the benefits of sustainable living and environmental protection and used his journalist background to write and blog regularly about his experience as a CamerGreen Music Ambassador. Due to this, artists in the JeuneArtiste WhatsApp group were willing to participate in a training workshop on the promotion of music for sustainable living and ten artists were selected randomly to participate in the training workshop and the production of the JeuneArtiste music album.
- **Philson Dikembo** set out to empower street children by showing them how they can make a living by participating in environmental cleanliness. First, he educated 500 children in the city of Yaoundé through a radio campaign on how their engagement in environmental cleanliness could earn them a living through the media. He did this through four radio sessions that were held over the period of two months, each lasting for

one hour. The sessions were held once every two weeks. In order to directly engage with street children, he walked through his neighbourhood street, mobilised about ten kids and talked to them about how they can create value in their community. However, he initially had issues getting their attention, but after offering to buy them food, he found he had an opportunity to talk to them about opportunities in getting income from environmental cleanliness such as offering to clean people's homes or collecting recyclables. Finally when he was performing publicly, he would ensure that he was introduced as the CamerGreen ambassador and took the opportunity to talk about environmental issues.

The project demonstrated the feasibility of using music to promote environmental awareness. Unfortunately, the on-going political situation in Cameroon that has sadly led to conflict between the Anglophone and Francophone parts of the country which curtailed some of the opportunities to spread the campaign throughout the country. Nevertheless, the project achieved impressive levels of public awareness and was able to engage both prominent media houses as well as national and local government officials for support.

The competition and the opportunity to win funds for their own projects helped bring together many contestants from across the country. Nevertheless, it is interesting to note the strong sense of camaraderie that the project was able to engender amongst the contestants and the genuine warmth of their relationships that was noted by third party assessors during the boot camp stage. Other future projects could potentially explore this angle and finds further ways to place these bonds more at the core of the experience. Developing a network of young committed musicians could help further disseminate environmental messages.

Although many of the contestants did not initially have an in-depth knowledge of environmental issues, the steadily deteriorating environment within Cameroon was something that they encountered every day, and the integration of environmental awareness with music was a concept that they found compelling. The enthusiasm many of them showed was inspirational, and the wide variety of ideas that they came up with during the boot camp showed their genuine interest and desire to make a difference.

From January 2018, the Resource Centre for Environment and Sustainable Development started an environmental programme on Hi TV called KEEPITGREEN every Thursday from 4pm to 5pm. This programme looks at environmental and other pertinent issues and presents an avenue for continued education for the project output. This platform has played a key role in raising awareness on the need of sustainable lifestyles. The general public and the project contestants are constantly brought to this show to share their engagements on how the project impacted them and what else they are doing to contribute to a sustainable environment.

The implementation organisation is keeping its commitment to support a sustainable environment by constantly raising funds to support activities that contribute to the sustainability of this great initiative and to support other activities that can enhance the implementation of sustainable lifestyle, using education as a tool.

Musicians participating in the contest	200
Citizens participating in the Caravan for Finalists	1,000

Direct Use of Geothermal Energy for the Promotion of Sustainable Production Model in Rural Areas in Chile: Implementation of Pilot Projects in Firewood Drying and Greenhouses for Agricultural Farming

Universidad de Chile

In the region of Chilean Patagonia, people suffer from the world's sixth worst air pollution caused by the use of low-quality firewood in the home and the limited access to vegetables which are mostly imported from lowlands in the country. The project designed by the engineers planned to take advantage of the geothermal energy abundant in the region to install technical solutions to these issues. The original proposal focused mainly in the technical aspects of the operation. However, the project team realised it was essential to collaborate with the community and local authorities. The project reconfigured their plans towards closer collaboration with local community, besides working with a cooperative, as originally envisioned. Thus, the project later on evolved into the co-creation of a viable business plan for promoting the use of geothermal to improve living conditions, as well as policies facilitating the uptake of such activities among the local government, farmers and businesses.

The Aysén region in Chilean Patagonia is famous for the national reserve and access to glaciers, and as such, the area attracts many tourists every year. However, the region is also well known for high levels of airborne pollution, which is a common problem in the cities of Southern Chile. According to World Health Organization data on ultra-fine particles, Coyhaique, the capital city of Aysén, is the most polluted city in the Americas. This is caused by the massive use of firewood burned for residential heating. As well as having poor insulation, most homes in the city depend on firewood for heating because of the cheap cost, which is about one fourth of paraffin, on fifth of natural gas, and seven times cheaper than electricity, making it difficult for families to switch to cleaner options. As firewood used in the area contains high levels of moisture, it raises the emission of particle materials in the air when burned.

Additionally, due to the low average temperature and the rainfall patterns, production of agricultural products, in particular leaf vegetables, has a marked seasonality. The production techniques used have not contributed to the diversification of agricultural products. Therefore, the local society mostly depends on vegetables imported from the lowlands of the country at a distance of hundreds of kilometers. This consequently contributes to an unbalanced diet for the local people, as well as fixed higher costs and an increased carbon footprint.

Chile is located in a zone with intense tectonic and volcanic activity. The potential of geothermal energy is estimated at 3,900 MW, which could potentially attract USD 20 billion in investments. Among the variety of technologies, Geothermal Heat Pumps (GHPs) accounted for 70.9% of the total installed capacity and 55.2% of the annual direct use of geothermal energy. Direct use of geothermal energy, particularly GHPs, is a sustainable alternative for heating, because it is a zero emissions option, both for greenhouse and atmospheric emissions. It is also a non-invasive technology for the surrounding environment because the GHP is buried (no visual impact) and the operation and maintenance of this technology is very simple. Furthermore, the technology can be operated simply which allows it is to be used in different locations. It could be used for different productive applications (e.g. pellets production, district heating, wood drying, or cogeneration) and adjusted to different business models based on sustainable production as community heating, export of native woods, vegetable production for own consumption (community or family), among others. However, in spite of such advantages, the potential of the direct use of geothermal energy has not been fully explored, except for just a few case studies.

Against this backdrop, the project team made up of engineers from the University of Chile planned a pilot scheme to set up facilities applying GHPs for the production of commodities that can contribute to the citizens. The two challenges mentioned above are considered good entry points to engage with local producers and businesses, and demonstrate the benefits of thermal energy to society in Chile, especially in rural areas. The project was designed in a timely manner whereby the government of Chile was working on materialising its commitment to the Paris Agreement. In this context, the government was working on the development of the energy efficiency law, and launched several related policies, including the public policy for firewood use and heating.

The main objective of the project was to contribute to GHG emissions reduction through the enhanced direct use of geothermal energy thereby bringing tangible benefits to the local society. To this end, the project collaborated with local stakeholders in measuring thermal properties, calculating the thermal load and heat demand, establishing the geothermal facilities, operating the production of firewood and vegetables with the community people, and developing a business model. The project was organised in four different phases, each with specific activities and outputs.

The pre-planning phase included activities such as the **diagnosis of energy resources and demands** by involving different stakeholders and beneficiaries. Thermal properties of subsurface were measured, and thermal load and heat demand were calculated to decide the right location for the project's purposes.

The implementation phase dealt with the technical implementation and design of the business model. This implied the **construction of the facilities needed in the selected area** after sizing and designing the greenhouse and firewood dryer, the organisation of **operational training so that rural farmers** could familiarise themselves with the project and learn how to use and maintain those structures. At the same time, a pre-study of the business model was developed to ensure positive results and affordable products for the community.

Towards the completion phase of the project, the project focused on the sustainability over time of the pilot projects in terms of **outreach activity**, website development and the **refinement of the business model**. Workshops were also included to engage with a larger number of individuals and stakeholders, and to encourage a shift to sustainable choices. The project team administered a survey to assess the performance of technologies and business schemes, as well as to determine changes in lifestyle as a result of the project and its business sustainability. To sum up, these activities altogether aimed to create a sustainable project that could lead to a reduction in pollution, spread good practices, and empower individuals to adopt sustainable lifestyles and reduce their local carbon footprints.

The project team from the University of Chile visited the region several times to establish contact with the two cooperatives that were interested in running the facility. It brought to light the importance of understanding the internal dynamics of the groups, as well as to make sure that the cooperatives had a formal structure and were able to collaborate and navigate through conflicts. This was crucial if they were to take over the operation of the project in the long term. The project team realised that without the participation and engagement of the primary beneficiaries, the project could not even have started. Through discussions with the Coordination Desk of the SLE programme, the team decided to involve additional members who have strong backgrounds in social science to make sure that the local community was involved throughout the project. They created a 'Council of Stakeholders' with representatives of public institutions and community to assess their needs and involvement in the design and subsequent operation of the project. They organised informative sessions and seminars for local schools, civil society and policymakers to explain the potential benefits of the project and the use of geothermal energy in the region, beyond the duration of the project. When the project team and the programme coordinator conducted an exercise to map the challenges and opportunities and develop the tentative theory of change, it became clear to both parties that the project had a scope far broader than the technical experiment of the geothermal energy.

However, even though the project team paid more attention to involvement and collaboration, progress was not smooth. The local governments of the cities of Coyahique and Aysén were hesitant at the beginning of the project. They had experience of collaborating with organisations from Santiago the Chile or other countries, only to be

completely abandoned or neglected after the termination of the funding period. Moreover, changes in local government following the election results forced the team to invest time and additional travel to the region in order to build a trusting relationship with all stakeholders. The organisation also encountered some problems in engaging with firewood traders and farmers. Consequently, the team took longer than expected to identify the location to set up the facilities. However, this gave the project team a better understanding of their needs, and guaranteed their involvement which is crucial for sustainability of the business model.

Furthermore, the project had to adapt to various situations throughout the project period. Firstly, due to a delay in identifying the location, the project had less time to test the capacity of the different sites available to build the facility. Secondly, the original idea of spreading technologies used during the implementation phase encountered some challenges due to time and financial limitations. In fact, the facilities were too expensive to be adopted by the local farmers. Thirdly, the volatility of the Chilean peso had a considerable effect on the implementation of the project, whereby the equipment required to build the dryer suddenly cost more than the budget available for it. Thankfully the authorities in Aysén were supportive and offered their facilities to carry out most of the outreach activities; thus the project outcomes were not affected.

The project represented an important opportunity to utilise untapped local resources to ameliorate the challenges of the local living conditions, namely, air pollution deriving from low-quality firewood which was causing respiratory and other diseases, as well as the limited access to agricultural products, such as fruit and vegetables. The construction of the drying wood system and greenhouses based on thermal energy can bring a range of positive impacts at different levels.

While the initial coordination and engagement with local stakeholders, namely the governments and farmers, took longer than expected, this gave the project team a good opportunity to engage with them and draw on their interest and knowledge to establish a pilot to use geothermal energy to improve living conditions in the local society. Indeed, the project could collaborate with these stakeholders on a greater range of activities than they anticipated, such

as fieldwork, meetings and workshops. Opportunities in education and training were also fully utilised. Five local farmers participated in the training at the geothermal site focusing on the set-up and maintenance of facilities, and production of firewood and leaf vegetables such as lettuce. Furthermore, the project worked with local schools and teachers to organise sessions on project outreach and to learn about the benefits of direct use of geothermal energy. On the other hand, the involvement of professionals from local universities (Aysén and Austral de Chile) was achieved, and they were important participants in the dissemination of this technology in the area. The project members were also invited to share the scheme at conferences held in other countries, such as Argentina and Armenia.

As a result, activities expanded more broadly than their original idea intended, and the project team refined the business plan of geothermal direct use for the local business and communities. Based on their analysis and discussions with stakeholders throughout the pilot implementation, the revised business plan focused on the viable businesses and associated benefits, in addition to the technical aspects of design, operationalisation and maintenance of the facilities with GHPs. Interestingly, hydroponic agriculture in greenhouses turned out to generate more benefits to the local economy than the firewood production.

Last but not least, the pilot scheme represented the massive potential to reduce GHG emissions. The production of high-quality firewood will result in the reduced use of firewood in households and will also mitigate deforestation. The local production of leaf vegetables enable citizens to avoid importing them over hundrreds of kilometers from the lowland agricultural regions. These benefits from only one firewood drying facility and greenhouse add up to the reduction of 169 tCO_2e during the project period. As noted earlier, GHP is a simple technology that is relatively easy to set up and operationalise as long as the initial cost is available. Thus, the project showed the effectiveness of the scheme in the region in mitigating climate change while tackling the local threats to sustainable living for the local population.

Production of firewood	360 m^3 per month
Production of vegetables	16,000–24,000 lettuces per year
GHG emissions reduction from avoided deforestation and transportation of vegetables	162.7 tCO_2e

SCRIPT (Sustainable Consumption and Recycling Interventions for Paper and Textiles) for Reducing Urban Climate Footprint

South Asian Forum for Environment (SAFE)

The project, started by SAFE (South Asian forum for Environment), aims to tackle climate change effects through the sustainable consumption of paper and textiles. Pulp and paper production generate massive amounts of CO_2 and methane. In addition, the increased consumption of textiles has brought consequences both in terms of increased textile waste flows as well as the environmental impacts associated with production, use and end-life management of textiles.

The locations for this project have been selected in India and Bangladesh, respectively in the cities of Kolkata and Dhaka. The Indian city focuses on interventions in the paper industry, while the other focuses on textiles. In both cities the main goal is to disseminate awareness among people, government organisations and agencies, schools and informal waste pickers. The main priority is given to women and young adults who live in poor conditions and work in unsafe circumstances by creating micro-enterprises based on paper and textile recycling technology. The initiative's plan is to develop the skills of informal waste pickers, organise laboratories to create and sell usable household products from recycled waste, and organise educational activities at different schools and agencies.

The project aims to focus on paper and textiles due to their high level of greenhouses gases (CO_2, CH_4, N_2O) and their impacts on climate change. Although India has shown a lower level of paper consumption per capita, around 15kg against the global average of 55kg, this trend is going to dramatically change by the year 2020 with the rising demand of paper reaching at least 57%. As estimated by UNFCCC, recycling 1 MT of municipal solid waste (MSW) paper can curb 1.28MT of landfill gas emissions that mainly contain methane and CO_2. In addition, waste paper recycling is still an unorganised sector that sustains the livelihood of thousands of informal waste workers (especially children and women) who are often in a disadvantaged position. Similar problems are also related to the increased level of textile consumption. Indeed, the Centre for International Climate and Environmental Research in Norway and the Stockholm Environment Institute (2014) estimated that global consumption of clothing results in around 30Mt of GHG emissions per year, with additional emissions of 530MT from the use of clothing which is the equivalent to 2.2% of global emission. More recently other reports show that south and southeast Asian cities contribute 270–300 metric tons of textile waste to landfill.

A sustainable usage and recycling intervention towards better resource utilisation would represent an impactful adaptive measures in addressing climate change. As analysed, one MT of recycled paper saves approximately 17 trees, 2.5 barrels of oil, 4,100 KWh of electricity, 4 cubic meter of landfill and 31,780 liters of water. Moreover, the project has great potential to spread awareness among different sectors of society, as well as to ameliorate living conditions for marginalised people/informal waste pickers, especially women's working conditions, and create new business opportunities for them. Another opportunity is represented by the change to spread awareness among young people and increase the adoption rate of more sustainable actions and behaviours. The ultimate goal of the project is to reach a large number of individuals, shift people's behaviours towards more sustainable patterns, and decrease the environmental effects caused by paper and textile waste. This will jointly benefit the urban context in terms of air pollution reduction and conservation of peri-urban wetland habitats often used as dumping areas.

The project has three main areas of interventions: (1) raising **awareness** among schools, organisations and waste pickers about sustainable behaviour and consumption in order to reduce civic waste of paper and textiles, (2) support and train informal waste pickers (especially women) to create their **own business** from the recycling of paper and textiles and (3) creation of household **products made from recycled material.**

Starting point: Important steps were the identification of two intervention areas in Kolkata and Dhaka, resource mapping of municipal recycling potential, an assessment survey on needs and livelihood vulnerability, and a stakeholder meeting to define project implementation/strategies.

1. The project aimed to engage students from different schools in India and Bangladesh and organised a two-day Youth Education Program to make young people more aware about sustainability and sustainable consumption of paper and textiles and segregation of waste at source. The project also aimed to reach different private organisations to explain how to reduce the usage of paper and textiles and to encourage donations of these materials within the work and school environments.

2. Voluntary recruitment and provision of basic and advanced training to form fully-skilled waste pickers was carried out, with the idea to formalise municipal's solid waste recycling. Creation of workshops focused on entrepreneurship and fiscal management in Kolkata and Dhaka. The project envisaged an increased income of 35% over previous earnings.

3. The project would include production of handmade standardised recycled products (from paper and textiles), and creation of catalogues of these products with established prices. The sale of goods was encouraged through exhibitions and displays of products in urban areas or by involving other stakeholders for online promotion. Training was given to 20 beneficiaries in retailing and marketing of recycled products in the market to make effective use of their products. The idea was to be able to handle 1,000kg waste paper and textiles per day.

A fourth fundamental point is also represented by the (4) **monitoring and evaluation** stage of the project. M&E for economic sustainability, a strategic impact assessment estimation of emission avoidance and reduction of consumption footprints on both papers and textiles were conducted in India and Bangladesh.

The overall goal of the project was to achieve 80/90% of segregation of waste at source and handle 40,000–45,000 MT of MSW each day with a reduction in urban landfill emission of approx. 1,000MT of CO_2 or more per annum.

The main beneficiaries of the project are individuals from schools, work placements and waste pickers who are involved in informal activities. The latter are mostly women, who are often unskilled and unaware of personal health and environmental issues related to their work. The waste pickers were key stakeholders for the project, first, to obtain the recycled materials useful to produce recycled products, and second, to encourage sustainable behaviors. However the initial challenge was to increase public awareness and train people to be highly-skilled in recycling paper and textiles products to create a sustainable alternative to exploitation and unstable incomes. The second challenge was ensuring that the project had sustainability and creation of an established business model during the implementation phase. In fact, the idea was to help untrained women to start a new business so that they would become self-sustained and independent after the project's completion. However, there was limited availability of markets and space to sell artisanal products, as well as a shortage of new products and a lack of creative design, so the businesses still have to rely on external funds which makes it difficult to launch current businesses on a broader level. As a result, the project needs to train more women to become so-called 'master trainers': women who are responsible, not just to collect paper and textiles waste but also to design and create attractive products to be sold during exhibitions (one of the main means of profit). Furthermore, the initiative had to create standardised recycling techniques that were absent in the market, in order to help these informal waste pickers in their daily collection and production of recycled goods. Actual sustainability and replicability can only be achieved when there is a sufficient number of master trainers, and when market availability is spread and policy interventions are integrated, so as to create a more stable market. One further crucial aspect is the need to engage more with policymakers in order to strength the position of waste pickers and regulate the market for waste separation and treatment. Such efforts have already been implemented and followed, but the impact needs to be further developed.

From the initial proposal, the project was able to follow and respect most of its activities and milestones, reaching different individuals and stakeholders. The project was successful in creating small businesses that could formalise the work of several waste pickers who often are working in informal activities with unstable incomes and are vulnerable to exploitation. Waste pickers who are working full-time receive 4,000 Rs per month, whereas those working from home rely on piecework payment per product and receive 100–200 Rs per day. This is more stable income compared to an average of 150Rs in a day earned before. It also helped in formalising the informal waste pickers as small entrepreneurs and assisted them in obtaining official IDs and respective benefits. The initiative aims to expand production for higher returns, but the project needs to help these new small businesses to be self-sustained without completely depending on external (or even SAFE) funds (e.g. World Bank or 10YFP). One way

might be to create more stable partnerships with local organisations. The project also needs to look at establishing a solid business model, and find new market channels to spread the initiative, as well as establish more collection routes to improve production and collection.

Training was completed and thanks to the initiative, 1,340 women from Kolkata and Dhaka completed the first training session. A total of 820 successfully completed the advanced training session, joining the bank as a 'Join Liability Group' for entrepreneurship development which is recognized as a micro, small and medium enterprise (MSME). The awareness campaigns also achieved good results for SLE's purpose to promote sustainable lifestyles, disseminate sustainable behaviours and to possibly integrate sustainable teaching as part of the school curriculum. There were 46 educational institutes (around 1,500 students) and 46 agencies where spread awareness and knowledge was spread, giving opportunities to students to broad their understanding of environmental issues and climate change impacts. There is good potential to scale up the project, thanks to the diverse nature of the stakeholders involved and also thanks to SAFE's previous experiences in similar projects that could help to implement the effects of the intervention.

Women completing advanced training and joined the Join Liability Group	820 women
Paper recycled	14,350 kg/year
GHG emissions reduction through reducing virgin material use and saving fuel to carry waste	19,19 tCO_2e/year
Textile recycled	255,816 kg/year
GHG emissions reduction through reducing textile waste	1,536 tCO_2e/year

Feed People Not Landfills

Forum Air Malaysia

The project "Feed People Not Landfills" aimed to review and improve current food waste management strategies through the development of supporting tools and materials to help households, schools and food service operators cut down on food waste. A module of "Farm to Table – Responsible Food Waste Management" will be incorporated into food and beverage, and hospitality course modules with progress being measured through a comparison of before and after greenhouse gas (GHG) emissions.

The project was implemented by Forum Air Malaysia (FAM), a non-profit organisation established in 2008 to assist the Malaysian Water Services Industry Commission or SPAN to address consumer issues related to water supply and sanitation services. FAM became interested in the issue of food waste as they saw leachate pollution caused by food waste in landfills becoming an increasing cause of water pollution. FAM worked with the Ministry of Housing, Local Government and Urban Well-being, Ministry of Education and Local Government and Ministry of Health (Food Safety and Quality Division), as well as with state capital local councils and other stakeholders to implement training and oversee activities.

With a population of around 31 million, it is estimated that Malaysia generates about 36,000 tonnes of solid waste a day[1]. About 95% of the solid waste generated is disposed in landfills[2], of which between 80% and 95% are unsanitary landfills with many having reached their maximum capacity[3]. Solid Waste Corporation (SWC), Malaysia estimates that food waste comprises 45% of solid waste generated, making a total of 15,000 tonnes of food waste generated each day. As much as 20%, or 3,000 tonnes, of this food waste was avoidable. Avoidable food waste is not only a solid waste management issue, but also generates additional stress on agricultural land by creating an environmentally unsustainable demand for food leading to excessive use of pesticides, fertilisers and water resources, leading to depletion of water resources and a steady erosion of the fertility of the soil over the long term. In addition to this domestic issue, Malaysia also contributes to environmental impacts from agriculture through importing between RM 35 billion and RM 40 billion worth of food each year. Food waste also weighs on household budgets, with 25% of an average Malaysian's income spent on food and beverages[4].

Such food waste does not only represent a waste of resources, but is also a significant source of pollution. In addition to GHGs emitted through the production of excess food, food waste disposed in unsanitary landfills leads to methane emissions, a potent GHG that is a key contributor to climate change. Moreover, over 70% of landfills are located less than 100m from rivers, leading rivers to be polluted by landfill leachate, adding to the on-going problem of water contamination in Malaysia with an increasing number of rivers being classified as polluted.

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1 http://www.nst.com.my/news/2016/03/135395/3000-tonnes-month-why-are-malaysians-wasting-so-much-food
2 Municipal Solid Waste Management and Potential Revenue from Recycling in Malaysia; Anwar Johari, Habib Alkali, Haslenda Hashim, Saeed. Ahmed & Ramli Mat; Faculty of Chemical Engineering, Universiti Teknologi Malaysia, 81310 UTM Skudai, Johor Bahru, Malaysia; Universiti Teknologi Malaysia; Published: June 25, 2014
3 Malaysia's stand on municipal solid waste conversion to energy: A review; Alireza Fazeli et al (December 2015)
4 Research shows Malaysians waste enough to feed millions daily (http://www.thestar.com.my/news/nation/2016/05/31/food-and-money-down-the-drain-research-shows-malaysians-waste-enough-to-feed-millions-daily/)

In response to this problem, Malaysia has established a number of policies and supporting regulations, which are implemented by government agencies. Solid waste in Malaysia is regulated by the Solid Waste Management and Public Cleansing Corporation (SWCorp Malaysia) which was established to complement and ensure the successful implementation of the National Solid Waste Management Policy. In general, the policy aims to provide a comprehensive, integrated, cost-effective, and sustainable solid waste management system in line with society's demand for environmental conservation and public well-being.

SWCorp has developed brochures such as Value Food, No Waste initiatives and promoted the Takakura food waste composting programmes among the general public to address problems with excessive food waste generation6. In addition, SWCorp already sells Takakura composting kits and also distributes them to those attending its food waste management talks to communities. According to SWCorp, a reduction in avoidable food waste could lead to an increase in recycling rates and extend the useful life of landfills. However, there is still a lack of information and tools for households, schools and food service operators to cut down on food waste. This project aimed to fill this gap by reviewing current approaches and developing necessary tools. In addition the project worked directly with households and food service operators to reduce food waste and help them understand the issues involved, as well as looking to raise awareness and capacity through working with schools and incorporating food waste management into Food and Beverage, and Hospitality course modules.

To address these challenges, the project undertook the following activities:

- Review of current food waste management strategies and identification of implementation strategies
- Development of supporting tools and materials
- Workshops and activities to increase the responsible preparation, consumption and waste management of food among households, schools and food service operators
- Development of module "Farm to Table – Responsible Food Waste Management", that was developed in partnership with the University Kebangsan Malaysia, Universiti Teknologi Mara, and Politeknik Malaysia

Activities kicked off with a workshop held in April 2017 in order to introduce the project, achieve buy-in from key stakeholders, and to understand further the current situation regarding food waste and management. Over 40 attendees participated in the workshop, including representatives from the Ministries of Health and Education; World Wildlife Fund (WWF) Malaysia; Malaysian Associates of Hotel Owners (MAHO); and non-governmental organisations including the Federation of Malaysian Consumer Association (FOMCA), National Consumer Complaints Centre (NCCC), ERA Consumer Malaysia, Consumer Research and Resource Centre (CRRC), Water and Energy Consumer Association of Malaysia (WECAM) and reporters from Bernama and Harian Metro. The day-long workshop included speakers from the Solid Waste Management and Public Cleansing Corporation (SWCorp Malaysia), the Malaysian Agricultural Research and Development Institute (MARDI), the University of Malaya (UM), and Petaling Jaya City Council (MBPJ). The discussion and presentations from the workshop showed that there are currently a number of food waste management activities on-going within the country, attacking the issue from a variety of angles, including working to reduce food loss and waste on the supply chain, zero waste campaigns at universities, community based work, and also at the policy level through national government action. Key to food waste management is waste separation at source, with public involvement and awareness being instrumental to this effort. Following the opening workshop, a micro-site was established by FAM in order to further publicise the project and function as a record of its progress and achievements.

Following the national workshop, the project undertook a nationwide awareness-raising campaign. The project visited eight states in Malaysia (Sabah, Sarawak, Malacca, Selangor, Kedah, Johor, Pulau Pinang, and Pahang), conducting workshops for public schools and local households, with a total of 400 students and 400 households being made aware of food waste management. The workshops explained food waste management issues to students and teachers in terms of both the environmental and economic cost. In addition, food service operators registered under the food hygiene recognition programme run by the Ministry of Health were invited to join training on the reduction of food waste. Over 300 food service operators in total received the training across the eight locations with 27 agreeing to monitor reductions in their food waste.

Schools, households and food service operators were encouraged to undertake activities to reduce food waste, with eight schools, 32 households and 27 food service operators ultimately participating. In order to measure the progress of the schools, baseline measurements were taken at participating schools, and progress was monitored over time. Following the end of activities, the amount of food waste reduced and the associated reduction in GHG emissions were calculated. In total the amount of food waste reduced by the schools over three months was 135.28kg, with a two-thirds reduction in associated GHG emissions. In the households (community) and the food service providers, 20.65kg and 63kg were reduced respectively with emissions from food waste in households being halved, and those of food service providers reducing by a third. Given the short time frame of the project, this was a significant achievement and demonstrated the potential for emissions reduction and food waste, if activities can be longer term and scaled further.

These efforts were supplemented by the development of "Farm to Table – Responsible Food Waste Management", a module that was developed in partnership with the University Kebangsan Malaysia, Universiti Teknologi Mara, and Politeknik Malaysia. It was further boosted by a Letter of Support from the Ministry of Higher Education, underlining the value of the module.

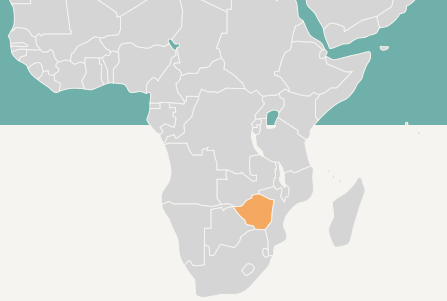
The project has shown the strong potential for the involvement of schools, households and food operators in implementing food waste reduction measures. Despite the short timeline of the project, the participating schools, households, and food service operators were able to make substantial reductions in food waste. This shows that awareness-raising and a structured approach to food waste management have the potential to lead to significant changes over a short period of time.

The project has greatly benefitted from the assistance of the national and local governments in implementing the activities. The government can be very supportive in identifying key stakeholders and providing technical advice and other assistance but still there should be an organisation like FAM acting as a bridge for all these stakeholders to lead the project. This is because they tend to work in silo and sometimes their roles can even be redundant.

In addition, for schools there should be an organisation or a body that can drive the food waste management programme because it is understood that teachers and the management have their own work to do. When schools were approached for this programme, it was realised that the canteen or café itself is a culprit for food waste. After the programme, there was a reduction of food waste in school's canteen. In addition, schools communicated with the local authority and asked them to collect the food waste as it is the local authority who carries out composting from the food waste.

For next year's programme (2020), FAM are planning to focus on four communities in Kuala Lumpur and Selangor, looking to focus on lower income groups. FAM will educate these groups on how to reduce food waste and how to carry out composting for unavoidable food waste so that that waste will not dumped directly into landfills. These four communities are selected as locations nearby the project office, making it easier to monitor them closely. FAM hopes this programme could be sustained thereby generating income for the communities.

Food waste reduced in 8 schools	135.28kg/day (206.28kg before and 71kg after the action)
Food waste reduced in 32 households	20.65kg/day (38.55kg before and 16.9kg after the action)
Food waste reduced in 27 food service providers	63kg/day (160kg before and 97kg after the action)
GHG emissions reduction through food waste reduction	438.73 kgCO_2e/day



Sustainable Lifestyles among Rural Families in Zimbabwe: Small-scale Conservation Farming to Change Lifestyles in Africa and Beyond

Development Aid from People to People (DAPP)

The agriculture sector in Zimbabwe has been on a decline in productivity due to variations of rainfall and temperatures, frequent extreme weather events, poor infrastructure, and limited access to support services and reliable markets, among other factors.

Development Aid from People to People Zimbabwe (DAPP) has been working with small-scale farmers in the country through its Farmers' Club Programme model since 1996. The Farmers' Clubs are self-supportive groups comprising small-scale agricultural producers. The farmers develop sustainable agriculture and organisational skills through participating in trials and training on production and marketing, which reduces their vulnerability and enhances their adaptive ability.

Building on the experiences of the Farmers' Clubs of the past 20 years, DAPP promoted sustainable farming, living, adaptation and mitigation practices to climate change among 2,000 farmers in the rural Gutu and Mutasa districts of Zimbabwe. The project formed eight Farmers' Clubs and carried out training on conservation agriculture, diversification incorporating high value and climate-resilient crops as well as agroforestry. It also provided trainings on entrepreneurship and market literacy, as well as on nutrition and healthy diets. For the sake of effective training and adoption of sustainable production, the project established model fields, gardens, small-scale irrigation systems, and planted trees.

Over the last decade, Zimbabwe has experienced temperature variations, while rainfall is increasingly unpredictable. Extreme weather events – tropical cyclones and droughts – have also become more frequent and intense. These changing and unpredictable conditions, combined with warming trends, have affected Zimbabwe's agricultural production. Farmers – who represent approximately 62% of the total population and the majority of whom are smallholders – face immense challenges. The agriculture sector (crop and livestock) has been on a decline in productivity due mainly, but not limited to: (i) limited access to agricultural support services, reliable markets, and inputs; (ii) post-harvest losses; (iii) a lack of value addition; and (iv) an unstable water supply. As a result, many rural families face tremendous difficulties: the project's baseline survey revealed 62% of the participant families lived on an income of below two US dollars a day.

Rural households must become more resilient. They need to build their capacities to manage their farmland and other natural resources to produce enough food and earn sufficient profit while coping with unstable weather and other climate-related risks. The needs of rural household members – particularly women – must also be taken into account and they must increase their participation and involvement in farm production, resource management and marketing.

DAPP has implemented community development projects using its Farmers' Club model in Zimbabwe since 1996. Farmers' Clubs organise farmers into groups of 250 farmers with one farming instructor, who provides training in conservation agriculture, agroforestry, and more. The farming instructor also facilitates the self-organisation of the farmers into smaller clubs, so that lasting structures are built during and after the project. The farmers are further

grouped into 50 members in a village with a committee of five members responsible for its running. The farmers are also trained in nutrition, health and community development. In many Farmers' Clubs, the majority of the farmers are women. Building on this model, and emphasising climate change adaptation, the project aimed to support farmers in two rural areas of Zimbabwe, Gutu and Mutasa. It intended to build their capacities of sustainable farming practices, to strengthen their household economy through better knowledge and skills of marketing their products, and to have a healthier diet through a better understanding of nutrition and sanitation.

The project organised 2,000 farmers into eight groups, aiming to help them develop climate-resilient agricultural production through the introduction of conservation agriculture. At model farm fields prepared together with DAPP, the farmers received training sessions on specific conservation agriculture skills such as weed control, pest and disease management, fertiliser application, mulching, and crop rotation. They also learned combined compost-making and manure use, harvesting, storage, calibration of herbicides and pesticides, chemical handling, and more. These techniques enabled them to reduce soil erosion, use organic fertiliser effectively, and more. The farmers applied these techniques in their families' fields.

Training sessions at the project-established model fields covered crop diversification to improve soil fertility and to produce high-value, marketable and nutritious products. The farmers piloted the production of Rapoko (finger millet) and recognised the benefits: it is easy to grow and drought resistant, so it can adapt to changing rainfall patterns. Some participants tried raising small livestock such as chickens and goats. This was beneficial, as small animals are less costly to keep than large cattle. This enabled farmers to stabilise their income throughout the year. The farmers were also encouraged to plant nitrogen-fixing trees, fruit and fodder trees, and live fencing.

The gained agricultural production skills need to be linked to improved income and livelihood options. The project thus also provided training on financial management, saving and lending, marketing, accounting, and agro-processing. The Farmers' Clubs in Gutu gained, for example, equipment to produce peanut butter which one entrepreneur processes and sells at his small shop and to shops in the city. "I used to think about moving to Harare to find a job. But now I have even created jobs here. I have one employee here in the shop, and another one at my home," he reported.

Last but not least, the project lessons on nutrition, diet diversity, sanitation, and other health issues were also provided. Farmers learned what foods they can eat and how food can be prepared differently. By the project's conclusion, more than three-quarters (85.4%) of participant families consumed three balanced meals with a minimum of five food groups a day.

The accumulation of knowledge, skills, and the experience of trying alternative methods of production and crops enabled the 2,000 participants to make their fields and crops more resistant to external shocks such as flood, drought and temperature changes. Furthermore, they acquired the knowledge to earn and stabilise income through these activities; their lifestyles therefore became more resilient.

At the beginning of the project, DAPP aimed for 50% of the 2,000 farmers to have adopted agro-ecology farming practices by the conclusion of the two-year project. In reality, 1,900 farmers (95%) were still using at least three concepts of conservation farming on an average of 100m^2 by the project's end.

It is important to note that not all of these activities went as smoothly as planned. DAPP and farmers experienced a handful of external shocks during the two years of the project. However, they learned from these unexpected events and showed flexibility to adapt to the shocks. Firstly, an unusual mid-season drought which occurred in January 2018 and continued for 25 days – which was almost twice as long as compared to other years – had a noticeable impact on some of the trial productions in the model fields. In particular, groundnuts were severely affected. In response, the project team changed some of the trials and training session schedules to minimise impacts. Secondly, economic instability since August 2018 led to inflation, which severely damaged the internal saving and lending (ISAL) groups that were formed by some of the Farmers' Club members. Most groups terminated contributions and reduced their buying power compared to the previous year. As a result, the FC in Gutu, for example, could not secure enough

money for groundnuts, which they had planned to purchase for peanut butter production. Instead, each farmer decided to use the money to buy fertilisers, seeds or household groceries. Thirdly, a cholera outbreak occurred in the capital city of Harare from August to October 2018. The outbreak did not directly hit the two areas of Gutu and Mutasa. However, it demonstrated the importance of hygienic practices such as proper handwashing (which was taught to the participant farmers.) While they were forced to face these unexpected events, the farmers grew their adaptive capacity to adjust their activities, and where possible, take advantage of the opportunities to develop more resilient livelihoods.

In fact, the farmers showed strong will not only to acquire the knowledge and skills provided by DAPP's trainers but also to learn with their peer farmers to make their actions more economically viable. For instance, Ms. O, a farmer in Mutasa, selected apiculture. She harvested 20 litres of honey, packaged in bottles, and earned USD265. Five farmers learned from her and also chose to engage in apiculture. Another female farmer in Gutu sold 200 indigenous chickens to restaurants and in the community, and was able to purchase seven goats by the project's end. Twenty-five other farmers also supplied chickens to local restaurants and supermarkets.

Farmers were also creative in the training sessions on health, sanitation and diet. Some farmers tested new recipes in pursuit of balanced nutrition. Others conducted a door-to-door campaign, emphasising the importance of handwashing after toilet use.

Last but not least, the participating farmers were proactive in reaching their achievements. In some of the dissemination workshops, farmers planned and organised the sessions themselves to showcase their agricultural produce, and demonstrated traditional and modern foods that were prepared hygienically, such as beetroot juice, soya bean bread, sadza made from rapoko, powdered corn and nut snack, and stewed chicken.

In many aspects, the results of the two-year project were much better than expected. The end-point evaluation conducted by an external consultant revealed that more than 80% of farmers had adapted agro-ecology farming practices. The increase of yields, as well as family income and savings, also exceeded the targets. Finally, the farmers' actions of soil improvement and planting resulted in the reduction of greenhouse gas (GHG) emissions by 7,332 tCO_2e/year.

This is, however, not the end of the story. The same evaluation also concluded that the increase in income and savings were not sufficient to secure the participants' household economy. Furthermore, project activities had several areas for improvement. For example, it was suggested that the farmers' capacity to record keep for conservation agriculture could be further developed. It would take a few more years to fulfill these needs. However, the fact that almost all farmers remain in the Farmers' Club and continue their creative efforts is a driving force for them to carry out further innovations.

Farmers adopted agro-ecology farming practices	About 1,600 farmers (80 % of 2,000 farmers participated)
Average yield increase for cereal production	41.9 %
GHG emissions reduction through soil improvement and planting	7,332 tCO_2e/year

Solar Energy for Low-Carbon Sustainable Lifestyles in Solak, Aygavan and Malishka rural communities in Armenia

Armenian Women for Health and Healthy Environment (AWHHE)

Armenia has no proven oil or natural gas reserves. Over 70% of electricity demand is satisfied through nuclear and thermal generation relying on imported energy. The imported natural gas and nuclear fuel are used to generate roughly 60% of its power and most of its heat. More than 130 small hydropower plants generate the remaining electricity. Armenia's dependence on imported fuels creates concerns on supply risks and security, as well as affordability problems for customers. Although Armenia is blessed with many sunny days, the country is inefficient in solar energy use, and lacks experience with low-cost environmentally friendly renewable energy technologies (e.g. solar fruit dryers, cooking stoves, water heaters, street lamps). The Armenian Women for Health and Healthy Environment (AWHHE) carried out this project to improve the social and economic situation in three target villages through the promotion of solar energy use. The project used an innovative participatory method developing and implementing local sustainable development strategies and plans with the active involvement of the different stakeholders and the public at large in local communities.

Armenia is a small country located in the Caucasian Highland with a population of about 3 million. The country had prosperous, highly developed industry in the Soviet era. However, in recent decades, society, and rural areas in particular, has been facing difficulties. Since the collapse of the Soviet Union, the economy has become stagnant, leading to fewer income opportunities. While men out-migrate in search of employment, many rural households are headed by women, and some of them live on less than USD2/day.

Furthermore, in Armenia over 70% of electricity demand depends on expensive imported energy, namely nuclear and gas generation. Energy is one of the major concerns of national security, which is putting further pressure on rural people's social and economic activities. For instance, due to high gas fees, rural schools and kindergarten have difficulty providing heated water and cooked food, and are forced to close during the winter. Some of the villages are not sufficiently equipped with street lighting, making people, particularly women and children, feel insecure in the evening.

The AWHHE identified two specific opportunities to address such challenges. Firstly, rural women could potentially have the capacity to lead the sustainable development of the communities. While it is obvious that there is gender inequality in contemporary rural societies, traditionally, Armenian women were the backbone of the communities. Rural women have always been involved in manual land cultivation, hard work of livestock and farm management, taking on additional income generation responsibilities to take care of their families. However, they do not usually take part in decision-making. Empowering women farmers in the target communities to use renewable energy will contribute to the sustainable development of their community. Rural women will gain knowledge and skills and eventually increase their community role.

Secondly, Armenia is blessed with many sunny days. The country has high potential for solar energy use. In rural societies, the potential of low-cost environmentally friendly renewable energy technologies (e.g. solar fruit dryers, cooking stoves, water heaters, street lamps) could be explored.

Taking advantage of these opportunities, and listening to the needs of three rural communities, AWHHE launched a project to support people in improving their lifestyles while cutting down on expenses and improving income generation. The project introduced **cheap and simple equipment to use solar energy**, and provided a series of training sessions so that people could make better use of the equipment, and enable them to market their products and manage their health. More specifically, solar fruit dryers, solar water heaters, and street lights powered by solar PV were introduced.

In *Aygavan* village, people are mostly engaged in horticulture, viticulture, cultivation of vegetables (pepper, eggplant, watermelon, melon, etc.), beekeeping, as well as wheat growing. The project introduced Solar Fruit Driers to 21 families.

In this village, the male population is predominantly engaged in seasonal work outside Armenia while women are left to take care of their families and also engage in income generating activities such as cattle breeding, horticulture and orchards. Traditionally, the women leave fruits to dry on a flat surface (e.g. a table) under the sun, for up to 10 days, meaning that the products are not protected from dust, insects, and birds. Some of the villagers developed fruit dryers themselves, with technologies learned from a TV programme. However, production was not very efficient and the quality of the dried fruits was not stable. The technology introduced by AWHHE is very simple – cut fruits such as apricots, apples, plums, etc., are placed into a wooden box equipped with a glass lid and a reflector on the bottom. Drying fruit takes just three sunny days, while the fruit driers made by villagers themselves needed seven days. The products stay clean and have better market value. An electric dryer can produce dried fruits in one night but in this case users have to pay expensive electricity cost. Thus, the introduced technology strikes the best balance of speed and cost, at the same time ensuring better sanitary conditions

In another village called *Solak*, high gas fees make it difficult for the local kindergarten and schools to provide heated water for kitchen use and hand washing. A solar water heater was set up on the kindergarten's rooftop which provided heated water to the kitchen. Not only did this save operation costs for the kindergarten, but also improved the working conditions of workers at the kindergarten who suffered from rough skin due to dishwashing with cold water in the winter. The children also benefited from access to warm water for hand washing in winter, which improved their education environment. This simple innovation attracted a great deal of attention – many people visited the kindergarten out of curiosity, and many neighbouring village communities considered using the system themselves.

Later, solar panels were installed upgrading the large solar fruit dryer in the Solak Women's Resource Center, which is a training and reference point for women in this and neighbouring communities. This helped the women lower production costs by using electricity generated by the solar panels during the day instead of conventional electricity, which they had to use at night. The kindergarten and the Women's Resource Center sell the surplus energy produced by the solar panels to the community electricity grid, which helps reduce operational costs.

The third village, *Malishka,* is a large community on the hillside. Due to its location, many areas of the village including the main street become dark quickly, causing security and safety concerns among the villagers. Women and children are reluctant to go out in the evening, making it difficult for them to participate in social and economic activities.

Street lights powered by Solar-PV were installed, improving street conditions by lighting up the central part of the village, which is used as gathering point and is the location of all-important community services such as school, administration, health centre, post office, and market. The electricity was also provided to the community library and sports school, which can now be opened in the evenings. Any surplus energy is sold to community electricity grid.

Four families in the village also introduced solar fruit driers following experience exchange meetings with other villages.

Through these activities, AWHHE envisaged that the project could strengthen the target communities by providing them with modern mechanisms for solar energy use, as well as opportunities to enhance local initiatives for improving quality of life and the environment. All four aspects of sustainability were important in this project: the environmental benefits due to use of solar energy resulted in economic, social and cultural benefits for the communities.

As is the case with most of the projects working with people, this project found several challenges of which AWHHE were not aware at the beginning. However, these challenges provided AWHHE and its partners with opportunities to carefully explore better technologies and more effective ways of engagement.

- **Technical Challenge** – The project had a technical challenge. The project originally planned to install solar ovens in households, schools and at the kindergarten to help provide healthier foods to families and children at low cost. However, this turned out to be difficult. Solar cookers require cooking to be done outdoors – which is not practical in the winter time. AWHHE discussed with the SLE Coordination Desk and decided to give up the plan. Instead, additional water heaters and solar fruit dryers were installed. The solar panels provided power to operate the large fruit drier in the Women's Center in *Solak* and this facilitated active engagement in the training provided.
- **Collaboration** – Another challenge was building a trusting and productive relationship. AWHHE found that local governments and communities were not very proactive in introducing new technology at first. Coordination with local authorities was the first hurdle in those villages where AWHHE had not previously worked. Similarly, people were rather reluctant in applying new technology or engaging in new economic activities.

The AWHHE team persevered in building a relationship with community members and local governments. The project **collaborated with those people playing key roles in networking with community members**. For instance, in *Solak*, the woman leading the Women's Resource Centre guided the training of the solar fruit dryers, inviting villagers and people from neighbouring villages. The installation of the solar fruit dryer at the Women's Resource Centre enabled the people to pay more attention to the project and explore the potential of healthy food-making at a lower cost, in addition to earning an income through the activity. The training covered setting up and operation of the fruit drier, as well as explaining nutritional aspects. While dried fruits are gaining popularity, producers often coat fruits with sugar to make them shine. However, sugar-coated fruits cause nutrition concerns. The training shared recipes to avoid sugar while improving the quality of the fruits both in terms of their appearance and nutrition value. Pursuit of such tips at the training helped participants become active in marketing their products at the later stage of the project. The leader of the Resource Centre also went to the other villages of *Aygavan* and *Malishka* and facilitated training. Furthermore, the project team **took every opportunity to deepen the relationship with the villagers and communities**. For instance, the project team joined a sports event in the village and used the opportunity to demonstrate the benefits of solar energy. On the occasion of the 50th anniversary of the *Solak* kindergarten, the project presented an inflatable swimming pool so that children can enjoy water activities outside in the warm water.

Through training and demonstration activities, people examined the benefits of new technologies or new economic activities themselves. This made them more proactive in taking opportunities and also proposing better ways of utilising technologies. For instance, a water heater was installed in school kitchens and supported workers cooking school meals in *Solak*. The water heater benefited the workers' health and contributed to a reduction in energy cost, leading to shorter days of closure. The warm swimming pool set up at the kindergarten encouraged more parents to send their children there. Local governments also provided many ideas. The mayor of *Malishka* proposed the best location to install street lighting to enable people to feel more secure about going out in the evening and he also encouraged them to participate in social activities. In *Aygavan*, the farmers used methods to dry vegetables and traditional herbs, and exchanged drying and cooking recipes.

Throughout the two years of implementation, AWHHE and its partners continuously learned from what was happening on the ground, exploring better ways of using technologies and engaging in collaboration. This resulted in the following achievements.

Firstly, the project activities **reduced costs** at the kindergarten and in households; there was income generation through the production and sales of dry fruits; more participation at the kindergarten for a longer season; and engagement in community activities for longer hours. The project also led to **a reduction in green house gas** emissions.

However, more important achievements are visible in the way people – including the AWHHE team, partnering community leaders and schools, and participating villagers – think and act. Several episodes illustrate this point. In most of the families, it is women who handled the fruit driers. However, in one of the participant families in *Aygavan*, a woman was seriously injured and was unavailable when AWHHE planned a visit to check the status of the fruit drier. Her husband became worried that their fruit drier would be taken away if they could not show that they were using it well when they were monitored. So he took over arrangements for everything before the visit. In such a manner, the participants developed their sense of ownership. At a later stage of the project, *Aygavan* villagers organised workshops on solar dried fruit production, inviting people from the neighbouring villages. They also contacted shops in the capital city of Yerevan to market their products by themselves.

In *Malishka*, the local government promised to provide a budget for the extension of solar street lighting. In *Solak*, the government proposed various ideas to use renewable energy to improve the village economy, such as PV panels in the kindergarten, pumping for cattle farming, and street lighting. In other words, the project was an opportunity to **work with people to proactively explore various potentials for their socioeconomic actions**. The experience of creating these activities through the interaction of the participants – local people and leaders, school teachers, government, and the private sector - will leave a legacy for further co-creation toward better communities and living.

Continuous efforts of learning enabled the AWHHE team and the project participants to take deeper consideration of what they were working on. Their project was not just about mitigating environmental impacts or economic difficulty. They collaborated in empowering people to proactively exchange and learn from each other on technologies, health, marketing, etc., with stronger roles for women in decision-making. Identifying these kinds of impacts led them to look ahead beyond the project period.

Firstly, some of the actions taken in the project have already been included in the **extension** process. Solar fruit driers and water heaters are attracting attention from community members, and the local government will extend street lighting. Secondly, the participants are **spreading their experience.** The project developed some recommendations for communities to utilise solar energy for improved living conditions. The experience will inform other communities with similar hardships. The participants are also spreading their experiences through workshops to which they invite participants from neighbouring villages. Thirdly, and most importantly, participants are **exploring broader potentials.**

The Project organised a workshop inviting the government and civil society organisations from Armenia and the other countries. The participants were excited to listen to the experience of the project from the community representatives and started considering the potential of replicating the project in the other countries. In other words, the project inspired people from other countries or other sectors to explore possible actions. The project team also collaborated with one of the participants – the other project team supported under the SLE Programme – and launched a new project which aims to support communities and young engineers to co-create sustainable food chains.

Farm households using solar fruit driers	21 Households
GHG emissions reduction from solar fruit driers in households and Women's Resource Centre	5.81–8.43 tCO_2e/year
GHG emissions reduction from the water heating in kindergarten	0.75 tCO_2e/year
GHG emissions reduction from street lighting	3.96 tCO_2e/year

How Emerging Urban Youth can be an Engine for more Low-carbon, Sustainable Lifestyles: Beginning in Bogotá

El Bosque University

With an increasing urban middle class, one urgent challenge is to limit the ever-increasing use of resources and reduce carbon emissions while enabling decent living conditions for all in these growing cities. Such efforts will be carried out on a global scale, but should also be tailored to specific contexts in different cities. In Bogotá, the capital city of Colombia, the economy is growing 8% annually, while national growth is 1.8%. Of about 8 million citizens (as of 2016), those between 15- and 39-years old account for 43%. A better understanding of the current patterns of this population is imperative to take action to empower them to adopt more sustainable actions that allow cities to reduce their environmental impact and support Colombia to fulfill the 2030 Agenda.

The project in Colombia carried out a survey of the current patterns of living of the youth of Bogotá, and launched a communication campaign *"En Modo Acción"* (In Action Mode) that encouraged them to change their daily choices of food and mobility, with unique online and offline campaigns.

Cities are exposed to a range of threats including but not limited to the impacts of climate change and food supply to the growing population. Systematic urban planning is necessary to cope with this situation. However, at the same time, changes in the actions of businesses, communities and individuals are also key to making cities resilient to any emerging shocks and stresses. To this end, it is necessary to capture the current patterns of behaviour and lifestyles, and harness them to potential alternative ways of living that allow people to live a decent life with less impact on the environment and society. Engagement with young people is essential to this end since they account for a large part of the population in cities in Latin America, and they are the ones who will take the lead in sustainable urban development over the coming decades.

The Government of Colombia has set sustainable lifestyles as a priority in its National Low-Carbon Development Strategy, Climate Change Policies and initiatives, as well as in the National Strategy for Sustainable Consumption and Production. There is also a foundation for awareness, experiences of initiatives, and expertise on sustainable lifestyles in the city of Bogotá. However, it is still necessary to engage with youth more effectively to build on such a foundation.

The project team focused on the ways young people connect and engage through social networks. These were proven to be one of the best ways to communicate with the general public and get feedback on the information that was delivered. The combination of a virtual and a face-to-face strategy was planned as the ultimate objective was to reach as many people as possible in order to deliver information in an effective way that leads to shifting behaviour to be more sustainable and responsible.

Additionally, the project activities informed them of another important resources that they should tap into, namely, the flexible mind-set of environmental engineering students participating in the project. They brought in different and fresh ideas to deliver information to the youth and convince them that a change in consumption patterns is possible.

The project started with a scoping phase which identified the areas of living with high potential of reducing environmental impacts, initiatives to engage with young people, and the current status of living of youth in Bogotá. A study was conducted at the global level to identify the core issues of sustainable living and the options for lifestyle changes in areas such as food, mobility and housing, as well as look into a stocktaking of the methodologies for developing initiatives, and practicable and measurable actions. For example, the following initiatives on food consumption were examined: (i) diversifying food supplier and suppliers; (ii) developing networks of informal traders; (iii) systems for organising food requests or donations (food banks) for delivering information to communities; (iv) promotion of urban and peri-urban agriculture; (v) campaigns committing to use carbon footprint tools. Stakeholders and their networks in Bogotá were also studied for any potential engagement in project activities. Finally, the project conducted a survey of youth attitudes in Bogotá to determine the intervention points and practical language/media for delivering messages.

Following this, the project carried out a communication campaign, "*En Modo Acción*" (In Action Mode). The campaign delivered messages to youth through two major channels – there were 25 events where they showed up, and the social networks that attracted more than 7,000 followers by the end of the project period. To do this, the project team worked with a communication agency. The agency designed and developed "In Action Mode, Live Simple, Live Happy": POP material, as well as a logo and website. Moreover, three social networks were created as promotion and linking mechanisms. Through the different tools that social networks provide, such as contests and video formats, it has been possible to spread the message in order to reach more of the public, not only from the city of Bogotá, but to other parts of the country. Likewise, two mobile applications were developed, based on the theoretical framework of Sustainable Lifestyles. The objective of this strategy was to provide information in a striking way for young people, using different formats such as GIFs or memes to hook them and reach more people. Furthermore, the team organised a course on sustainability. A total of 23 young leaders came from different universities and professional careers to gain knowledge on issues such as environmental impacts deriving from their ways of living, and the theories behind them. They collaborated with the project by putting communication materials and channels at physical events and through online campaign to promote alternative actions in the areas of food (e.g. consumption of organic and local foods, food waste reduction) and mobility (e.g. less use of private vehicles). Edutainment contents and mobile apps were also delivered and used in several universities in Bogotá. They provided data on the environmental impacts associated with lifestyles and the actions to mitigate them in a fun, enjoyable way.

Finally, the impact of the campaign on youth behaviours was measured with a survey targeting more than 700 respondents. The team developed guidance for replicating the project model with practical tips for each phase of the scoping study, engagement, design and implementation of the campaign.

The survey of youth attitudes revealed some conditions among young people that may affect the potential of the campaign to foster the uptake of sustainable living. Firstly, it was found that young people do not often know what the environmental impacts of their actions and their lifestyle are, nor do they know any alternative actions they can take to promote sustainability. Thus, it was relevant to conduct the campaign to provide information and options for actions in an attractive manner. Secondly, adoption of sustainable behaviours unfortunately have limitations due to specific barriers such as the cost of sustainable products, and the lack of infrastructure (for example, safety conditions and roads for cyclists), among others. Thirdly, it became clear that providing information does not guarantee a change in behaviour. Young people showed skepticism about the issues and asked questions such as "Why do I have to change, if others do not?" or "Shouldn't it be the government or the companies responsible for the change?" Such understanding fed into the design and operation of the campaign "*En Modo Acción*" through the wider variety of the materials of engagement, such as the edutainment app, as well as the face-to-face events and the use of social networks.

Additionally, the use of social networks was not as easily scaled up as planned in the beginning. In this way, the project team learned about the different features of social networks and found out better ways of using them. The project discovered that Facebook and Instagram were more useful in engaging with the youth and fostering the adoption of actions, and so focused on those two platforms instead of Twitter. Media content was redesigned to fit these formats. Thus, communication kept changing through the project period.

Another difficulty was the collaboration with stakeholders, particularly with the government, although the work with stakeholders was positive overall. Since the government and its officials change frequently, the project team was forced to re-establish and maintain a partnership with them to guarantee the constant commitment of stakeholders, especially when alliances depend on only non-paid agreements.

The campaign "*En Modo Acción*" was carried out at 25 events and reached 7,000 followers on Facebook and Instagram as of project completion. The campaign continued after the official completion in December 2018, with five more events and 8,000 followers as of December 2019. However, these are not the only impacts of the project. The survey targeting youth in the evaluation phase revealed the actual changes in behaviour among the 700 respondents. Some of the tangible changes of behaviour include but are not limited to the following:

- **Moving:** The use of the private cars decreased by 50%, compared to the initial survey. This results in a 24% reduction in carbon footprint from private cars and 17% from taxis.
- **Eating:** 62% of young people decreased their meat consumption out of concern for the associated environmental impacts.
- **Purchasing of goods:** 76% have changed the way they buy goods.
- **Leisure:** 95% of young people have become more aware of the environmental impacts of their leisure activities during this year.
- **Staying home:** 99.9% of young people became more conscious in saving water and energy at home and 78% of young people began to separate their waste this year or already did.

Such results demonstrate the possibility of behaviour changes.

Given the successful campaign, the project team envisages the broader uptake of its model to engage with a larger number of young people in different contexts, in cooperation with more stakeholders including public institutes, universities and schools. The team summarised the lessons learned through the project into a guidebook entitled "What if? Replication Model". The guidebook contains a clear description of the steps to design and carry out similar campaign, with many specific tips to take at different phases of the project. For instance, the guidebook explains the importance of flexibility when making plans to fit the context of any given city at the planning phase, the careful selection of social networks for communication, and which events to participate in so as to strategically engage with the relevant partners at the implementation phase.

Participants of the events	1,000
Changes in behaviours	50 % reduction of use of private cars 62 % of youth reduced meat consumption 76 % changed ways of buying
Projected GHG emissions reduction through behavioural changes in eating	13.7 $kgCO_2e$/person/year for beef 0.17 $kgCO_2e$/person/year for pork 9.65 $kgCO_2e$/person/year for chicken 5.49 $kgCO_2e$/person/year for rice
Projected GHG emissions reduction through behavioural changes in moving	144.8 $kgCO_2e$/person/year for car use 52.35 $kgCO_2e$/person/year for taxi use 49.35 $kgCO_2e$/person/year for Uber use 5.19 $kgCO_2e$/person/year for public transportation

Better By Design

National Council for Sustainable Development of Honduras (CONADES), World Resources Forum and WRAP

In the face of the dual challenge of stimulating the economic growth needed to provide jobs, services and well-being to our citizens, and of ensuring that this growth is decoupled from environmental degradation and social inequality, we need a radical change in the way we make and consume the products and services that we rely on and that consumers increasingly demand. Changes in consumer behaviour are desired, it is also imperative to develop the capacities of the producers to adopt alternative product design leading to the drastic reduction of negative impacts, and means of communication that support consumers to select sustainable products.

The project worked alongside Latin American retailers, suppliers and policy makers, to embed sustainable, low carbon thinking into new product development. It collaborated with the manufacturers in improving their products and package design, and introducing the means of communicating reliable sustainability information. Their joint efforts created tangible outcomes of reducing the use of materials and CO_2 emissions reduction. Furthermore, their practices and the lessons learned were taken up in the development of national policy concerning plastics.

Consumer products and their value chains are responsible for over 30% of material extraction[1], 30% of greenhouse gas (GHG) emissions[2] and 90% of our water footprint[3]. Food and drink are the dominant contributors. The design stage in the product lifecycle is critical in determining sustainability, with as much as 80% of the environmental impact pre-determined at this stage[4]. If we carry on using resources at the current rate, by 2050 we will need the equivalent of more than two planets to sustain us.

In Latin America, the record on corporate sustainability has been steady to date. However, the growth remains slow according to the World Bank report (2015) due to the lack of innovation. This means that consumers in the region have limited access to sustainable consumer products.

The project team could take advantage of two specific opportunities, namely, the momentum for eco-innovation among the regional stakeholders, and the tools supporting the suppliers that were established and tested in other regions.

Governments in Latin America and the Caribbean have been active in adopting sustainable consumption and production for many years. They launched the Regional Strategy on SCP for the years between 2015 and 2022, with emphasis on the promotion of the supply and demand for sustainable products suitable for the region, and the reliable communication of sustainability information. Among these countries, the Government of Peru has enacted

1 www.materialflows.net This figure is an underestimate as it does not consider the fossil fuels required to extract, process, transport and utilise products.
2 Hertwich, E.G, and Peters, G.P. (2009) Carbon Footprint of Nations: A Global, Trade-Linked Analysis *Environmental Science & Technology* 2009 *43* (16), 6414-6420.
3 Hoekstra, A, and Mekonnen, M (2012) The Water Footprint of Humanity, *PNAS* 2012 109 (9)3232-3237 http://www.pnas.org/content/109/9/3232.full.pdf+html
4 EU Eco-Design Directive.

the regulation to promote eco-efficiency in the private and public sector. Besides, several international organisations and networks of stakeholders have been working on eco-innovation and resource efficiency, such as UNEP, and the Latin American Network of Cleaner Production Centres. The project team aimed to support and add value to the various initiatives and policies that were already introduced or were planned.

To do so, the project team of WRAP, the World Resources Forum, Thema and the LAC Footprint fully utilised the expertise they have developed in their past work. The team has supported the improvement of eco-efficiency, sustainable product design, and consumer information for small and medium sized enterprises (SMEs) mainly in Europe and North America. Their experiences bolstered the project team's work in engaging with suppliers and policymakers in achieving sustainable production of consumer goods and provision of relevant sustainability information to consumers, ultimately enabling citizens to take up sustainable ways of living.

The project started with the creation of tools. The Sustainable Product Design and Development (SPPD) toolkit included guidance notes and forms to be used during the implementation phase. SPDD was developed in collaboration with international experts on the issues of sustainable design for retailers, sustainability hotspots analysis, and Life Cycle Assessment. The Sustainable Advertisement and Consumer Campaigns (SACC) toolkit covered the actions for the Consumer Information Laboratory, and in-store experiments were also developed by international experts on the topics of sustainable communication, consumer behaviour, and social sciences. The two toolkits were translated into the Spanish language, integrating elements and local cases to suit the regional contexts.

The project team then organised a series of workshops to implement these toolkits in the partner companies. A three-day Training of Trainers (ToT) workshop was held in Lima, Peru, in November 2017. Professionals from Peru and a few surrounding countries leaned the basic theoretical background of the SPDD and SACC toolkits. the participants learned about various topics, including hotspot analysis, product visioning and sustainable design approaches, green marketing, behavioural economics, and social psychology. A two-day Retailers workshop followed this focusing on discussion and practical exercises. These workshops were not just opportunities for providing knowledge to the participants. The project team developed a user-friendly tool in an Excel file for three types of products — granola,

mortadella, and cleaner — based on lifecycle inventory data to be used by the three companies in identifying hotspots and assessing the baselines. The feedback from the workshop participants to the SPDD and SACC was welcomed by the project team who made revisions to better fit to the regional context. However, the first series of workshops in Peru revealed that it was not realistic to invite companies from the other two countries, Honduras and Nicaragua. Therefore, workshops were also held in those two countries in March 2018.

Company Union, the company participating from Peru, implemented the SPDD toolkit with support from local partners in defining the value chains of their production of granola using Andean seeds as well as their bakery products, estimating consumptions, emissions, waste generated and products delivered, and calculating the environmental indicators. As a result, Company Union adopted the recommended measures on production, and developed a prototype of new granola with eco-designed packaging. Two more companies in Honduras and Nicaragua, Delmor and Grupo MacDel, followed with additional tailored supports based on the experience in Peru. Grupo MacDel collaborated with the providers of refill bottles for their products and started a technical and economic evaluation for the full application of sustainable packaging. The SACC toolkit was also implemented. Gropo MacDel in Honduras adopted the CI-Lab and store experiment design using behavioural economics.

Additionally, the project team conducted a mapping exercise of good practices in the Latin American and Caribbean region on policies supporting sustainable value chains, as well as a gap analysis based on input from in-countries partners. The findings of these analyses enabled the team to identify the need for policy support and prepare a concept note on regulating plastic bags to support policymakers. Together with various influential partners, the team worked on assisting the formulation of legislation in the three countries. By the end of the project, Peru and Honduras developed draft regulations for the use of single-use plastics. The plastics regulation in Peru was issued in 2018. In Honduras, local regulations at municipal level to ban single-use plastics have been issued since 2018.

The project team were able to make the best use of the scientific and practical knowledge they developed through past experiences of supporting SMEs in applying eco-efficiency and Consumer Information Labs. However, putting such knowledge to use into the support of the companies in Latin America is not necessarily a smooth process. The initial toolkits of SPDD and SACC developed by international experts were generic and cases provided did not specifically reflect the contexts and needs of the companies in any given country. Thus, it became essential to obtain feedback from in-country partners to include more practical examples and cases. The feedback obtained at the ToT workshop and Retailors workshop were useful for the team in adding more specific examples on the food sector and for cleaning products in the final version of the toolkit.

The engagement with the companies turned out to be more difficult than expected. Although the project team involved the governments and a network of suppliers in Peru, Honduras and Nicaragua, the project could not smoothly engage with companies in the mid-term processes of changing product design, packaging, and advertisement and information provision. Thus, the project implementation started with companies that were already committed since its launch, and then continued to recruit more companies. By the time of project completion, CENCOSUD, the biggest supermarket chain in Peru, TOTTUS, a competing supermarket, the Ministry of Industry, Foreign Trade, and two other companies had expressed interest in participating in the project.

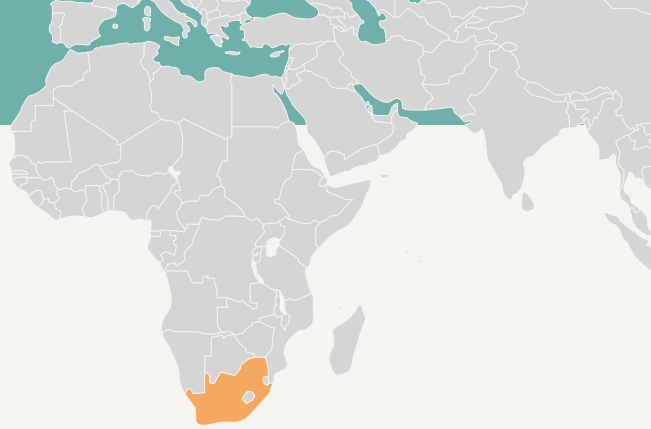
Additionally, some of the companies in Nicaragua and Honduras could not attend the workshops in Peru in 2017 due mainly to travel costs. This was regrettable considering that the workshops had good participation from companies in Peru, and the face-to-face training and discussions were valuable both for the participants and the project team. Thus, the team decided to organise workshops in both these other countries in early 2018 to support more companies there. The feedback obtained in Peru was utilised to the improved design of the sessions and materials for the subsequent workshops.

In spite of some difficulties, the project successfully produced tailored toolkits for sustainable product design and advertising, and supported companies in applying sustainable products and packaging, as well as improving the communication of sustainability information. As was mentioned earlier, the SPDD toolkit helped Company Union in Peru in the production of a granola product with increased eco-efficiency. Currently, supermarkets CENCOSUD and TOTTUS who participated in the workshops and/or were approached during the process replaced their non-recyclable bags for eco-designed bags. In case of Company Union, the new package was based on bio-based compostable material and would lead to a reduction of2.6 tons of waste to the landfill (assuming 80% of the packaging is disposed of in the composting sites, and assuming a reduction of 10 tons of CO_2per year). Furthermore, the focus group discussion conducted by the project team made clear that consumers are willing to pay up to 30% higher price for the new product. If the new package is used, the increased benefits due to the higher price and the costs saved by implementing eco-efficiency in the product chain, will allow the company to be able to cover the cost of introducing the biodegradable packaging. In 2019, the Grupo Macdel in Honduras planned to introduce sustainable refill bottles for the cleaning products. The environmental benefits of the new refill bottles are estimated at 0.65 tons reduction in CO_2per year, and an 80% reduction in waste (out of 310kg of the baseline).

Progress in policy development in the countries should also be highlighted as an achievement. The project team could reach out to policymakers in Peru supported by in-country partners. Therefore, the knowledge obtained during the project, namely, the policy gaps and best practices mapping, were utilised in creating regulations for zero waste or for control of the distribution of single-use plastics, as well as for the national SCP action plans. Out of the three countries where the project team worked, Peru and Honduras drafted regulations for controlling single-use plastics. The regulation in Peru was already approved in December 2018.

These achievements show that the Better by Design project has paved the way to spread eco-efficiency, sustainable product design and packaging, and sustainability communication to consumers, through its actions of creating tailored toolkits, supporting companies in applying them, and supporting policymakers in developing legal frameworks in support of the objectives.

Reduction of packaging send to landfill	2.6 tons in Company Union (Peru) 0.25 tons in Grupo MacDel (Honduras)
GHG emissions reduction	10 tCO_2e from Company Union (Peru) 0.65 tCO_2e from Grupo MacDel (Honduras)



Food for Us

Environmental Learning Research Centre (ELRC), Rhodes University

Food for Us is a sustainable food systems mobile phone and learning project, started in 2017 by a consortium of South African partners. The intention was to design and develop a mobile application that could help reduce on-farm food surplus, while also supporting change through learning. The initial phase was 18 months. Subsequent to the initial phase, partnerships are being built with retailers, NGOs and government initiatives to "establish surplus food processing agri-hubs and agricultural capacitation".

The issue of food waste in South Africa is critical, particularly with high levels of food insecurity; and access to affordable, nutritious food. An estimated 12 million tons of food waste is generated in South Africa annually[1]. About 50% of this waste (by mass) occurs during agricultural production, post-harvest handling and storage stages[2]. At the same time, 13 million South Africans routinely experience hunger, with malnutrition a serious concern for early childhood development[3]. This disconnect between the need for food and the food that is available for consumption but being wasted, has profound social, environmental and economic impacts.

For the farmers, losses on-farm can threaten their financial survival. The main types of food lost during post-harvest waste includes cereals (8%), roots and tubers (18%) and fruits and vegetables (9%)[4]. Most of this produce is edible; however, depending on where a grower is based, they may not have easy access to alternative markets for surplus product and instead plough this into the land, compost it or send it off for animal feed.

The distance between the food consumers and producers suggests that there must be opportunities to create social, environmental and economic value through innovative and transformative initiatives that link food producers with food consumers in South Africa, particularly those in need. By filling these through introducing the mobile application as an information sharing and matching platform, food waste in the country can be reduced and surplus food can be utilised to provide those in need with nutritious food.

The level of mobile phone usage in South Africa is growing rapidly, with a 15% increase in the number of people accessing the internet over their phones between 2016 and 2017[5], and so a mobile phone solution for trading surplus food makes sense. Data costs in South Africa, while still high, are also decreasing, enabling more people to use mobile phones. This creates opportunities for trialling and testing the use of mobile phone apps for food system innovations.

1 Oelofse, S. (2014). *Food Waste in SA – The Magnitude, Cost and Impacts*. Presented at the SAAFoST Lecture. Retrieved from http://www.saafost.org.za/Events/BRANCH_Northern/2014/Mar27/Food%20waste%20SAAFost%20Lecture.pdf.
2 von Bormann, T., de Vries, L., Jenkin, N., Tian, N., Modau, I., Pillay, P., et al. (2017). *Food loss and waste: Facts and futures: Taking steps towards a more sustainable food future*. Cape Town, South Africa: World Wide Fund for Nature South Africa.
3 StatsSA. (2018). *Investing in early childhood development is the future*. Statistics South Africa. Retrieved from http://www.statssa.gov.za/?p=10950.
4 Oelofse, S. ibid.
5 GreenCape. (2018). *Sustainable Agriculture: 2018 Market Intelligence Report*. Cape Town, South Africa: GreenCape. Retrieved from https://www.greencape.co.za/assets/Uploads/GreenCape-Sustainable-Agriculture-MIR-FINAL-WEB-24-5-2019.pdf.

The Food for Us project sought to contribute to the emergence of more sustainable food systems, and investigate how best to facilitate such systems in a developing country. The pilot project objectives included: i) to adapt and develop a fit-for-purpose mobile phone app to trade on-farm surplus produce; ii) to trial the app to link producers and buyers to enable the trade on-farm surplus produce; iii) to undertake research to understand the scale of and opportunities to reduce on-farm food loss and waste; and iv) to build the capacity of South African researchers in the fields of food waste and transformative learning.

In particular, the combination of social learning and a mobile phone app were envisaged to enable the interactions between food producers and food consumers, thereby enhancing sustainability, efficiency and inclusivity within South Africa's food system. At the core of this process is the disruption of existing value chains and the systemic elements that produce high levels of waste in the context of food insecurity.

During the development and piloting process, workshops with buyers, sellers and intermediaries were held to ensure their involvement in defining the functionality of the app. It was originally intended that the app development would adopt a 'lean start-up' approach[6] that worked through quick cycles of trialling new functionality, responding to user experiences and requests, and updating of the app.

The Food for Us pilot sites were chosen to support rural growers and often marginalised communities who needed new, low-cost ways of connecting local growers, buyers and consumers. This decision had significant implications for the level of ability that the users had in terms of the use of smartphone functionality. This in turn required higher levels of support both through face-to-face training and online access to technical staff.

Food for Us has a strong research focus, which is based on the recognition that socio-technical transformations in the food system, within a framework of just transitions, require a significant and deep understanding to develop new approaches and changes in practice. A research method based on **communities of practice** and **value creation** underpinned the project's research processes, which was to track the interactions facilitated and enabled by the app, and to establish what kind of value could be created by such a process.

6 Ries, E. (2011). The Lean Start-up: How today's entrepreneurs use continuous innovation to create radically successful businesses (1st ed). New York: Crown Business.

Through the project, the value proposition included inclusive stakeholder involvement across government, business, research institutions and local communities. The project team also learnt that key to the success of these partnerships going forward is the involvement of intermediaries situated in a local food hub who have existing relationships or mandates to work with local stakeholders operating in the food system. The above is made possible through the learning and transition processes supported by an engaged food system community of practice and networks. This helped tremendously to enable use of the app, use it as a communication platform, and manage the system for collecting and analysing information. Together these two components have the potential to support significant transitions in South Africa's food system at the local, national and international level. Within these value creation processes a number of other insights emerged. These included deepening understandings and practices related to: transitioning systems and learning; app development, networks and communities of practice; and calculating benefit.

The location of Food for Us within the Environmental Learning Research Centre at Rhodes University helped to establish the project as a research and learning programme that sought to contribute to just socio-technical transitioning in South Africa's food system. Working together with specialists in the field of app development, food systems, institutional change, and carbon emission tracking, the research and implementation teams developed insights into how niche innovations can contribute to broader systemic change.

Given the vision of the Food for Us project to lower the transaction costs between food producers with surplus food and the market's need to access affordable, nutritious food, we decided to trial the project with marginalised rural communities to test its capability to not only achieve environmental outcomes (i.e. reduced food waste and carbon emissions) but also socioeconomic outcomes that could benefit small-scale farmers, local shops and feeding schemes. These shifts had a number of implications for the pilot project, including a shift from high volumes of food surplus that are produced on large-scale commercial farms to a greater focus on market access at a local level, where food surplus is less likely or is generated in small volumes. This resulted in higher levels of support being needed relative to the amount of food surplus being traded, yet greater access to market.

Significant challenges were encountered with the development, use and updating of the app. These related to the capture and storage of information, technical capabilities of the user, the diverse and expanding functionality

requests from the users, poor access to data due to cost, and poor network coverage in some areas. After a year of learning and testing there is a far better understanding of how the app needs to be structured, developed and scaled, such as: i) the need for adequate budget to allow for flexibility in the development and adaptation of an app; ii) starting lean with key and agreed initial functionality criteria; iii) to identify a person who can act as an intermediary or champion to provide on-the-ground support, assist with training and to problem-solve. Most importantly they should be local, be trusted by and have a good understanding of the community; iv) to provide a conducive environment for people to share their experiences and learn together; v) to not underestimate the time (more than 12 months) and human resource required time to embed a new socio-technical solution e.g. training and network building; and vi) it is far easier to engage and develop a solution with a community that already has a strong network, particularly around the theme or issue, in this case food.

In addition to the application learnings, some significant learnings were generated with regards to on-farm food surplus quantities. Broad-based figures indicate that a large percentage of food is 'wasted' on farms in South Africa. However, through this project, it would suggest this wastage is occurring more on large-scale commercial farms, with little being generated at the small-scale farm level. In addition, South Africa appears to have a sophisticated secondary and tertiary market for surplus food. Also, as a project outcome we developed South African-specific food waste conversion factors to determine potential food waste savings. These included: i) emissions saved from producing food that would have been sourced elsewhere and food that would have gone to landfill, ii) water savings (blue and green*), and iii) nutritional savings (energy (kcal) and macronutrients. These South African-specific factors allow for a deeper understanding of the nexus between social, economic and environmental dimensions in sustainable food systems. They also offer a stronger case for dealing with food surplus not only as an environmental issue, but also as a social, economic and educational issue (i.e. strengthening the case for integrated sustainable development outcomes and sustainable value creation in sustainable food system work).

The pilot project of Food for Us has stimulated interest from other communities and sectors to explore the potential of a social learning-supported mobile app, or similar technical solution, and a case management system to enable sustainability transitions in a developing country context. It is an innovative example of creating shared value within and through networks and communities of practice that include a broad range of stakeholders in the food system.

The Food for Us mobile app was developed and trialled during the project to ensure that it is fit-for-purpose and meets the needs of the users; and that it adequately links growers with buyers. LEAD Associates, a project partner, developed the main structure of the app. Two consultative workshops, involving more than 130 people with buyers, sellers and intermediaries, ensured their involvement in defining the functionality of the app.

The Food for Us app was piloted at two sites focusing initially on small-scale rural and peri-urban farmers in Worcester in the Western Cape and the Raymond Mhlaba Municipality in the Eastern Cape. Through the Food for Us app, the farmers in these two areas gained opportunities for greater access to markets, thereby enhancing the value of their crops. This is an important and often marginalised component of the food system. Based on these two pilots, deeper insights into social learning and mobile phone app development have emerged that significantly strengthen our understanding of the potential to achieve 'socio-technical transitions' in South Africa's food systems.

Robust, granular data on the food waste challenge in South Africa is currently inadequate, with data obtained from ad hoc specific studies (which cannot be used for extrapolation) or based on high-level data for sub-Saharan data. Due to the small number of transactions realised through the app during the trial, it was not possible to derive adequate data and therefore useful actual savings. This was because the focus of the first phase of app use was development and maintaining stability. However, once stability was realised in the last two months of the trial, transactions increased substantially, which indicated the significant potential for savings if the app is fully realised. As such, potential environmental and nutritional savings scenarios have been derived for exponential increases in transactions for main food types traded. Four scenarios were calculated, based on the initial purchases of potatoes, onions and lettuce (see table Scenario-based estimated environmental saving).

Towards the end of the first phase of the project, the Food for Us project team met with over 50 people representing international food waste organisations, national and provincial government, academics, national and local community-based organisations as well as non-governmental organisations and municipal economic development professionals. The aim of the event, held in July 2018, was to reflect on project work in enabling a more sustainable food system, and the many challenges that this holds for just transitions to sustainability. This rich sharing of insights and potential ways forward was celebrated with a lunch produced entirely from surplus (or cherished) food that would otherwise have gone to waste.

To develop the social learning and technological components of Food for Us, it will be necessary initially to cross-subsidise the project activities and the kinds of innovation and transformation that it seeks to bring about. This will include engaging with large retailers, government departments and programmes, and international and local donors. Over the longer term, internal funding mechanisms such as subscriptions, advertising, data sales and potentially a percentage of sales could be considered and developed to support the ongoing sustainability of the app.

The Food for Us project continues to involve various emerging networks and activities for further develop this initiative and contribute to addressing the food waste issue in the country.

Scenario-based estimated environmental savings

	Average savings of food waste			
	100kg	500kg	1 ton	10 ton
Total carbon Savings ($kgCO_2e$)	154.80	774.00	1.548	15.480
Water use savings (m^3)	22.79	113.96	227.92	2,279.20
Energy savings (kcal)	63,600.00	318,000	636,000	6,36,000
Macronutrient savings (g)	16,328.00	81,640	163,280	1,632,800

11 Viet Nam

Upscale and Mainstream Green Office (GO) Lifestyles in Viet Nam

Asian Institute of Technology Center in Vietnam (AITCV)

In line with the Paris Climate Agreement 2015, the Government of Viet Nam stated its commitment of reducing greenhouse gas (GHG) emissions by 8% using domestic resources by 2030 and by up to 25% with international support. Against these targets and a background of rapid economic growth, urbanisation and a rising middle class leading to increased emissions due to consumption, the Green Office project was developed in order to target employees in their work environments by creating Green Offices (GO) which are able to reduce environmental impacts and mitigate climate change. The project had three objectives: (1) to assist service providers, manufacturers and public organisations to improve their green office lifestyles in key consumption areas such as energy, water, waste, paper, office equipment to reach an overall expected reduction of 20% of CO_2 per year; (2) to develop a Green Office Lifestyle toolkit and a GO Standards for public audience; and (3) to contribute to the development of GO certification, sustainable procurement, sustainable consumption and production policies together with sustainable lifestyle education and training in Viet Nam. The project ran in three separate cities (Hanoi, Ho Chi Minh City and Da Nang) with the ultimate goal of implementing Green Offices in 10 organisations, and building the capacity of 20 experts and 20 auditors in GO Lifestyle and GO Standards.

Viet Nam is characterised by its fast-growing economy. However, because of the lack of sustainable consumption and production, Viet Nam is suffering from increasing environmental impacts from resource usage and waste. Although sustainable consumption (SC) and lifestyles and GO model have been promoted in Viet Nam for the past decade, the pattern of SC remains at a low level of adoption on a large scale or systematic approach.

Looking at the consumption side, in Viet Nam 117,226,907 MWh of electricity is consumed every year, which is a per capita consumption of 1,306 kWh against a population of 89 million. Around 50% is used by SMEs, 4.6% by service providers and 4.1% by other services/organisations. It was calculated that a medium service office of around sixty/seventy employees would have average operating expenses of around USD13,000 per annum, with electricity usually being around USD10,000 of that amount. In terms of GHG emissions, this translated to around 82.2 tonnes of CO_2ee per year. This showed the high potential of the project to tackle climate change by reducing office consumption and use of resources.

At COP21, the Viet Nam Government stated its determined commitment to cut GHG emissions by 8% using internal resources. This has been a trigger and source of inspiration for individuals and organisations that promote sustainable low-carbon lifestyles.

With hands-on experiences from a previous project "GetGreen Vietnam (2012 – 2015)", the project team from the Asian Institute of Technology Centre in Vietnam (AITCV) recognised that office workers as a group have various characteristics to upscale SC programmes. To give some details, they have relatively stable numbers, and consist of individuals who share common cultures, core values and goals. In addition, they spend 5 days per week with their colleagues. These characteristics give a stable base for SC programmes such as GO to be successfully deployed amongst this consumer group.

There have been several similar programmes that were familiar with Vietnamese companies, including a Japanese-based programme called 5S – which stands for "SERI (SORT) – (SEITON) SET IN ORDER – SEISO (STANDARDIZE) – SEIKETSU (SUSTAIN) – (SHITSUKE) SELF-DISCIPLINE" introduced into Viet Nam in 1993. These five concepts are considered fundamental principles for a high performance working environment. Another programme was the global Green Office Certification programme by WWF which began in 2007 and led the green office movement in Viet Nam. Since then, several other certifications and labelling systems for green building have been implemented. However, most of them were for large companies, requiring high investment for reconstruction or new constructing projects. Furthermore, these types of green building certification have not included or only minimally included green end-users who will later run the building and spend their lives in there.

In short, there had been no systematic approach with clear guidlines or toolkits, nor any quantitative indicators to accurately reflect the efforts to reduce environmental impacts through behavioural change and alternative green products. Conducting a thorough analysis of the context, AITCV came up with an initiative to customise a GHG inventory tool and standard for offices in Viet Nam as well as an innovative GO programme to enable reflections of sustainability-driven behavioural changes. These all provide the circumstances for AITCV to launch its initiative "Upscale and Mainstream Green Office Lifestyles in Viet Nam".

One of the clear strengths of the project is its focus on clear activities and collaboration with different partners. One of the priorities of the initiative was to select project partners and organise a kick-off meeting to assure that everyone was aligned with the proposal. Then, the team developed **GO Lifestyle Toolkits and Standards**, with a GO Guidebook for office employees accessible to the public and/or staff in order to spread sustainable practices.

The next crucial step was to build the **capacities of GO trainers and auditors**. The project team used the GO Lifestyle Toolkit to train 20 people from the three selected locations who would then become official trainers themselves. At the same time, 10 people were trained as auditors. The trainers work with the participating organisations to create action plans for **implementing GOs** and integrate them into their policies. The auditors were responsible for **monitoring progress and carrying out evaluations** at the end of each GO programme implementation at each office.

To conclude, the project aimed to **promote policy dialogues** by using best case studies as models of best practices, developing a website and sustain social , and organising dissemination workshops to share findings and recommendations with participants from different organisations. Moreover, a dialogue workshop was also included in the delivery phase to present the GO Lifestyle Toolkit, GO standards, proposed criteria and certification process to receive comments from relevant stakeholders and policymakers.

The project team learned that recognising the main gaps before the implementation phase was fundamental to avoid future problems. Analysing policy instruments, sustainable products or technologies gaps, and understanding the management boards' willingness to implement the initiatives, were fundamental to the project. Regular communication and close collaboration with stakeholders and beneficiaries were sustained as some of the keys to great partnership and achievement of the project. In addition, it was important to **define clear roles for trainers and auditors**. Trainers and auditors worked as bridges between the project coordinator and the project beneficiaries. A trainer could organise, inspire and facilitate behavioural changes with general knowledge on environmental issues and green lifestyles. On the other hand, an auditor could provide deep technical knowledge of enviromental topics and technologies to play the dual roles of consulting on GHG reduction options and examining GO programme results. The project team worked closely with the official trainers and auditors in order to ensure the pace and quality of progress.

One of the challenges was to **find participating offices**. A strong commitment from the leaders of benefiting offices and engagement of their staff was essential. The project team opened a public call for application and received more than 60 applications. Amongst these, one outstandiing enterprise that showed strong commitment to sustainability in their business applied to join the project. However, they could not commit the time and number of staff to

implement the GO programme following the GO methodology. Thus the project board made a decision to invited a different office. In another case, a major water tank provider was willing to pay for AITCV's consulting service on GO but failed in the middle stage because of a change in their human resources assigned to the GO programme. To reduce the risk of dropping out and failure, the project decided to place commitment as the highest criteria when selecting participating offices.

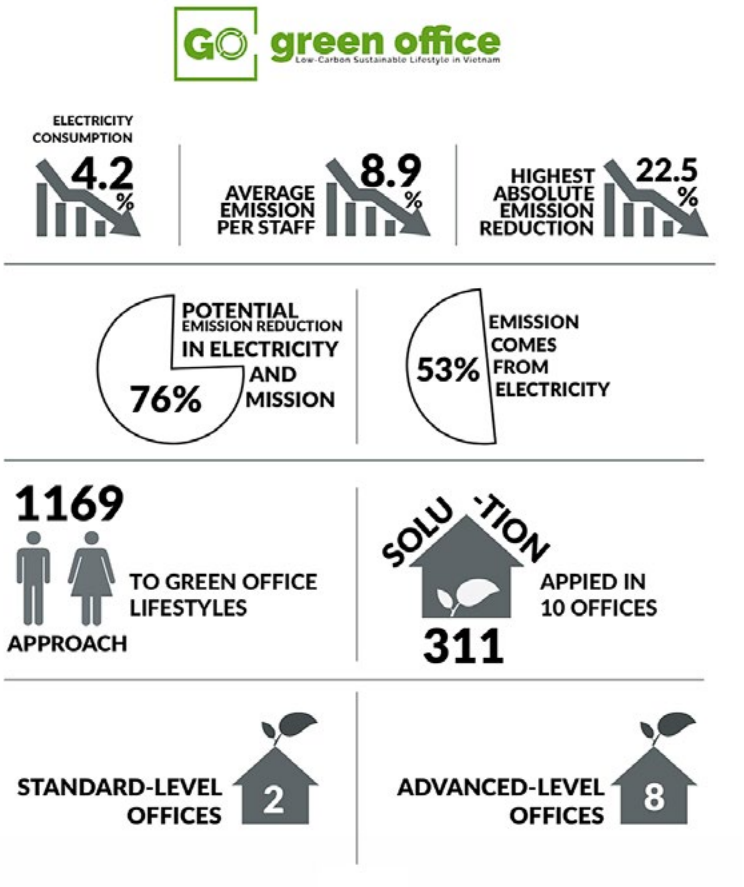
The project also learned lessons from the implementation of GO initiatives. Each participating office had its own characteristics, which required **adaptation and tailor-made consultancy of trainers and auditors** to achieve the goal of reducing GHG emissions. To illustrate, Pixelz Inc., in Hanoi had approximately 250 staff working in shifts to provide visual post-production for global brands. It was not possible for all staff to attend training at the same time and it was difficult for them to provide training for all staff. To address this, a holistic and long-term communication plan was built and weekly e-newsletters were sent to the staff containing informative and appealing contents of SC and green alternatives. Furthermore, green stickers and reminders were provided in visible spots in their offices; data related to consumption and GHG reductions were updated regularly to encourage behavioural change and sustain belief in the staff. Another case of a tailor-made GO programme was applied at the Red River Delta regional hydro - meteorological centre. A "green wave" was launched, beginning with a rearrangment of inner spaces, establishing work stations using natural light, providing bonsai for decoration, and, most importantly, giving a spark in the minds and senses of staff that something new was starting in the office. Thanks to this wave, the staff showed better engagement in the GO programme.

The project has been positively welcomed and the key milestones have been achieved. The GO Lifestyle Toolkit, instruction materials and a database for GO Lifestyle trainers were completed. The materials cover topics such as energy, water, paper, stationery and waste management. The GO Standard was also finalised to include calculation methods, monitoring, reporting and certification processes. It also includes a GHG emissions calculator. Two 3-day workshops were successful and 40 selected participants completed the training. In the second stage, 10 of them were then designated as trainers and auditors to be involved in the monitoring activities during the implementation stage. A website page was also made available to stakeholders. Overall, the methodology of GO AIT-VN (training methods and GHG inventory tooklit) turned out to be effective to cover the three most popular types of offices, which are manufactoring, service providers and public organisations. It can be applied to offices in many professtional fields such as education (university/school), electricical equipment providers, technical inspections, visual post-production and media, and meterology.

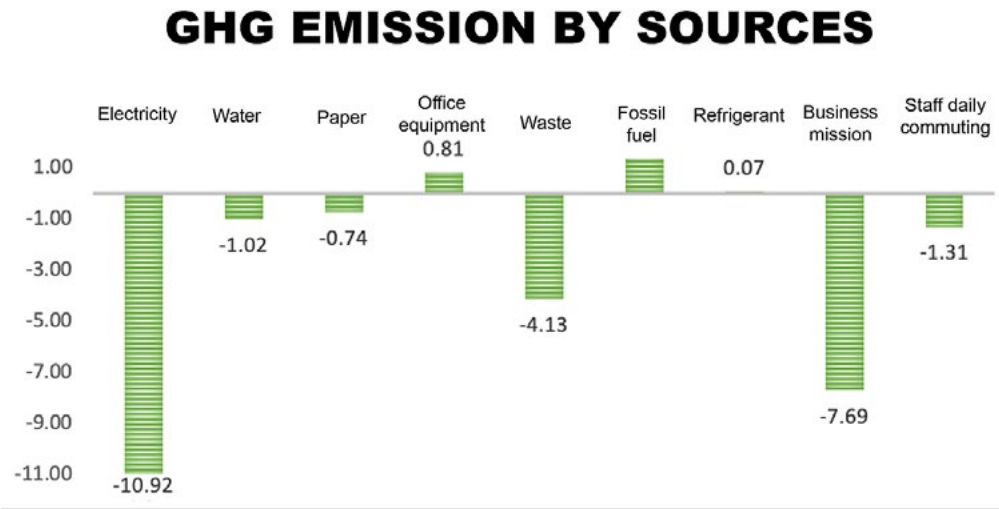
After the project was completed, the integration of GO training and GO assessment services into current training and services provided by AITCV will sustain the activities. AITCV will provide training of trainer/auditors to NGOs, NPOs, development projects and their partners/network to broaden the circle of experts and areas of the GO model. The commitment of the Government through the Ministry of Natural Resources and Environment /Vietnam Environment Administration to promote GO among public organisations will serve as an effective way to spread the concept of GO. In addition, the public will be involved through the dissemination of the GO Lifestyle Toolkit and GO best case studies. The GO service market will be also developed to become national instruments, officially supported by authorities at the national and local level.

The dialogue workshop, policy brief and recommendation report supported the replication of the project in other contexts. Workshop dissemination also helped spread the findings, reflections or future partnerships with those organisations who are interested in pursuing the same goals. The GO AIT-VN concept has been an innovative and holistic approach for any organisation that wants to improve their performance in terms of environmental, social, and economic aspects. Another plus is the transparency of the methodology, which is accessible to anyone through their social media.

Thus, the high potential of scaling up has already been shown. To fully explore the opportunity, the project team has identified some of the necessary steps, and started working on them. Firstly, a revision of the toolkit's contents and its delivery methods is necessary in order to implement audience learning and engagement. Feedback and collaboration with employees are important points for the efficacy of the initiative. Secondly, further campaigns need to be organised in order to reach a higher number of offices and official partnerships. Government and public institutions also need to be established in order to support the project.

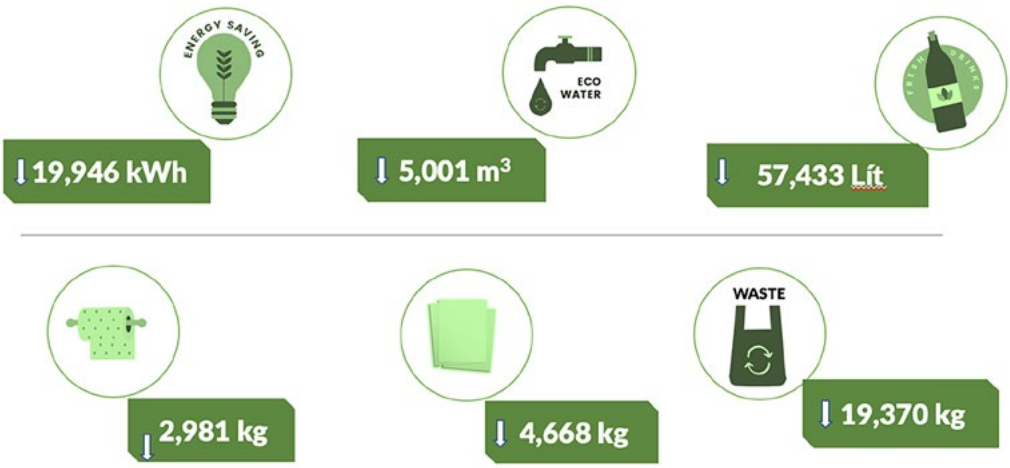


Overall results of the GO project



GHG Emssions by each sources of 1 total 10 offices implementing GO AIT-VN programs

(Unit: percentage)



Consumption reduction by domains of total 10 offices implementing GO AIT-VN programs

A New Approach to Reducing Greenhouse Gas (GHG) Emissions through Changing Lifestyles toward Water and Electricity-saving in Urban Households in Da Nang, Viet Nam

Da Nang University of Science and Technology

Da Nang City is the sixth most populated city in Viet Nam, with an area of about 1,255km^2 and a population of slightly more than 1 million as of the end of 2017. The majority of the population are living in urban areas. It is estimated that the urbanisation rate in Da Nang between 2018 and 2025 will be more than 80–90%. Da Nang has turned itself into a rapidly growing hub for transportation, services and tourism, with more than 4.5 million visitors recorded in 2015. This situation has created huge pressure on old water supply infrastructure due to the rapidly increasing demand for water, not only from local residents but also for the increasing number of tourists in recent years. It is anticipated that by 2030 the total water demand of Da Nang will grow to more than twice the amount that is currently being supplied by the city's water utility. Water demand in Da Nang could even increase fourfold within the next 10 years, thus placing a significant risk on water security for the city in the near future if no appropriate measures are taken.

Providing clean water for local people using water trucks during peak season

To address the challenges and promote water-smart living to the city residents, a team of researchers from Da Nang University of Science and Technology initiated a project to influence lifestyles and behaviours of urban residents in Da Nang through participatory research, demonstration, education and training on both passive and active measures to reducing GHG emissions through water and energy-saving. Active contributions from different sectors and stakeholders (including relevant local government departments, the water utility company, engineers, educators and local residents) have been observed during the planning and implementation phase. Learning from the actual experience, the team and their partners started paving pathways toward creating a water-smart and resilient city in the context of further economic development for Da Nang.

At present, water supply in Da Nang City has been managed and operated by Da Nang Water Supply Company (hereinafter referred to as "DAWACO"), a Water Supply Joint-Stock Company. DAWACO is now operating four water treatment plants (WTPs) throughout the city with a total capacity of about 250,000m^3/day. It is expected that the total demand for urban and adjacent rural areas will be 462,000 m^3/day by 2025, according to the approved Urban Development Program in Da Nang City for 2018 – 2030. In addition, it is forecasted that water demand per capita will increase from 120 litres/per person/day to 180 litres/per person/day in urban areas and 150 litres/per person/day by 2030, if no water-saving measures are applied.

The increased demand will be a serious challenge, both for local residents and DAWACO. Residents will suffer from an unstable supply of water, and the increased possibility of water shortages, especially during high-demand season (e.g. summer or tourist season). Hydraulic pressure at the waterworks is not strong enough in some parts of the city, so most residential and commercial buildings in Da Nang are equipped with at least one large water tank on

the rooftop to store water and adjustments are made to water pressure for daily use. With the continued increase in water demand at hotels developing along the coast, residents located in higher areas will experience low water pressure or more frequent shortages. Additionally, DAWACO and Da Nang City government are very much concerned with the rising water demand. The increased use of water, combined with the increasing trend of extreme weather conditions affected by climate change, will lead to more frequent shortages, as well as deterioration of water quality.

Local government, the water utility company and other relevant stakeholders are already concerned about water shortages, especially during the peak seasons. Thus, the local government and water utility company are now trying to meet the water demands of residents through a supply side-oriented approach. This means that instead of looking for solutions to reduce the demand, they are making efforts to seek an alternative water source or increase the capacity of existing plants, which often requires a huge investment and leads to more intensive resource consumption. Meanwhile, a preliminary survey conducted before the project launch revealed that many local residents are also aware of the necessity to save water, thus saving electricity consumption as well. However, without any tools or useful tips, they are unable to control their water usage effectively. There are no regulations and necessary guidelines for installing water and energy-saving devices in households. The devices installed in households often use a lot of water and electricity because they are purchased following the advice of local dealers. A survey of over 300 households conducted under this project has shown a huge variation in water use per capita per day (42 to 500 litres/person/day), indicating that there is great potential to reduce water use in the city. However, nothing will change unless a set of concrete and effective actions are proposed and implemented properly in order to address these challenges.

Against this backdrop, a team of researchers at the Environmental Protection Research Centre (EPRC) of Da Nang University of Science and Technology launched a project aiming to influence lifestyle decisions of urban residents through participatory research, demonstrations, and education on measures for water-saving. More specifically, the project introduced the following approaches and activities:

Demonstration of supporting measures for water-saving behaviours was introduced in 15 pilot households. The measures included passive and active measures. Passive measures meant the installation of devices to save water and energy associated with water use, such as water-saving taps, dual flush toilets, and solar water heaters. Active measures were the introduction and training of a set of practical actions such as avoiding unnecessary use of water and energy, and keeping track of daily water and energy use.

Both active and passive measures are introduced under this project

The EPRC's project team surveyed household water use to selected pilot households with diversity in family structure, economy, construction types and water use. Their water and energy usage and associated costs were monitored through surveys during the demonstration phase of the Passive and Active Supporting Measures.

Development of training courses and integration into the education curricula: Based on the results of the pilot measures, the project team developed a training course targeting university students (engineering and designing faculties), and carried out training for all relevant stakeholders such as local government, water utility company, community leaders, women unions and local residents.

Development of decision support tool: In particular, the project has successfully developed a decision support tool for the water utility company and facility managers (DAWACO), policymakers and even local residents for identifying the most effective measures available to save water usage at different levels.

In short, the project collaborated with stakeholders including educators, government and the water utility company toward developing conditions whereby local residents of Da Nang have access to necessary knowledge as well as tools to save water, supported by the policies of the government and the water utility company.

Offering a training course for engineers, designers, water practitioners and university students in the field of water and wastewater engineering at DUT

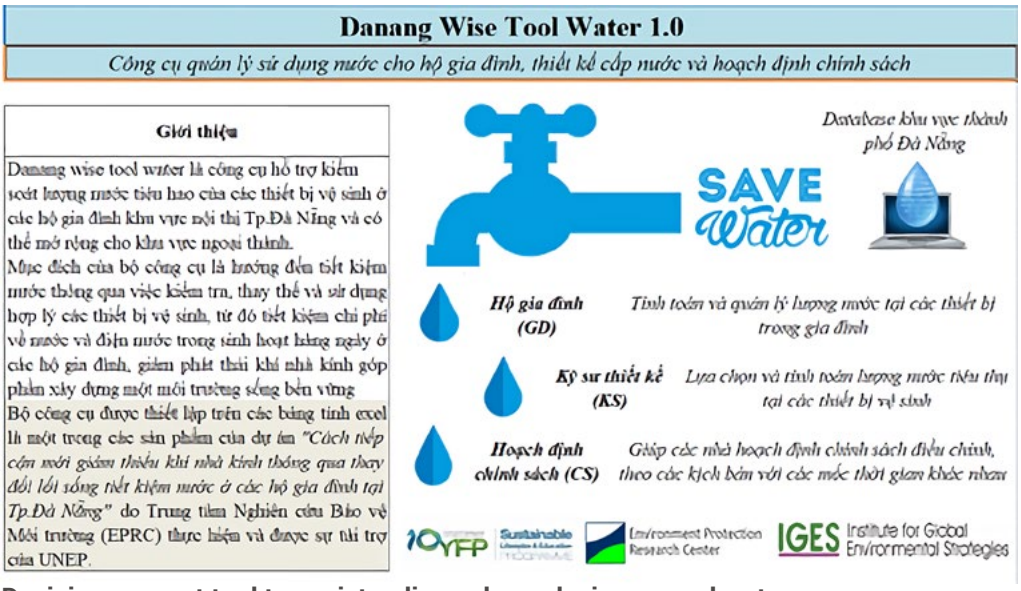
EPRC team has conducted a series of consultation meetings with relevant stakeholders throughout the project period. The discussion with the water utility (DAWACO), Da Nang City Government, university researchers and secondary and elementary school teachers, and piloted households, have helped the team to identify several key opportunities they were unaware of up to that point.

Firstly, the introduction of demand-side water-saving measures, associated with training and awareness-raising, could be more effective if the project approaches the households through a few key actors or groups. These key actors or groups could be, for instance, the Women's Union, children of elementary or pre-school age, and the teachers working with them. Secondly, although the tourism sector leads to an increasing demand for water, it was desirable that the project cooperated with this sector for the pilot. Thirdly, many stakeholders pointed out that the design of each building and the water supply system as a whole should be improved to tackle water issues from a long-term point of view, while awareness and tools for households would be effective in saving water quickly. Therefore, it would be better that demand-side actions are integrated with long-term policies and measures for the supply-side, such as the technical design, pricing, and so on.

The project team reflected these points in the implementation and added many activities that were not originally in their plan. They immediately started consultation with a kindergarten and an elementary school to explore a plan to conduct the pilot and training courses in these facilities. In the original plan, the EPRC team intended to develop and test the curriculum targeting university students majoring in civil engineering. While this curriculum could focus on the technical aspects, it was also important to provide contextual knowledge such as sustainable development, climate change, and so on. However, education and training targeting children and families would require different contents and methods. Therefore, the project put great emphasis on the expertise of the teachers in this regard. Demonstrations in the classrooms or school facilities turned out to be very effective in attracting the children's attention and leading them to talk to their parents about what they could do in their families.

They also continued discussions with DAWACO and the city government to identify the most effective forms of inputs for development of their long-term policies with regards to water management. In this context, the **Decision Support Tool** helps the utility company and the facility managers to design and introduce saving measures. The tool was developed by the EPRC with an external consultant and modified to meet the demands of these users.

In this way, through continued discussion and adaptive implementation reflecting the points that came up, the project team identified suitable partners. The EPRC team successfully formed an expanded group of partners collaborating towards the short-term targets (such as the demonstration and training in the classroom and households) and the long-term goals (such as the stable water demand and supply with improved awareness and skills of the citizens).



Decision support tool to assist policymakers, designers and water users

Based on the findings from this project, it was found that 33% households in Da Nang City have a higher level of water consumption than average, accounting for more than 50% of total supplied water. At the time of conducting the survey, due to high demand particularly during peak hours, the city is still lacking about 7,500m^3/day. Thus, in order to address this challenge, the project explored the potential of expanding the scope of water-saving lifestyles through the demonstration of water-saving measures (through both passive and active measures), development of trial education curricula, and campaigns targeting stakeholders.

It is expected that if all active and passive measures are properly implemented, total water consumption for daily household activities can decrease by 10% to 15%, particularly in households with high levels of water use. Consequently, 5,500 – 8,100 m^3/day can be saved. This amount of water can be used for addressing water shortages during peak hours in Da Nang City.

In addition, GHG emissions could be decreased up to 0.03kgCO_2/day/household (11kgCO_2/year/household), and emissions from electricity could also be decreased to 0.11kgCO_2/day/household or 40kgCO_2/year/household.

If these measures were spread across the city, the city could reduce water use by a significant amount, as well as achieving significant reductions in GHG emissions.

Furthermore, the group of partners evolved through the repeated discussion and collaborative actions will become the basis toward further scaling up of the project. The project has already carried out actions seeking further opportunities, including the training of teachers, and discussions with engineers and policymakers. What the project learned has been quickly reflected into the implementation and plans, and this will continue to be the case. For instance, the city government decided to integrate the education curriculum tested at the university into the city's programme. Additionally, the city government requested its Climate Change Coordination Office (CCCO) to start examining the long-term policy of water management. EPRC and its partners will further work on improving actions together with households, and representatives in the fields of education and communication, while also working on long-term policies and further exploring the partnership with key stakeholders, including but not limited to the Women's Union and the tourism sector. In this way, it is hoped that sustainable living with be expanded in Da Nang.

Water-saving in households	10–15 %
GHG emissions reduction through saving water use in households	40 kgCO_2e/year/household

Showing Sustainable Lifestyle Behaviour and Technologies for Energy-efficient Households in Zambia

The Copperbelt University

Despite the large demand for housing supply, detailed published information about energy use in households in Zambia does not exist. The project contributed to increase the availability of energy data, which is crucial for policymakers and experts to understand the current situation and to develop measures to encourage changes in energy-use behaviour. The project consists of three major components: i) energy user survey, case studies, and scenario building of energy-saving behaviours; ii) capacity building of university students and teachers for energy simulation; and iii) dissemination of scenarios and recommendation to stakeholders. The project team consisted of Finnish researchers and Zambian university faculty members, who together addressed multiple challenges including unavailability of data and implementation challenges in the survey and simulation. The situation of energy consumption behaviour in Zambia was revealed through a combination of literature study, questionnaire surveys, and scenario development. Two series of housing energy simulation courses were conducted at Copperbelt University (CBU), which evolved as part of the regular curriculum and research practices, in addition to another training course for professional architects in the country. The scenario simulation study and discussion among project members created opportunities to identify important factors and policy recommendations for increasing energy efficiency and changing consumer behaviour.

The scale of the housing challenge in Zambia is immense, with a new dwelling required every two minutes of each working day until 2030 to meet urban housing demand[1], i.e. 1.3 million new dwellings by 2030. In Zambia, a large part of the country does not have access to an electricity grid service. There is a huge need to expand services to as yet unserved areas, using grid or off-grid solutions. Services for households should be expanded so as to ensure that national energy production can follow the development of consumption, thereby avoiding possible problems of under capacity. While increasing the number of houses and apartments, there is a need to expand the existing electricity grids and enable access to electricity in new areas.

Although energy-related data is crucial for policymakers and experts to understand the current situation and to develop measures to change energy-use behaviour, Zambia does not have sufficient statistics and other detailed information about household energy consumption. Additionally, energy-efficient appliances or energy efficiency measures in households have neither been showcased nor disseminated to citizens, professionals or policymakers in the country.

Energy use in households has a key role in the future development of the sustainable housing infrastructure in Zambia. In 2015, 31% of households were connected to the grid, and 69% being offgrid. The electrified households (about 947 000) used 3482 GWh electricity in 2015, which is an average of 3678 kWh/per household connected to the grid. The development of technical systems should be done in an energy-efficient manner, utilising the best available affordable technologies in households and by utilising local renewables, e.g. solar power. To ensure a

1 UN-Habitat (2012) Zambia Urban Housing Sector Profile. UN-Habitat, Nairobi, Kenya.

supply of new housing in the country while minimising the increase in energy consumption, the government and other relevant organisations in Zambia should address both supply-side measures including energy management and introduction of renewable energy sources, as well as demand-side measures including the dissemination of energy-saving consumer behaviour.

To this end, the capacity of professionals who work on the design and development of energy-related policies, infrastructures and demand-side actions would be the most critical issue. In particular, young engineers and students will be able to contribute to the development of energy-saving infrastructure and culture if they are provided opportunities to develop and learn from the real-world cases of household energy use and energy-saving options, as well as scenario-based analysis of the potential impacts of these options. Furthermore, case studies based on measurements and simulations can increase the visibility of available options for energy-saving to a broad range of stakeholders including the public sector, businesses and households.

The objective of the project was envisaged to show the impact of lifestyles, behaviour and technology on household energy performance, and also to show the possibilities of energy efficient technologies to the general public. To achieve this objective, several actions were planned: i) energy user surveys, case studies and scenario building of energy-saving behaviours; ii) capacity building of university students and teachers for energy simulation; and iii) dissemination of scenarios and recommendations to stakeholders.

The first action includes a user survey on energy consumption, case studies and scenario development. It studies household energy consumption and production, associated technologies and occupant behaviour in Zambia. The possibilities for detailed energy data gathering will be studied using literature surveys, data collection from existing sources and data analysis. It also studies the lifestyle and behaviour of households and citizens using participatory approaches, e.g. interviews, focused group meetings and questionnaires. It is hoped that the studies will illustrate future scenarios of user behaviour, which have influence on energy performance of the households. The behaviour influencing on household energy use will be studied using case study simulations. The case studies show the impact of lifestyle and behaviour scenarios on household energy use. These studies and business case analyses can give recommendations to system design and selection. The related simulations will give the exact results of any savings in the form of mitigation in CO_2 emissions.

The second action includes capacity building for university teachers and students by disseminating the simulation methods and tools. The building energy simulation tools will target university students who may be thinking of a future career as a building energy designer or consultant. The simulation activities will improve the knowledge and skills of CBU teachers and students. Teaching simulation skills in simulation workshops and courses will transfer the knowledge from teachers to teachers and from teachers to students. This knowledge will then expand especially to be used by graduated students if they then later work in design and planning of household and building energy systems. The target is for all students in the CBU School of the Built Environment, who are studying building energy systems would, in future, have knowledge and skills in building energy simulations.

The dissemination activities were planned to be conducted in three levels: i) development of the knowledge and expertise of university teachers and students by implementing building system energy simulation tools and methods in university courses; ii) material for basic education of the public and youth; and iii) increasing the knowledge of decision-makers and policymakers about the economic viability of energy-saving technologies; practical case studies and business cases. The dissemination activities will improve the understanding of end users about their own energy use, and give information about the impact of their own lifestyle, selections and behaviour on energy bills.

Through this set of project actions, the expected long-term impacts of the project were improved household energy efficiency, mitigation of climate change, and more sustainable lifestyle and societies. The project aimed at showcasing the influence of lifestyle, behaviour and technology on household energy performance and the possibilities of energy-efficient technologies to the general public including business sector and policymakers. In addition, research and education capacity is increased among teachers and students.

The project team consists of partners from Zambia (CBU) and Finland (VTT Technical Research Centre). The combination of this international team and support provided by the SLE Programme's coordination desk, including gap analysis and a theory of change workshop, created opportunities for mutual learning between partners and on the local context. The project team faced some challenges throughout the implementation, namely: i) unavailability of data on local energy use behaviours; ii) implementation challenges for the household survey; iii) curriculum development on energy efficiency simulation; and iv) dissemination of key factors for improving energy efficiency.

To cover the lack of data availability, the project carried out a questionnaire survey, literature study and an energy efficiency simulation. The project team first analysed household energy use based on existing and available household energy data. However, it was not possible to obtain enough data on behavioural patterns of households related to energy use. Therefore, a questionnaire for the households was prepared to get a better overview of the status of households.

The implementation of the questionnaire survey was challenging due to environmental and social conditions including a cholera epidemic during the survey, and the fact that respondents had no previous experience of participating in this type of survey. The project team collaborated well to develop an online platform to efficiently collect and analyse the data. The user study revealed that around 70% of households were willing buy energy efficient appliances including energy savers, and about 50% were willing to pay 20% more to buy energy efficient appliances. However, about 57% of the households indicated a preference for a payback period of two years and below for their investment in energy efficient appliances. These results are an indication that the government's policy of reducing the cost of energy efficient appliances as a way of reducing energy consumption in households is likely to have the intended impact.

The experience gained by the international team in the above household energy use study has contributed to the development of a curriculum through pilot simulation courses. Two series of simulation courses have been arranged in collaboration between VTT and CBU. Lecture materials and simulation tools were initially prepared by VTT. Approximately 40 students took part in the course and field visit, and follow-up simulation courses were organised for faculty members. These pilot courses created opportunities for CBU's faculty members to incorporate energy simulation as part of the curriculum and research activities. CBU has now incorporated energy consumption simulation into the curriculum in the third year of the Bachelor of Architecture programme.

Finally, the scenario simulation study and discussion among project members created opportunities to identify important factors and policy recommendations for increasing energy efficiency and changing consumer behaviour. The scenarios developed in the project show the direction of energy consumption depending on the different household level technologies selected and how they are used. The results give an idea of the impact of the selection of the energy efficient household technology and the behavioral aspects, e.g. time of use, effect on energy consumption and energy sources. The calculation of CO_2 emissions is very much dependent on the production share between renewables and non-renewables. Households can have direct influence on their own energy savings and energy consumption. However, they cannot have a direct impact on energy production and CO_2 emissions, which are very much dependent on policy-level decisions and investment decisions in the energy sector. Discussion between the project members and the coordination desk identified several entry points for further promoting energy efficiency. Some key long-term actions were found to be incorporating energy efficiency in building codes and regulations, capacity building of policymakers, and the necessity of system-wide change and political will.

The project achieved capacity building at the local university on energy simulation, conducting analysis of energy use behaviours and scenarios, and disseminating the importance of energy efficiency and promotion measures to stakeholders.

First, the situation of energy consumption behaviour in Zambia was revealed through a combination of literature study, questionnaire survey, and scenario development. The questionnaire was carried out in three provinces and in six towns with different household types. Data from 600 households is now available and the first round

of analysis has been done. CBU continues to conduct data analysis and reports the results of all 600 households and each province separately. The simulation was conducted for an average Zambian household, and the results were summarised as a report, giving an overview of simulations of case studies showing energy use scenarios in households in Zambia.

The simulation consisted of different cases and scenarios: different household appliances, different use periods of the appliances, scenarios in population and infrastructure, and scenarios in energy production shares. The case results aim to impact on selections of the end users, e.g. making selections, if selecting traditional equipment or energy efficient equipment for the household. The analyses with the case households showed that energy consumption for lighting can be decreased by 20–43% which would reduce CO_2 emissions from household electricity use by 39,000–81,000 tCO_2 if the improvements were to be made in all households. If the appliance groups of lighting, refrigerators and TVs were to become energy-efficient, this would lower electricity consumption up to –74% of the base case situation. This would cut CO_2 emissions by 141,000 tCO_2. The calculation of the CO_2 emissions is also very much dependent on the production share between renewables (RES, e.g. hydro, bio, solar) and non-renewables (e.g. coal, gas, oil).

Second, the project organised two series of simulation courses in November 2017 and June 2018. A total of 40 students took part in the first simulation course which included two days of simulation course and a two-day field trip to visit green demo houses as a case study for the simulation courses. The second simulation course at CBU continued the work. A simulation course was also organised for lecturers so that they can include it in their curriculum. These pilot courses led to the incorporation of energy consumption simulation into the curriculum of the ESA330 course in the third year of the Bachelor of Architecture programme. The project team continues to support the arrangements of using the simulation software introduced as a pilot so that students can be taught this part of the curriculum which was not taught in the past because CBU did not have access to simulation software.

To further disseminate this topic to stakeholders, a third training session targetoing experts, was conducted in the form of a workshop with the Zambian Institute of Architects (ZIA) on 29 June 2018, attended by 28 participants. The workshop discussed the results of the project and presented an easy-to-use building energy simulation programme.

CBU plans to have two workshops to disseminate the findings of the project. The first one will be a general one for different stakeholders such as academics, professionals, NGOs, institutions in the energy sector, and civil servants. The second workshop will be for policymakers who will mostly be the politicians such as government ministers and parliamentary members. The idea behind this workshop will be to bring project findings to the attention of policymakers so that they are aware of the critical policy issues on energy efficiency in households as they develop policies for the future. Zambia is at a stage where energy policy needs to evolve quickly to guide socioeconomic development so this report is required to inform that process of policy formulation.

Energy efficiency simulation pilot lecture at CBU

Scenario-based estimation of the potential of energy saving from electricity saving in households

Potential of energy saving from lighting in households	20–43 %
CO_2 reduction from energy saving from lighting	39,000–81,000 tCO_2e
Potential of energy saving from home appliances	Up to 74 %
CO_2 reduction from energy saving from home appliances	Up to 141,000 tCO_2e

The Asia Pacific Low Carbon Lifestyles Challenge

United Nations Environment Programme Regional Office for Asia and the Pacific (UNEP/ROAP)

Sustainable lifestyles are only possible if there are products and services available to people that are low-carbon, low waste, and that meet their needs. This project aimed to explore and encourage business solutions for sustainable lifestyles, and answer the question: how can sustainable lifestyles be part of traditional economic development?

Under the 10YFP thematic programme on sustainable lifestyles and education, UNEP Regional Office for Asia and the Pacific has been implementing a project to support entrepreneurs developing innovative business solutions that enable sustainable lifestyles in Asia and the Pacific.

Economic development has come with critical environmental challenges – air pollution, plastic waste and greenhouse gas (GHG) emissions. Of the three drivers for environmental impacts – population, technology and incomes – incomes (or 'affluence') have taken over as the leading driving force for environmental impacts. Lifestyles in Asia are becoming increasing unsustainable. Material and carbon footprints per capita are growing at 7% per year. Once household income grows beyond basic needs, people have enough income for some discretionary spending. Consumers thus move into the middle-class category, which is where the bulk of Asia's population now sits.

Discretionary spending on products and services that meet people's needs can have a large or small environmental impact. According to the Max-Neef fundamental human needs framework, each individual has a need for: subsistence, protection, affection, understanding, participation, recreation (in the sense of leisure, time to reflect, or idleness), creation, identity and freedom. Only two of these needs refer to what have traditionally been referred to as needs (food and shelter, under subsistence and safety). However the remainder of the needs are considered equally important in shaping how money is spent in the search for 'satisfiers' to these needs. For example, low income households are likely to buy a television at early levels of income due to the need for leisure and connection. Another example is water – it is a subsistence need, but the way in which it is consumed also relates to other needs like recreation (consuming water on an airplane generally means it is bottled), affection (offering water bottles to international guests unsure of local water quality), or identity (certain cultures prefer to consume mineral water).

Whether people choose products and services with a high or low environmental impact to meet needs depends on the options available, as well as the social norms around how to fulfill needs, and the level of individual awareness and willingness to contribute towards sustainable development. It also depends on the extent to which barriers to sustainable consumption come into play.

Some emerging trends show signs of hope – Asia is a dynamic hub for innovation and startups. The high profile of marine litter, and climate change has sparked interest among consumers to adopt more sustainable lifestyles. While multinationals are slowly starting to provide sustainable options, some Asian startups such as Mobike (durable bike share), Mercari (peer-to-peer sharing), Grab (ride share) are radically shifting consumption patterns towards commercially viable more sustainable products and services. Inspired by this trend, this project aimed to identify and support entrepreneurs who are developing business solutions for low-carbon lifestyles.

The activities included the following:

Seed funding for young entrepreneurs to implement innovative, scalable, measurable low-carbon sustainable lifestyles startups. The project supported 12 startups in the first phase and 9 in the second phase selected through open calls.

Startup bootcamp to train young entrepreneurs about sustainability, communications, carbon footprinting and business skills.

High-quality **multimedia products** and outreach on social media to broadcast the voices of the entrepreneurs and accelerate their consumer engagement.

Measurement of **carbon footprint** and waste reductions of the green products compared to mainstream market alternatives.

One of the main challenges the project found interesting was that sustainable lifestyles have traditionally been approached from an education, academic or awareness-raising approach, so taking a business approach required new thinking and ways of implementing the project.

In addition, the project had some specific challenges.

Applicants: Sustainable lifestyles 'startups' that applied were mostly social enterprises and NGOs. The project received 180 applications at the first open call for proposals, and many of the ones already in operation were based on non-profit models rather than commercially viable solutions that could be financially sustainable. This was likely a combination of two things: (1) the distribution list for the call for applications included over 1,000 alumni of SCP programmes and events in Asia and the Pacific. Therefore the entry point was dominated by public and non-profit networks; (2) entrepreneurs passionate about environmental sustainability are less likely to be motivated by profit models. This might be due to a traditional absence of sustainability training in business schools, or a lack of business training in environmental studies. Facing this reality, the project connected with innovation networks, business school networks, and targeted specific startups that would fit the criteria.

Criteria: How should sustainable lifestyles experts select startups? Startup competitions, incubators, bootcamps, accelerators, hackathons – there are many models of ways that organisations can choose to support innovation. Until 2017, the date of the start of the competition, these types of support were largely implemented by institutions that were motivated by profit. They had clear sectoral priorities, and generally selected entrants based on their possibility to attract investment – which means they had the potential to grow financially. The priority was to follow the journey of innovative solutions for sustainable lifestyles – whether they succeed or fail – so that the project team and partners could learn how sustainable lifestyles does, and doesn't, fit in traditional market forces. For these reasons, the project reviewed the criteria for a wide range of public and privately funded startup competitions and developed the list. The revised criteria are summarised as follows:



Sustainability. The startup reduces the waste and carbon footprint of goods and services in one or more of the following fields: low-carbon mobility, waste prevention, energy efficiency.

Clear articulation. Startups must have a clear question or problem they will address plus a reasonably specific solution.

Realistic balance between aspiration and attainability. The startup should be able to generate results within 12 months, with a quick start element for the first 3 months.

Sustainability beyond the grant period. The startup should indicate how it will have lasting impact beyond the implementation period.

Measurability. Can the startup develop baseline and changed data to measure impact? e.g. energy, material use, kilometers.

Led by stakeholder in the area they want to see impact. A founder that can use their networks, role in society, experience or other to carry out the project. Not only an ideas person.

Furthermore, the project also engaged private sector experts as guest judges, in addition to the subject matter (energy, plastic, mobility) and life cycle experts.

Expertise: Need for corporate expertise. Entrepreneurs, especially new entrants, require a breadth of support to get their innovative ideas off the ground. The four workstreams covered sustainability, business, marketing, carbon footprinting. For business, the project engaged a business school (Sasin School of Sustainability and Entrepreneurship) to run the training module, but also invited guest speakers from Cupclub (coffee cup as a service), Mobike (durable bike share), PayTM (fintech platform), Covestro (inclusive business), Lazada (eCommerce). However, the entrepreneurs needed more inputs from the private sector in order to refine their business strategies for a given sector. Therefore, corporate partnerships were developed for each category (Mitsui Chemicals for plastic, Nissan for mobility, GCL power for energy). Each of the corporate partners provides the grants, business mentoring, and pro-bono technical support.

The project has gained further learning through its implementation.

Policy frameworks are critical. The project team asked each startup two questions: (1) how does your startup contribute to sustainability policy in your country? (2) what policy barriers prevent scaling of your solution? What the project team found were the following:

- Life cycle accounting showed that all products and services resulted in carbon footprint reductions of between 40–93% compared to the mainstream alternative. This makes a good argument for including innovation support in climate change mitigation policies.
- The startup businesses also tended to have additional benefits for sustainable development policy. For instance, one provided livelihoods for people with disabilities.
- Public sector and policy support can take the following forms:
    - Include sustainability criteria in national innovation agency grants.
    - Support R&D, as well as grants for commercialisation.
    - Provide tax holidays for entrepreneurs developing innovative goods and services that are sustainable, as they often need a longer initial time frame to reach a prototype (especially in hardware).
    - Create a conducive policy framework that makes a sustainable product or service financially viable. This includes: introduce full cost accounting or taxes for raw materials, bring in weight-based disposal fees, require recycling for certain items, ban or heavily discourage single use plastic, add Scope 3 carbon

emission reductions to climate finance mechanisms, lower or eliminate the cost of sustainability certification to early entrepreneurs or SMEs, ensure standards are in place for sustainable energy/materials, integrate incentives or favourable conditions for sustainable applications of ICT and other emerging fields, and ensure that innovative solutions and startups can apply to public procurement bids.

Need to involve finance and corporate sector: All major companies have received investment either from the public sector, or the private sector or both. It is not enough to have a good idea for sustainable lifestyles, if it is not financially viable. In addition, financial capital is needed at all stages of a startup. Entrepreneurs generally self-finance by bootstrapping to start with, but will normally need to move to other sources of finance quickly, such as family and friends, public and private sector grants, angel investors, bank loans, venture capital and private sector investments. Therefore representatives of these sources of finance play an important role in preparing startups to access varying types of finance.

Equally, the project learned from startups that they need partnerships with corporates in their sector. They have sectoral technical expertise, business know-how (e.g. patenting) as well as networks that can help startups fill in gaps they may have with their small teams at early stages. Large corporate institutions can in turn benefit from engagement with entrepreneurs, but learning about innovative models, potentially engaging the startups in their supply chains, and also employee retention, as professionals enjoy mentoring young entrepreneurs. In the later stage the project engaged three corporate partners – Nissan (mobility), Mitsui Chemicals (plastics) and GCL Power (energy).

Communications is not a "nice to have", it's "do or die": The topics covered by the project are of immense media and public interest. While there is high demand for 'eco-content', there is not enough supply of compelling content with high production value.

In this project, each startup's story was told by professional film makers who balanced compelling storytelling, with clear messages about innovation for sustainable consumption.

Sustainable businesses have an image problem – association with having fewer or worse options. In this project, the project associated sustainable consumption with the modern, aspirational, business-friendly branding of innovation and startups. The project raised awareness about what can be done by individuals today, in particular highlighting sustainable, circular businesses that can displace eco-intensive mainstream options.

In order to do this, the project engaged award winning filmmakers who developed 10 films of between 1-4 minutes, suited for social media, as well as generous amounts of B-roll to be used by external media. These generated over one million views, 270,000 on UN Environment channels, and 800,000 on other channels using the video content. One of the key lessons learned was the importance of developing communications outputs like B-roll that could be used by national media to develop their news content. The article about the competition was the highest viewed SCP article on the UN Environment Programme website in 2018.

Facebook

440,000 impressions
84,500 views

Twitter

373,000 impressions
30,000 views

Instagram

770,000 reach
21,500 views

Linkedim

190,000 reach
34,000 views

Weibo

410,000 impressions
90,000 views

External media

> 700,000,000 reach
803,000 views

Need to connect with innovation circles: One question the project members asked themselves throughout the project was – is it more important to raise awareness about entrepreneurship in sustainable lifestyles networks, or the raise awareness of sustainable lifestyles in innovation circles? The project team concluded that both are important with different time scales of impact. In the short term it is important to bring sustainable lifestyles knowledge to innovation networks – incubators, accelerators, and entrepreneurship networks – for two reasons. Firstly, they are accustomed to quickly developing solutions, and can tolerate risk to get started immediately. Secondly, they bring much needed skills to the domain of sustainable lifestyles which is dominated by academic or non-profit professionals. For the long term, it is worthwhile to invest in bringing business education to sustainable lifestyles circles, so that they can have a greater reach and impact with their work.

In this project the team saw a 65% increase in applicants when it shifted to advertising in innovation networks (over 300 applications vs 180 applications).

The Way Forward: There are three key recommendations going forward:

- Listen to and engage entrepreneurs and businesses in developing solutions for sustainable lifestyles. In particular, encourage innovation networks and partnerships between entrepreneurs, finance sectors and large corporates.
- Provide policy recommendations about how to facilitate business action, in particular in emerging sectors, to governments interested in supporting sustainable lifestyles.
- Engage professional communications professionals with a proven track record in developing widely viewed, compelling multimedia.

Examples of CO_2 emission reduction estimated among the 21 startups

Sustainable cooling system using earth and water and no refrigerants	8,343 $kgCO_2e$
Conversion of Two-Stroke Tuk Tuks to electric drive	11,219.7 $kgCO_2e$
Phinix Textile Recycling	7,980 $kgCO_2e$
Powering electric vehicles with solar power using blockchain technology	47,020.5 $kgCO_2e$
Smart energy meters	222,000 $kgCO_2e$ (when 100 buildings install the smart meter)
Dynamic Route Optimization for enabling crowd sourced Transit/Freight Lines	157,390.6 $kgCO_2e$
BIOTIC - BioNano Plastic to produce helmets	5,600 $kgCO_2e$
Opt out of plastic cutlery - Foodpanda	252 $kgCO_2e$
Turning waste into sustainable fuel	25,800 $kgCO_2e$
CoolAnt - Beehive inspired eco-friendly cooling solution	8.5 $kgCO_2e$
ModulusTech: Affordable, Multipurpose, Sustainable housing solutions	127,1675 $kgCO_2e$

Sustainable Lifestyles in the Workplace: Morocco and Colombia

United Nations Environment Programme and El Bosque University

The UN Environment Sustainable Lifestyles and Education (SLE) team piloted and promoted sustainable lifestyles in the workplace in Marrakesh, Morocco and Bogota, Colombia. The project researched globally sustainable lifestyles efforts that have been applied in the workplace, compared them to ongoing related initiatives in Marrakesh and Bogota, and created synergies in developing and piloting holistic sustainable lifestyles in select companies. The project built on the facilitation and technical skills of the SLE team in Paris, research and domain expertise of One Earth and implemented efforts through the on-the-ground operations and implementation teams of Mawarid, an NGO, (Marrakech), and El Bosque University (Bogota).

The project's purpose was to raise awareness at the grassroots level and work through the lens of a company to see how positive interventions could affect workers in their personal as well as professional lives. The project drew on a generic menu of options for sustainable living that was developed in the course of the project and selected several options that could be adapted to the workplace. The results highlight that there is a thirst to live more sustainably and more is needed to support the transition.

Sustainable lifestyles is an emerging area which poses challenges on various levels. Developing the technical support that the project needed – the menu of options – was required before piloting activities could be started. In addition, building awareness and engaging experts required more work as the ground work was lacking. Since project activities were dependent on these results, activity implementation needed to remain flexible to adapt to the outcome. Finally, because the project was carried out in parallel with another project in Bogota on promoting sustainable lifestyles to youth, there were synergies that developed and influenced activity direction. In both locales, there were major challenges encouraging company participation, as workers and investors were not used to considering a lifestyles lens. Another main challenge, which the issue of lifestyles faces in general, is the breadth of domains that are covered in the piloting.

Workplaces are an impactful context for collective change toward sustainable daily living, as people already have relationships with co-workers and can be supported by management to take action. Actions also lead to an improved bottom line and employee retention. By harnessing workplace assets, initiatives can become positive examples and can test what works and what doesn't in a company context.

Workplace teams can experiment advancing more sustainable living – and create 'roadmaps' based on their experiences. For example, efforts to engage staff in lighter living and promoting a lighter ecological footprint culture can inspire people to shift their lives at homes and to support others to do the same in their community. Benefits to workplaces include development of in-house sustainability expertise, improvements in organisational reputation as a sustainability leader, and increased staff retention through positively engaged employees.

Snapshot of brochure for Colombian companies: "How can the workplace help to live more sustainably, more happily, and more healthily?"

The results of the project highlighted the thirst to embrace and progress in sustainability and showed that real changes can be made. Companies were generally open to new initiatives and opportunities. Integrating easy indicators to measure progress, impacts and success would have further helped spur traction and uptake. While the menu of options was effective upfront, more support would be needed to extend an ongoing culture of change.

The project had five steps: (1) project management foundation; (2) development of a menu of options; (3) piloting lifestyle initiatives in companies (with support); (4) final events; and (5) a "Final Activity Report."

To set the substantive foundation of the project, a global scoping study of sustainable lifestyles initiatives was undertaken with an added focus on initiatives within the workplace context. Sustainable lifestyles cover food, mobility, housing and leisure (which includes tourism and consumer goods, like fashion and electronics). The scoping study also sought to identify sustainable lifestyles initiatives in workplaces. Based on this research, a filtered actionable 'menu of options' was provided for workplace contexts.

In Marrakesh, to capitalise on related ongoing projects, the focus was on the hospitality industry. In Bogota, general sustainable lifestyles scoping also included efforts companies were making. Local scoping studies fed expert-led company workshops that assisted companies to develop tailored initiatives to be piloted.

Before piloting began, workshops with companies were held to validate the scoping exercise, set piloting initiatives, outline media plans, and act as a platform to engage stakeholders for the rest of the project.

Piloting was carried out simultaneously with the development of a specific menu of options. The specific options for sustainable lifestyle opportunities in the workplace therefore partly arose from specific contexts and working with targeted companies – it was not a lateral approach.

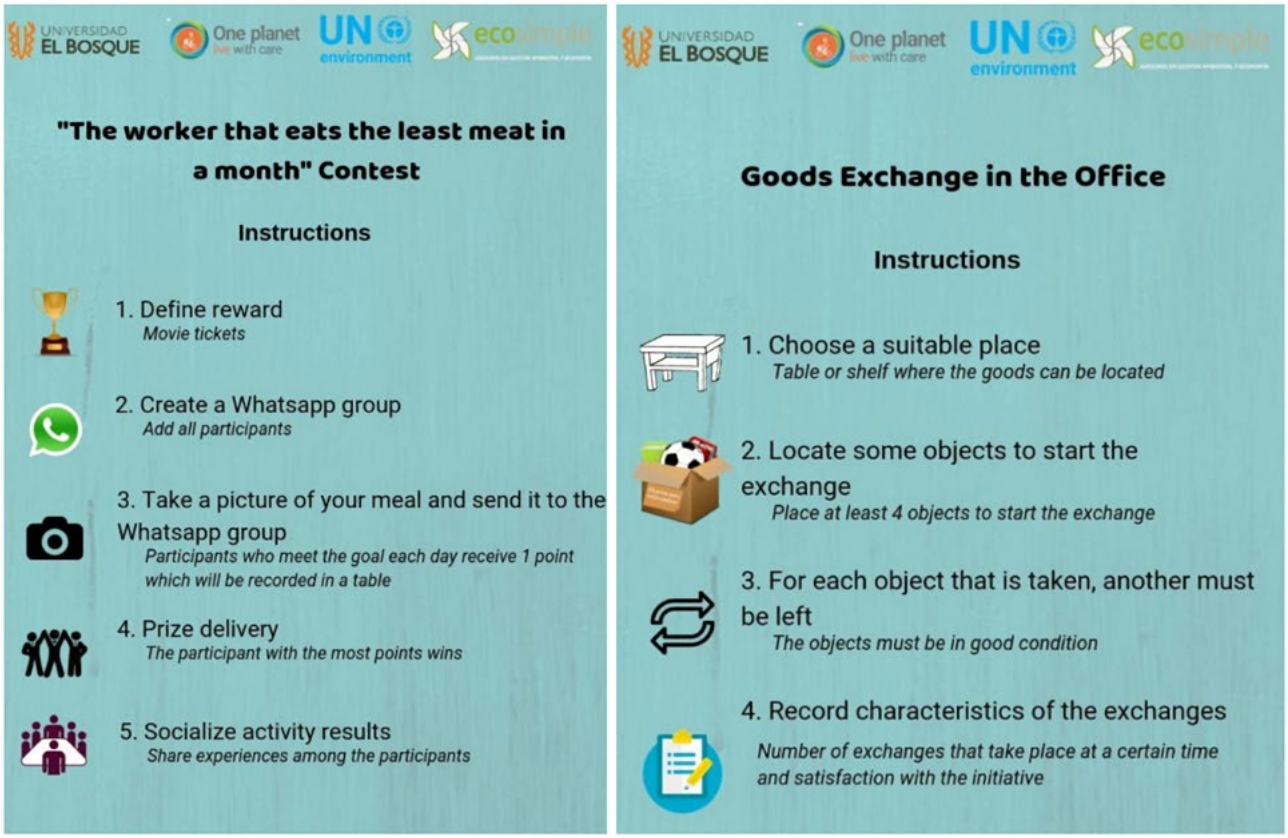
The menu of options was a methodology that companies could follow to raise awareness of sustainable lifestyles among employees and launch concrete initiatives for employees to take steps toward more sustainably lifestyles.

Poster for Marrakech hotels depicting the different sustainable lifestyle areas (food, mobility, housing, and leisure): "All for a more sustainable workplace"

Under the different sustainable lifestyles areas (food, mobility, housing, and leisure), the tailored menu of options included the following: reduction of food waste and promotion of low-carbon diets; shift of transportation modes, finding of alternatives to personal car ownership, and finding of alternatives to long distance travel; increase of the energy efficiency of the workplace; increase of the sharing, reuse and repair of goods, and promotion of zero-waste lifestyles; and encouragement of low-carbon holidays.

Drawing on this menu of options, companies piloted initiatives that sought, for example, to launch low meat consumption challenges; modify employee commutes and schedules; implement goods exchanges; and more generally to reward healthy and sustainable behaviours.

Urban employers were able to design and implement sustainable lifestyle initiatives and activities in the workplace that enhanced and reinforced citizen sustainable lifestyles, resulting in lower carbon resource use and a better quality of life for individuals. These case studies enabled a better understanding of sustainable lifestyles by providing a snapshot of sustainable lifestyles opportunities in the workplace. In addition, outlining the regional context and engaging local stakeholders created an opportunity to better inform future projects. In sum, the case studies demonstrated what could be done to encourage sustainable lifestyles in the workplace.



Examples of instructions for food and leisure initiatives at Eco Simple, Colombia

Results from the implementation of local initiatives could be analysed to enhance understanding of how sustainable lifestyles can be achieved on a local scale. These results could then be interpreted, by UN Environment, global stakeholders and local groups, and be compared to the global scoping of sustainable lifestyles and initiatives to understand how to translate global efforts into a local context and vice versa. This analysis, part of a larger comparison of initiatives at the local level with those concerned with a global scale, contributed to the identification of gaps and target areas that need more focus for enhancing the understanding and implementation of sustainable lifestyles.

The specific objectives were to: contribute to awareness and understanding of how sustainable lifestyles can be integrated in the workplace; look at how the workplace can then contribute to sustainable lifestyles; and develop and share specific environmental and lifestyle domain related interventions as well as examples of their implementation and messaging.

As noted under challenges, various aspects of the project can be described as learning by doing. Relations with partners also evolved further, bearing in mind that the project was designed with partners who understand and work in the lifestyle agenda area. Working with *new* stakeholders did produce lessons learned on how to more effectively engage. For example, in Morocco, the hospitality companies required extensive engagement to pull in and keep the project. Follow-up efforts with them would benefit from the project experience. In general, the (social) media aspects of the project provided excellent insight into how to use this media. Specifically, these centered around Facebook, Instagram, LinkedIn and Twitter. Further projects should devote resources to this in order to maximize outreach. With most new consumers coming on line (youth) and getting the majority of their information from social media, this is critical.

The purpose of the project was to raise awareness and support sustainable lifestyles in the workplace. This was done through technical support development and piloting.

To evaluate the project's impact in Colombia, a final survey was conducted, and an estimation of the potential carbon footprint reduction was developed. Through the application of alimentation initiatives, a decrease of 37.16 per capita CO_2-eq tons was projected. The average satisfaction degree of the workers for the implemented initiatives was 91%. The final analysis was delivered to each company with the aim that they continue to implement the initiatives and start to develop new ones in the different domains. The companies were willing to include this type of initiative in their strategic planning for 2019. All the companies wanted to continue implementing sustainable lifestyles initiatives in the workplace in the different domains. The results can be found in the document link above.

In Morocco, companies chose a more anecdotal piloting approach as there is a basic need to create awareness and develop capacities around sustainable lifestyles. The results can be found in the document link above.

Implementation of food and leisure initiatives at the Pearl Hotel Marrakech

(Photos ©Association Mawarid by Khalid Benfanich)

This project, with the required research, implementation, analysis, stakeholder development and engagement at different scales, further enhanced the technical understanding around lifestyles. In addition, the pivotal role that social media will play in promoting more sustainable living became apparent. Stakeholders had the opportunity to facilitate the dissemination of key messages through social media, enhancing project exposure and creating goodwill and support among the local populace. In the future, creating a 'local buzz' should be a project focus. The project was reflected in web stories for UNEP and referenced in annual reporting because of the media-friendly attractive visuals and good storytelling potential. The global scoping studies and the workplace-specific efforts were critical outputs which can be used globally. The project could have benefited from more support for quantitatively measuring action impacts. This is the case for all work in the sustainable lifestyles area.

Projected GHG emissions reduction in the 4 hotels participating in Marrakesh	37.74 tCO_2e/year
Projected GHG emissions reduction in the 4 companies participating in Bogota	0.622 tCO_2e/year

16 Thailand

Promoting Household Energy Conservation through Feedback Services and Home Energy Audit on Residential Sustainable Lifestyle Programmes

Provincial Electricity Authority

The government of Thailand developed a national long-term Energy Efficiency Plan 2015–2036 (EEP 2015) in 2014. In the EEP 2015, energy-saving targets and energy efficiency measures for the residential sector were established. The Provincial Electricity Authority (PEA), as the main distribution utility to residential customers in the country, is the key stakeholder in implementing energy efficiency measure no.4 (EE4), the Energy Efficiency Resources Standard (EERS), which is listed as one of the core compulsory strategies in EEP 2015.

EERS specifies that electricity generation and distribution companies in Thailand shall implement energy efficiency and conservation (EE&C) measures for their customers. The EERS measure targets of a 0.3% reduction in electricity consumption or equivalent to about 500 ktoe. In response to the national plan and the EERS energy savings target, PEA has initiated a project to transform the behaviour and lifestyle of residential consumers by encouraging energy-saving behaviours and the adoption of energy-efficient (EE) equipment, to reduce household electricity consumption and CO_2 emissions. Behaviour and lifestyle changes are encouraged through the provision of two types of services – an energy consumption feedback report and a home energy audit (HEA).

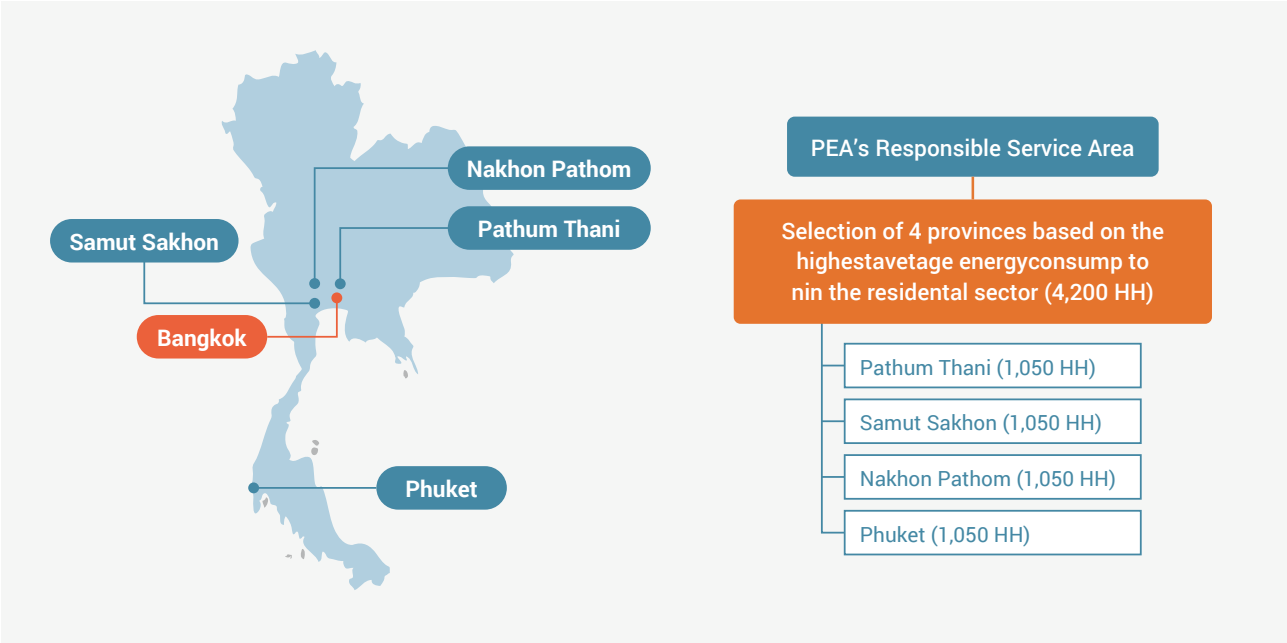
It is known that residential energy consumption in Southeast Asian countries is generally lower than that in developed countries due to the absence of heat and hot water demand. A comparison between Thailand and other developed countries (Japan, South Korea, the United Kingdom, and Germany) in terms of energy use for cooling, lighting, plug loads, and cooking shows that Thailand's household energy consumption in urban areas has already reached the same level as those developed countries. Furthermore, future improvements in living standards and urbanisation trends will further increase household energy consumption. In this regard, reducing residential energy use in Thailand has become a more critical issue than that in developed countries.

Although multiple awareness campaigns on EE&C, including subsidies for switching to energy-saving equipment, have been implemented in Thailand since 1994, it is not clear whether these **programmes have been able to motivate and sustain consumer participation in the implementation of EE&C measures since the economic benefits such as cost-saving are not significant from a consumer perspective.** Evaluation of the effectiveness of past and ongoing EE&C measures for the residential sector in Thailand has been hampered by limited data related to Thai household energy consumption and energy end-use. Data collection to date has been haphazardly carried out by different agencies, so it is of the utmost importance to establish a comprehensive energy consumption database in identifying trends in energy supply and demand for this sector.

International experience has revealed that one of the cost-effective measures to induce EE&C behavioural changes is to provide information or feedback on energy consumption, which includes a comparison with other households similar to the one owned by the homeowner. Several international studies have confirmed the energy saving impacts as a result of energy consumption feedback. In addition, home energy audits are common in Australia, Japan and the USA, but these are not a standard practice for residential facilities in Thailand. Furthermore, knowledge in this domain appears to be limited, even within PEA where in-house energy audit capacity for industrial and commercial facilities exists. Capacity building on energy auditing at the residential level and development of a service on home energy audits are therefore important for PEA in achieving its EERS goals.

Three core activities were undertaken in this project – A. Database Establishment, B. Feedback Service, and C. Home Energy Audit.

To lay the foundation for collection of household energy consumption data and establishment of an **energy consumption database** for the residential sector, a large-scale survey of household energy consumption was conducted, targeting a total of 4,200 households in four provinces of Thailand where average consumption levels were among the highest (Samut Sakhon, Nakhon Pathom, Pathum Thani, and Phuket). Findings from the survey were compiled and populated into a detailed database of household types, housing characteristics, equipment possession, etc, and this has been used as key inputs to implement a pilot project on energy consumption feedback services and home energy audits.



Target Survey Population and Sample Size

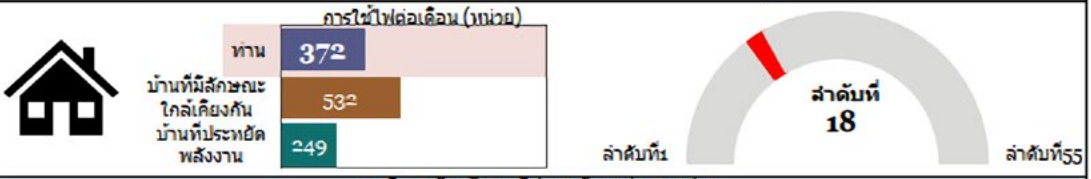
Feedback Service targeted a group of 50 pilot households. The contents of the feedback service reports were developed based on electricity consumption, appliance ownership and usage behaviour. The feedback service reports included a comparison of each selected pilot household with energy-efficient households and households with similar energy usage patterns.

Promoting Household Energy Conservation through Feedback Services and Home Energy Audit on Residential Sustainable Lifestyle Programs

5_ID10009_รายงานการใช้พลังงานคุณปิยะฉัตร ธนาดำรงค์

การใช้ไฟต่อเดือน (หน่วย)

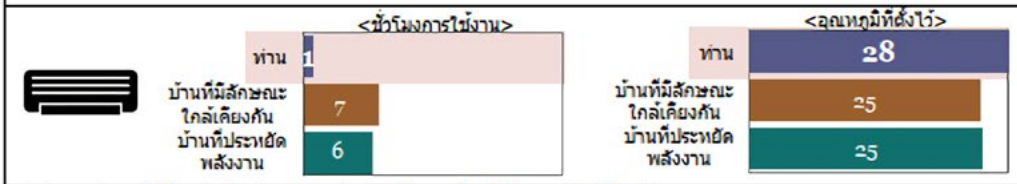
- ✔ การใช้ไฟรายเดือนของบ้านท่าน น้อย กว่าบ้านที่มีลักษณะใกล้เคียงกันอยู่30%
- ✔ การใช้ไฟของบ้านท่านอยู่ลำดับที่ 18 ถ้าเทียบกับบ้านที่มีลักษณะใกล้เคียงกัน (จำนวนบ้านที่มีลักษณะใกล้เคียงกัน 55 บ้าน)
- ✔ ค่าไฟรายเดือนของบ้านท่าน มาก กว่าบ้านที่ประหยัดพลังงานในกลุ่มบ้านที่ใกล้เคียงกับท่านประมาณ520บาท



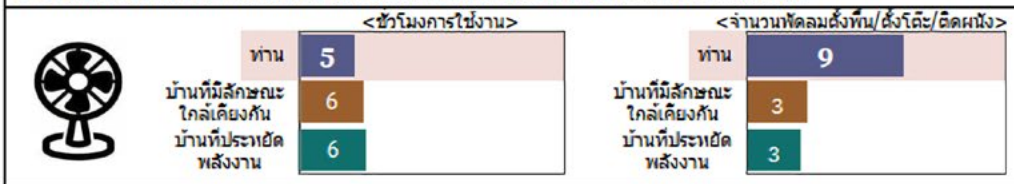
<เครื่องใช้ไฟฟ้าใดที่ท่านใช้โดยส่วนใหญ่?>

หมายเหตุ: เครื่องใช้ไฟฟ้าที่แสดงด้านล่างนี้ เป็นอุปกรณ์ที่ท่านใช้เป็นประจำ

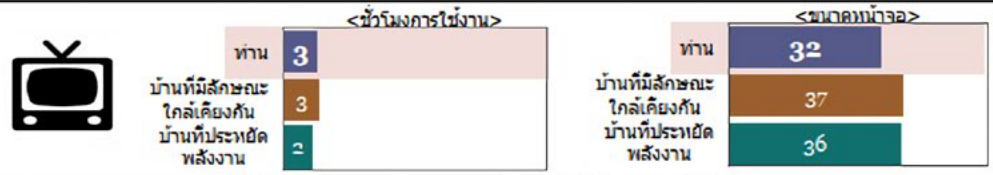
- ✔ จากข้อมูลที่ได้รับ เวลาการใช้งานของครื่องปรับอากาศในบ้านท่าน เหมาะสมแล้ว
- ✔ ท่านตั้งค่าอุณหภูมิเครื่องปรับอากาศได้เหมาะสมแล้ว ทางเราขอขอบคุณท่านที่ให้ความร่วมมือในการประหยัดพลังงาน



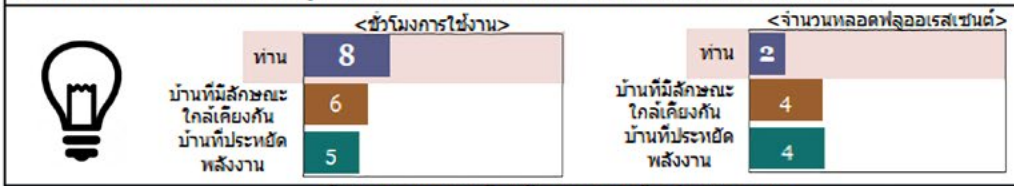
- ✔ จำนวนพัดลมที่ใช้งานในบ้านท่าน มาก กว่าค่าเฉลี่ยของบ้านที่มีลักษณะใกล้เคียงกัน
- ✔ ชั่วโมงการใช้งานต่อวันของพัดลมในบ้านท่าน มีค่าเฉลี่ยในระดับเดียวกันกับบ้านที่มีลักษณะใกล้เคียงกัน



- ✔ ชั่วโมงการใช้งานต่อวันของทีวีในบ้านท่าน มีค่าเฉลี่ยในระดับเดียวกันกับบ้านที่มีลักษณะใกล้เคียงกัน



- ✔ จำนวนหลอดฟลูออเรสเซนต์ที่ใช้งานในบ้านท่าน น้อย กว่าค่าเฉลี่ยของบ้านที่มีลักษณะใกล้เคียงกัน
- ✔ ชั่วโมงการใช้งานต่อวันของหลอดฟลูออเรสเซนต์ในบ้านท่าน นาน กว่าค่าเฉลี่ยของบ้านที่มีลักษณะใกล้เคียงกัน



<ข้อแนะนำการประหยัดพลังงานภายในบ้านท่านโดย กฟค>

วิธีการประหยัดพลังงานอย่างง่ายๆ	✔ กรุณาปิดพัดลม ถึงแม้ว่าจะออกจากบ้านเป็นระยะเวลาสั้นๆ ✔ กรุณาถอดปลั๊กให้เรียบร้อย เมื่อคุณไม่ได้ดูทีวี ✔ กรุณาปิดไฟ ถึงแม้ว่าจะออกจากบ้านเป็นระยะเวลาสั้นๆ
วิธีการประหยัดพลังงานอื่นๆ	✔ กรุณาเลือกเครื่องปรับอากาศแบบอินเวอร์เตอร์ เมื่อท่านเปลี่ยนเครื่องใหม่ ✔ กรุณาเลือกทีวีแบบประหยัดพลังงาน เมื่อท่านเปลี่ยนเครื่องใหม่ ✔ ถ้าท่านเปลี่ยนหลอดไฟที่ใช้อยู่เป็นหลอดประเภท LED จะทำให้ท่านประหยัดพลังงานมากขึ้น

Sample of Feedback Service Report for this Project

Home energy audit was carried out for another group of 50 pilot households. Home energy auditors are trained through on-the-job training (OJT), and they are tasked to conduct energy audits and deliver home energy audit reports to the target households. The four-page HEA report provides information on home energy performance indexes in comparison with other pilot households, breakdown of annual energy consumption by end-use, energy cost, GHG emissions, no-cost/low-cost energy saving measures, and medium-/high-cost energy savings measures. It acts as a tool to increase awareness on energy conservation and CO_2 mitigation options, which in turn motivate behavioural changes in the target households to carry out home renovations, switch to EE equipment and so on.

Piloting Energy Consumption Feedback and Home Energy Audit Services in 100 Households

Lessons learned from project implementation and recommendations on future project activities are as follows.

Intra-Organisational Communication – PEA is a large organisation with a number of provincial and branch offices. Intra-organisational communication within PEA has to follow certain protocols and procedures, and exchange of project information between the project office located in the headquarters and provincial/branch offices was not ideal during the implementation of this project. Specifically, there was insufficient information exchange on communications related to household data collection and requests for participation in home energy audits by pilot households. Household residents sometimes called the branch offices to inquire about the project as they were afraid of being tricked into revealing their personal information by scammers. Detailed briefings on project activities and work plans should have been conducted in the four selected provinces (Samut Sakhon, Nakhon Pathom, Pathum Thani, and Phuket), as this could potentially eliminate confusion over the course of project implementation.

Public Relations – Many households visited by the project were not aware of the project, and reluctant to cooperate with the market survey and pilot project activities carried out by the project team. Prior to the project implementation, public relations activities should have been carried out at the community level to enhance awareness of households. If there had been well-designed public relation activities, it would have been easier for household residents to understand and be more willing to participate.

Monitoring and Evaluation – Continuous monitoring and evaluation (M&E) of the long-term energy saving impact as a result of the pilot project prior to development and implementation of the scaling-up phase is an important process. M&E will also provide necessary information to determine whether the actions in the pilot phase were effective and which aspects of the project designs and activities should be improved.

The short project achieved some tangible results. Firstly, it developed a comprehensive database of household energy consumption in association with characteristics such as household, housing, car ownership, use of appliances and behaviours based on the responses from more than 4,700 households. The survey results indicate that energy demand for appliances and lighting for urban households in Thailand is almost the same as that of Japan, and CO_2 emissions are estimated at 2.6 tCO_2/household/year. There is significant room for improved energy-saving in lighting, appliances, cooling, and kitchen as compared to Japan, and it is necessary to take thorough measures to reduce energy consumption.

It was encouraging to learn that 70% of the 50 pilot households responded that household members have become more aware of EE opportunities, particularly from fans and lighting, and recommendations provided in the feedback service reports compel them to implement EE measures, such as switching off fans when not in use, e.g., leaving rooms or home, even for a short period of time, as well as unplugging the TV from electrical sockets. Additionally, 93% of the respondents said they intend to implement EE measures to achieve energy savings. More than 80% of the households who received the home energy audit report saw that implementation of EE measures enables electrical appliances/equipment to deliver similar or higher levels of comfortability and convenience. Thus, implementation of the feedback service and HEA activities among the selected 100 pilot households clearly demonstrated the benefits of the provision of energy consumption information to households in Thailand. The provision of energy consumption information through feedback services and HEA reports is a cost-effective measure in Thailand.

Assuming that the feedback service and HEA activities continue after the end of this project and that the target households in each region are expanded, the CO_2 reduction effects due to the feedback service and HEA are estimated at 9.6 and 8.7 tCO_2/year respectively. The electricity consumption reduction for all four regions is estimated at an average of 0.60 ktoe for feedback service, and at 1.52 ktoe for HEA if the services are expanded to 5% of the total households in these regions. It should be noted that under the EEP, the EERS aims for a reduction of 114 ktoe by the year 2036 for the residential sector. The amount of CO_2 reduction and electricity consumption reduction (tonnes of oil equivalent) are estimated in the table below.

Table 1. Estimated Energy Saving Effects of Scaled-up Feedback Services

Region	CO_2 Reduction Effects from this Project [tCO_2/year]	Number of Household [household]	Prediction of Future Scenarios				
			unit	Eligible Ratio: 5%	Eligible Ratio: 10%	Eligible Ratio: 15%	Eligible Ratio: 20%
Samut Sakhon	2.5	278,188	tCO_2/year	703	1,406	2,109	2,812
			ktoe/year	0.12	0.24	0.36	0.47
Nakhon Pathom	2.4	585,814	tCO_2/year	1,385	2,770	4,155	5,539
			ktoe/year	0.23	0.47	0.70	0.93
Pathum Thani	2.4	388,241	tCO_2/year	920	1,840	2,759	3,679
			ktoe/year	0.16	0.31	0.47	0.62
Phuket	2.3	247,471	tCO_2/year	579	1,158	1,737	2,317
			ktoe/year	0.10	0.20	0.29	0.39
Total	9.6	1,499,714	**tCO_2/year**	**3,587**	**7,173**	**10,760**	**14,347**
			ktoe/year	**0.60**	**1.21**	**1.81**	**2.42**

Note: CO_2 Reduction Effects from this Project represents a total of 50 households of this project.

Table 2. Estimated Energy-saving Effects of Scaled-up Home Energy Audits

Region	CO_2 Reduction Effects from this Project [tCO_2/year]	Number of Household [household]	Prediction of Future Scenarios				
			unit	Eligible Ratio: 5%	Eligible Ratio: 10%	Eligible Ratio: 15%	Eligible Ratio: 20%
Samut Sakhon	3.39	278,188	tCO_2/year	2,777	5,554	8,331	11,107
			ktoe/year	0.08	0.17	0.25	0.33
Nakhon Pathom	3.62	585,814	tCO_2/year	5,297	10,594	15,891	21,187
			ktoe/year	0.16	0.32	0.49	0.65
Pathum Thani	1.38	388,241	tCO_2/year	2,687	5,375	8,062	10,750
			ktoe/year	0.09	0.18	0.27	0.36
Phuket	0.38	247,471	tCO_2/year	1,565	3,129	4,694	6,258
			ktoe/year	0.05	0.10	0.14	0.19
Total	8.77	1,499,714	**tCO_2/year**	**13,159**	**26,318**	**39,477**	**52,636**
			ktoe/year	**1.52**	**3.04**	**4.56**	**6.08**

Note: CO_2 Reduction Effects from this Project represents for implementation of no-cost/low-cost measures in the 50 households of this project.

To ensure effectiveness of the feedback service and HEA activities in the scaling-up phase, it is crucial that challenges and lessons learned identified in the pilot phase are properly addressed. Summarised below are recommended actions for PEA to ensure smooth transition from the pilot phase to the scaling up phase.

- **Establishing a taskforce and work plan on project communication and outreach:** A specific task force on project communication and outreach should be established. The taskforce should be headed by a high-level official and its responsibilities in the overall outreach and communication plan should be defined. The taskforce should be responsible for both intra-organisational communication and public relations (PR) activities. In addition, before commencement of the scaling-up phase, it is important that all of the stakeholders including branch offices involved be aware of who is doing what, resources required, and timeline for expected outputs. This needs to be clear and easily trackable so adjustments can be made to improve if some parts of the plan are not working as planned. A strategic PR plan should also be developed to raise awareness of the project and create long-term PR results.
- **Developing a plan for impact evaluation:** An effective M&E plan to be created and integrated with the implementation of the scaling-up phase. This needs to define how to track the results of these activities, the baseline values, timeframe and targets. In addition, a specific coordination protocol among different divisions and departments within PEA should be establishded to ensure timely seamless coordination and data sharing (such as monthly electricity consumption data) between the project team and other departments.
- **Allocating budget for implementation:** An adequate budget for implementation of the above mentioned actions and other project activities, e.g., feedback services and HEA, should be allocated. Additional resources within PEA for project implementation should be evaluated before moving forward with the scaling-up phase.

CO_2 emissions reduction from Feedback Services in 4 provinces	9.6 tCO_2/year (50 pilot households)
CO_2 emissions reduction from adoption of no- or low-cost measures recommended in Home Energy Audit in 4 provinces	8.77 tCO_2/year (50 pilot households) 52,636 tCO_2/year (Future Scenario, assuming 20 % of households adopt)

Strengthening Food Resource and Information Channels of Urban Consumers for Sustainable Production and Consumption of Food

Centre for Sustainable Agriculture

India is one country that is experiencing rapid urbanisation and as such, is undergoing one very significant lifestyle change in the form of changes in food consumption behaviour, with severe environmental and health consequences. Food is being increasingly transported long distances to the rapidly expanding urban areas, which also has climate and environmental implications. Consumers are increasingly isolated from producers and this is contributing to a lack of understanding on how food is being produced in terms of resources used and how food choices made by consumers have environmental and health impacts. This project "Strengthening Food Resource and Information Channels" promoted environmentally sustainable and healthy food by promoting sustainable urban food production and linking urban consumers with rural farmers through ICTs in a Connected Ecological Farming approach thereby reducing food miles, carbon miles and the overall urban footprint in one of the fastest growing cities in India.

Over the last 50 years, the food system in India has shifted to high external input dependent, high energy and chemical intensive, monoculture of crops and animals, and long-distance trade. The social, economic and ecological impacts of such shifts were found to be devastating particularly for small and marginal farmers who form about 81.3% of the Indian farming population (Ranuzzi and Srivastava, 2012). In India, agriculture contributes about 28% of the greenhouse gas (GHG) emissions. In addition, about 78% of methane and nitrous oxide emissions are estimated to be due to current agricultural practices (MoEF, 2010). Furthermore, changes in the socioeconomic systems which set the ground for the aforementioned impacts to sustainability, have been associated with changing food production and consumption habits.

Coupled with economic liberalisation, access to employment opportunities, raising income levels, growing education levels, and access to instant information have provided ample ground for Asian households to transform their lifestyles at a rapid pace in the past decade. These rapid lifestyle changes are epitomised by a preference for urban dwelling, changing food habits towards non-vegetarian food including fast food, and a preference for private transportation. The growing preference for these lifestyle choices have negative impacts on human and environmental health.

There has been a rapid rise in the lifestyle diseases such as obesity, heart diseases, hypertension and diabetes. Negative environmental consequences include rapid deterioration of natural resources, pollution of air, water and land, and damage to biodiversity and ecosystem services. To curtail these negative consequences, there has been an emphasis to steer lifestyle changes to environmentally friendly and sustainable ones.

The degree of adoption of environmentally friendly lifestyle choices varies depending on a host of factors that the households are exposed to. These factors include the cost of lifestyle choices and their availability within the physical vicinity of households, the education and awareness levels of household members, social context within which households live, and willingness to pay for these lifestyle choices. The willingness to pay for environmentally friendly lifestyle choices could be determined by factors such as disposable income of households, ease with which the perceived quality of life can be achieved by adopting certain lifestyle choices, as well as the social and policy environment within which a household finds itself.

The project undertook several actions to enhance sustainable food production and consumption in peri-urban and urban areas including providing support for farmers adopting organic agriculture by setting up training at "Producer Knowledge Centres", and also connecting them with urban consumers through "Food-Info-Marts" that deliver organic food and information on nutrition and health, as well as climate change mitigation to the urban consumers.

Food-Info-Marts (FIMs): Specialty food outlets are often set up in high income neighbourhoods to cater to the demands of well-educated and wealthy urban households. However, in this project, five FIMs were opened in Hyderabad City aiming to cater to mostly middle-income families. One FIM was opened in the neighbourhood of Secunderabad i.e. Tarnaka, with low to middle income households. Another FIM was opened in the K.P.H.B (Kukatpally Housing Board) area which consists of middle to high-income households, where a majority of households are working in the IT sector or in other service professions. K.P.H.B is characterised by the presence of multinational food courts and chains, indicating the food preferences of this community. In the state of Andhra Pradesh, one FIM was set up in the city of Vishakhapatnam in the neighbourhood of MVP Colony which consists of low to high-income households.

In addition to the fixed FIMs, two mobile FIMs were also introduced to reach out to households that could not obtain the services of the fixed FIMs. The FIMs provided improved access to healthy food, including organic food, while also providing environmental information on the food such as the quantity of resources used for producing the food, and various health and environmental benefits of consuming the food made available through FIMs. By doing so, the project team hoped to provide necessary knowledge to the consumers to influence their food consumption behaviour to be more environmentally friendly. In addition to providing food and related information, the FIMs have also acted as hubs for recruiting participants to various capacity building activities organised by the project. Displays in the FIMs and mobile FIM showed the following information: information on the Farmer Producer Organizations (FPOs), i.e., producers, that supply low-ecological impact food, location of FPOs, information on individual farmers who have produced the food, ecological impact of sustainable vs. conventional production practices, how to join the initiative and contribute to the common understanding on the issue, ways to cook healthy, and ways to reduce food wastage.

Produce Knowledge Centres (PKCs): The project established Producer Knowledge Centres (PKCs) at 10 strategic locations to support the farming community in understanding the environmental impacts of food production, and helping them adopt sustainable production systems, establish nutrient recycling plants to recycle nutrients from the food waste and use the same for food production within and beyond project boundaries. In total, 2300 farmers undertook the training courses on adopting agro-ecological approaches based on the local situations. Four rounds of training have been organised on climate change impacts on agriculture, adaptation, understanding soil, managing water, planning crops based on water budgeting, quality management, traceability, post-harvest handling, waste management, etc.

Data collection and analysis of "Ecological Debt": The project team designed and administered a survey to participating farmers and urban consumers to gain a better understanding of the current production and consumption patterns, and the associated impacts on the environment. Data was collected from five farmers in each of three locations, to quantify the ecological footprint in terms of water, agrochemical and energy use, and distance travelled from the conventional vs climate smart agro-ecological farms. The data was converted into a label which becomes part of the traceability for the consumers. Randomised control trials were adopted to analyse the "Ecological Debt Index" covering the topics of chemical consumption, waste, water, energy, food, health and fitness, ant total material consumption.

The project team faced a few difficulties in implementing the project. To start with, although the training for farmers included conversion of plastic packets to eco-friendly paper packets, it turned out to be a challenge due to the fewer number of options for sustainable products. The paper packets available were not economically sustainable. In order to make the same profit available for the farmers, a price hike was needed but this was not feasible from a marketability point of view. Also, the paper packets available could not guarantee pest prevention beyond a certain time.

Secondly, during the data collection to analyse the Ecological Debt Index, survey participants were reluctant to provide data at such frequent intervals. So instead of asking the participants to complete the survey themselves, the project staff collected data from them on a regular basis.

However, the project team and participants found that some of their actions were certainly effective in strengthening interaction and mutual understanding among the producers and consumers, or between producers and a broader range of stakeholders including educators, students and policymakers. The farmers trained in the PKCs welcomed visits by other famers who wanted to learn their methods. They also welcomed urban consumers who were interested in sustainable and healthy food. In particular, when urban consumers visited the fields. it was a great opportunity for them to see organic farming methods, and to check out packing, procurement, and processing activities. Project training on urban gardening also gained favourable responses from participants. Additionally, the project established kitchen gardens at urban schools where students enjoyed the experimental farms and learned about healthy diets. Based on such interaction, volunteers are continuing to engage the school children. This activity will continue after the project is completed. Two summer camps were organised for the school children at organic

farms associated with Sahaja Aharam in Mulugu. Such interaction informed discussions between the project team and schools on the development of course content covering climate change, sustainable farming, kitchen gardens, food choices, etc. for mainstream courses. Changes to the curriculum would not be easy but some subjects would be selected by the syllabus committees.

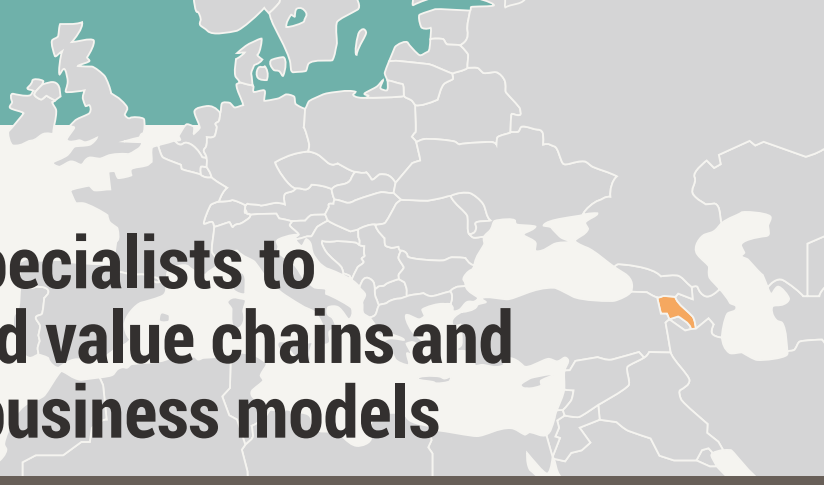
Through project activities including introduction of Food-Info-Marts and Producers Knowledge Centre, as well as training and piloting with farmers, urban consumers, school teachers and children, the project equipped partners with relevant information and skills, and encouraged them to start reconsidering how they carried the growing, delivering, purchasing, and eating of food. Initiatives such as linking farmers with consumers through information channels and by exposure visits are empowering consumers to take the right decisions in the domain of food.

As a result, the project generated some tangible outcomes and impacts including the adoption of organic farming of five different crops (rice, tomato, groundnut, papaya, and wheat) among 2,470 farmers. This resulted in a reduction in GHG emissions equivalent to 27,189kgCO_2e, and generated a massive amount of organic produce that was sold at the Food-Info-Marts (e.g. 28,980kg of rice, 8,340kg of tomato). The project thus enabled proactive use and interaction.

Furthermore, the survey conducted by the project revealed some points that could be addressed further to promote sustainable food production and consumption in the context of urban and peri-urban areas of India, despite some of the difficulties mentioned above. For instance, environmental awareness among urban households provides a positive basis that can be built upon. Targeted information campaigns could help enhance the current levels of environmental knowledge among the urban households thereby instilingl further environmental actions among the households. People of the relatively younger generations and with high educational levels showed significant awareness on the impacts of lifestyles on the environment, and recognised the growing health concerns associated with overall environmental degradation and urban lifestyles including food habits.

There is a willingness among urban households to try and implement environmental actions to reduce their environmental footprint. However, several bottlenecks are hindering them from doing this. These include a lack of time, lack of space, and lack of knowledge and know-how. By addressing these limitations, urban households will be able to further promote their environmental actions. The limited access to environmentally-friendly lifestyle choices needs substantial improvement with policies promoting organic agriculture at an affordable level (e.g. tax, pricing). The project experiences also indicated the potential contribution of Social Media. Currently very little information about sustainable and healthy food is shared on social media. However, offline activities, such as the Food-Info-Marts and Producer Knowledge Centres in this project, could be better communicated via social media to a wider section of society, such as urban households. Lastly, the promotion of ways to improve household waste treatment turned out to be difficult. While local communities can initiate local composting measures, the feasibility and sustainability of these initiatives is far from satisfactory. Hence, there is a need for local governments and other local actors to introduce waste segregation policies at the household level, and to implement large-scale waste recycling projects that can also take into consideration the advantages provided by the household and community level waste recycling opportunities. Implementing solutions to the issues identified in the project will inform the future promotion of sustainable food production and consumption in India and beyond.

Farmers adopting organic farming of five crops (rice, tomato, groundnut, papaya, wheat)	2,470 farmers
Organic produce sold in the Food-Info-Mart	28,900 kg of Rice 8,340 kg of Tomato
GHG emissions reduction from organic farming	27.19 tCO_2e/year



Encouraging young specialists to empower the agri-food value chains and building sustainable business models

Armenian Women for Health and Healthy Environment (AWHHE) & Universidad de Chile

Dependence on imported energy sources puts pressure on rural societies when aiming to create a viable local economy and build more sustainable and resilient living conditions. A community in rural Armenia collaborated with NGOs, universities and students to update the food supply chain taking full advantage of the available renewable energy sources. In spite of the severe challenge caused by the COVID-19 pandemic, the participating community members, teachers and students as well as the NGOs formulated a resilient partnership to aim for the common goal of creating a sustainable food supply chain.

Armenia's economy largely depends on imported fuels, which has risks in terms of security of supply as well as affordability problems for customers, including farmers. The national strategy for energy system development lacks planning for small villages where low-cost environmentally-friendly renewable energy technologies are barely used for local agri-food value chain development. Women have a great potential to advance the national innovative renewable energy agenda, but this potential is not fully utilised. Moreover, university education is not really oriented towards meeting the needs of communities. In general, there are very few female engineers and scientists, and this holds true in the renewable energy sector in Armenia. While the level of enrolment of young women in universities is high, energy faculties in national universities are dominated by male students and professors. At community level, decision-making on sustainable development including energy efficiency is mostly male-driven. The Solak community, which is identified as a pilot under this project, is one example of such communities. Although Solak is located close to the capital of Yerevan, it is still quite isolated due to its geographical position high in the mountains with harsh winters. The agricultural community of Solak relies on natural gas as its primary fuel source, with many poor farmers using wood or manure for heating and cooking. Prior to the project, solar energy use in agriculture was limited to traditional fruit drying.

Armenia has an abundance of sunny days, and thus has a high potential for solar energy use. The Armenian Women for Health and Healthy Environment (AWHHE) believes that if women are empowered to use renewable energy, they could gain more capacity to lead sustainable transformations at community level. Another opportunity is to target young people who traditionally show high interest in university education, including specialisation in technical engineering and agriculture. Rural and urban youth are eager to acquire skills and knowledge to be able to move the national renewable energy agenda forward, thereby linking it with agricultural development.

To connect these opportunities with community needs and university skills, AWHHE collaborated with the Energy Centre of the University of Chile and two universities in Armenia on a project called "Encouraging young specialists to power the agri-food value chains". The project was a direct response to the identified challenges.

The project's approach developed and replicated real-world capacity for sustainable lifestyles in the academic and economic areas. In the academic area, the project developed an optional academic course for master students in cooperation with the universities. The micro-pilot in Solak rural community under this project contributed to improved sustainable energy-saving and community engagement lifestyles, thus directly linking university education process with the needs of community members.

The project's academic course encouraged female students to participate. Students from the National Polytechnic University of Armenia (NPUA) and the Armenian National Agrarian University (ANAU) worked jointly with the Solak pilot community to seek and introduce various clean energy solutions along the agri-food chains that are most popular among Solak farmers. The project cooperated with the local Women's Resource Center in identifying and training community activists.

As a result of the project, the students engaged with the community activists in powering local water pumps with solar panels for irrigation of endemic lentils and other high value, climate-resilient crops. The education partnership expanded to include more university students and professors, as well as engaging the private sector (solar energy companies). The Solak community and the universities established an important cooperative link with the local Water User Association (WUA).

Due to the COVID-19 pandemic, the universities and the Solak community were under lockdown for certain periods of time, which impeded the academic course and field activities. Online options were made available, but the number of students decreased from the originally enrolled 25 to 15, due to weak internet access experienced by some students living in isolated rural communities. Travel restrictions meant that the business models and basic guide to project monitoring were developed via online consultations with the University of Chile, and made available electronically. The training on the models for farmers was conducted remotely via social networking platforms and included messages on personal hygiene for their families. The general project coordination was organised via regular and ad hoc online sessions; necessary advice was duly offered by the One Planet partners.

Despite the difficulties caused by lockdown and travel restrictions, the project teams and partners took these challenging situations as opportunities, and were able to strengthen project activities and partnership engagement.

Identification of needs with Solak community participation

A general agreement was reached on the major need to use solar energy to transport irrigation water to arable non-watered lands located uphill. However, different groups of stakeholders prioritized different needs: the farmers wanted water for irrigation and cattle but were questioning the flat fee for irrigation water regardless whether solar energy was used or not; the WUA representatives argued that a flat fee could not be avoided; the mayor and administration questioned the economic value and immediate benefits to the community. To reach consensus,

the project partners undertook numerous visits to Solak and talked to different stakeholder groups separately, as well as holding joint presentations and discussions. The economic aspects were discussed with the WUA (the generation of the fee, the government subsidy scheme); and with the representatives of private agri-business and ANAU experts. AWHHE represents the national NGO community in national platforms for water policy discussions, such as the Steering Committee of the EU Water Initiative National Policy Dialogue; the National Water Committee; and the Regulatory Council of the National WUAs. This opportunity was used to obtain information and solutions from the national level. AWHHE exhibited another organisational strength in that the team included experts with backgrounds in epidemiology hygiene and sanitation. This proved very helpful in developing and implementing strategies for the community members and students to cope with the pandemic challenges.

University students and the Solak community working jointly on solutions

As a result of the pilot implementation, a total of 10 hectares of irrigated land was used for growing grain crops by 11 farmers. Thanks to a new closed irrigation system, water loss has decreased from 40% to 15%. Installation of solar panels resulted in a reduction in electricity consumption and a fall in CO_2 emissions, estimated at 13.8 CO_2 tCO_2e per year. The farmers learned how to use a mobile application to monitor energy production and noted electricity savings with great satisfaction. The Solak community members warmly welcomed the involvement of university students at all stages of the pilot activities and throughout the project, making this the strongest and most rewarding of the project partnerships.

Academic course

This type of student course was itself an innovation, and it was difficult to develop the full educational package before the course started. The university partners agreed to use a step-by-step approach: the first module was developed before the beginning of the course, and the rest of the material was being developed parallel to the course. This enabled any possible comments/requests by students or professors to be taken into account. To better attract the students, presentation workshops were organised with participation of the Solak community, private companies and NGOs. The educational materials were developed in English, translated into Armenian and shared among students via social network and on flash pens. The students initiated a closed Facebook students' group called Green Rangers of Armenia, assuming control over the organisational and other issues of mutual interest. The project's academic course participants were invited to the ANAU's Impact Venture Accelerator funded by UNDP-Armenia where their idea was acknowledged as one of the first-round finalists.

Partnering with the private sector

The technical evaluation process helped the project to ask the right questions and come up with exact specifications for the bidding. The project partners did a mapping of local companies, and consulted with construction companies and architects. During these consultations, the project team started building partnerships with the private renewable energy companies that lasted throughout the project and beyond.

Cooperation with the local WUA serving Solak community

The Solak community water pumping station managed by the WUA was in a very poor technical state. The building had been constructed in 1979, and had not been renovated since then. The water pumps were made in 1970, the electricity installation was outdated and hazardous, the insulation was poor, and there was water leakage in dangerous proximity to electric power equipment. Since the project was tasked with developing a model, the state of the pumping station was unacceptable. The project partners (Solak Mayor's office, WUA and AWHHE) signed a Memorandum of Understanding (MoU) to guide the work, and the WUA invested in basic renovation of the pumping station, while the Solak community administration cleaned up the community land around the pumping station.

Some of the direct achievements of the project have already been covered above, including the results of the pilot implementation, namely 10 hectares of irrigated land for grain crops, managed by 11 farmers, and the prevention of water loss by the updated closed irrigation system, and the installation of solar panels resulting in the saving of energy costs and GHG emissions reduction.

Notably, the project trained the participating community to monitor CO_2 reductions themselves. The SEMS tool was applied to gain periodically updated information on emissions, the role of forests, and income. According to the data, the solar photovoltaic system of 16 kW installed capacity should produce 23,000 kWh of electricity. Taking into account the fuels used in Armenia, annual CO_2 emissions are likely to fall by 47 tonnes.

The salient achievements of the project could be seen in the growth of knowledge and capacities among the participants, and the enhanced and strengthened partnerships between community, projects and supporting organizations. The academic course was made possible thanks to cooperation with universities both inside and outside of Armenia. The professors, students, community, private companies and NGOs eventually took more proactive roles in developing, sharing and utilising the training materials, with periodical monitoring of CO_2 as one of their many active roles.

Last but not least, the visit by the project team, professors and students to the community prior to the lockdown contributed to building trust, which enabled pilot activities to continue online even in the midst of a global pandemic.

Engineering students working with farmers	25 students
Farmland irrigated with the solar powered system	10 hectares
Electricity produced with the solar photovoltaic system	23,000 kWh
Annual CO_2 emissions reduction	47.251 tCO_2e

Recovery of the traditional cultivation of rice and wheat for food sovereignty in integrated agroecological production systems in Colombia

UTA Foundation (Fundación Para la Producción Agropecuaria Tropical Sostenible)

For many regions around the world, the effects of the green revolution have become a salient reality. This is particularly true for rural, agricultural areas. To mitigate these changes, bringing back sustainable methods and resources for farming is essential.

This unique project aims to help by recovering Colombia's sustainable, traditional practice of rice and wheat cultivation by providing communities with the tools necessary to revive such cultivation. The implementing team Fundación para la Producción Agropecuaria Tropical Sostenible (UTA) worked closely with farming families to understand the processes of cultivation and provide the resources needed.

Rescuing old traditions that preserve knowledge on sustainable farming practices does not only strengthen food security but also strengthens the cultures that are woven around these crops and their uses. Social construction and its contribution to a sustainable lifestyle is directly related to the appropriate use of energy, resources and habits of consumption – which can be amplified and replicated through promoting sustainable farming techniques.

The project works at 21 farms with three development points – Tosoly farm, Guapotá municipality, Santander and Boyacá – El Bosque and Villa de la Mata farms, Santa Rosa de Viterbo and Nobsa Municipality. The goal is that the work done here can be replicated across the country, with the end result being the revival of farming and the creation of locally adapted sustainable farms.

Globally, many sources of food have been used ancestrally. However, food supply for humanity has been reduced over time, in spite of – or arguably even because of –economic growth. Today we mainly depend on no more than five food sources, including rice and wheat.

In Colombia, rice and wheat have long been considered basic staples. However, the official statistics show a constant decrease in wheat production. Under the context of free trade agreements, government support for wheat production has been cut, jeopardising crop sustainability in Colombia. While farm households have largely been neglected, traditional mountain rice farming in Santander has been put in danger of extinction.

These two crops have been affected negatively by the promotion of monopolies, agribusiness and monocultures that use agro-toxics. They have also been under pressure from other crops such as coffee. The damage to local food production has certainly increased the vulnerability of local communities and households as they become more dependent on food imports. Furthermore, the use of chemicals contributes to global warming and the destruction of the planet.

In light of the above, it was necessary to contemplate pathways to strengthen farm households and their communities. Colombia is a biodiverse country in terms of socio – cultural aspects and ecosystems. As in the rest of the world, it is clear that community-based family agriculture has an enormous impact on food production in the countryside and in the city. The project addressed this challenge by recovering traditional practices of mountain rice and wheat cultivation, combined with appropriate technologies in Santander and Boyacá, Colombia.

Through practical experience in the process, the project team of the UTA Foundation considered it necessary to address the problem in a comprehensive manner from socio-cultural, environmental, and economic aspects. The diversification of production, integration, agro-ecological practices, the use of renewable energy alternatives are decisive aspects to move towards food and energy sovereignty.

However, it is quite important to note that technologies alone cannot bring about change. Technologies must be appropriate and appropriable, as well as being diverse and flexible enough to adjust to local resources. Moreover, it is essential to learn from local wisdom and facilitate exchanges of knowledge. In the process of adapting technologies, it is people that drive change, as well as the interior plots which must be fertilised, watered, prepared. Thus the seeds of knowledge fall on fertile ground to prosper and bear fruit.

In other words, the project aimed to strengthen the social fabric, i.e. people, families and community with application of appropriate technologies, exchange of knowledge, introduction of the agro-ecological approach in integrated systems.

An innovative methodological process was taken, comprising five courses called Schools of Sustainable Lifestyles and the provision of technology baskets with a variety of 16 different appropriate technologies. The project team supported by the local promoters carried out these actions.

The concept of the technology baskets was taken from the preceding approach of community baskets. The baskets provide both equipment and knowledge applicable to many aspects of farm production, such as threshing rice and wheat, polishing rice, grinding for family and animal feed, incubation of eggs from Creole chickens, pasta-making techniques, soil preparation, strengthening of family gardens, thereby generating community funds for machinery and equipment.

Five courses of Schools of Sustainable Lifestyles took place, covering themes to hone skills and reinforce knowledge learning in integrated agro-ecological systems. Here individuals are considered the main axis for sustainable development. Based on the practice of vital principles and comprehensive care as a person, people recognise the elements that make up the integral ecology for sustainable living.

The first two Schools of Sustainable Lifestyles were carried out from late 2019 to February 2020. Face-to-face activities were crucial to bring students together, so that they could get to know each other to formulate the bases of the Project.

The third and fourth Schools of Sustainable Lifestyles took place in the midst of the COVID-19 pandemic that hit the country in March 2020. The project team immediately began to respond to the crisis and taking it as an opportunity. Mobile phones proved to be very useful, enabling the project team and participants to communicate using WhatsApp to form a group so that all members could meet online at the same time.

During the third and fourth Schools of Sustainable Lifestyles the project team and participants discussed alternative plans. They included the creation of a virtual community space – a traditional habit of communicating over a cup of coffee in the morning, which all families followed. The participants listened to audio files of characters created by the coordinators to facilitate the learning of the weekly theme. Pictures, texts, music and short videos were also shared in the virtual space. This way participants in the community as well as more than 30 national and international people outside shared their experiences and knowledge. To date, more than 3,000 WhatsApp messages and more than 2,000 photos and videos have been shared from the community.

Whenever possible, the project team visited virtually every farm and met all the families; children, youth, parents and grandparents. Virtual and face-to-face workshops were carried out on different topics, such as the processing of farm products and doughs, generating a recipe book, making an inventory of native tree species with their uses and identification. Knowledge was shared actively: for instance, mushroom cultivation skills were shared by a participating family and put into a guidebook to support the entire group.

Each activity carried out was edited and turned into a podcast or radio programme that was sent out to families on a weekly basis. This allowed people to listen to the programme in their own time and is available to everyone on the website.

The fifth School for Sustainable Lifestyles covered access to and promotion of local markets, taking into account the need that it is sometimes important to prioritise household consumption. The project team provided each community with a 4 by 6 m tent to participate in village and city markets.

In this way, the activities of the project were strengthened by the exchange of knowledge, skills and the will of people to create conditions for a more stable family and local economy, understanding that everyone is part of the natural environment. All activities and contingencies were opportunities to strengthen the social fabric, solidarity, and trust, and achieve efficiency at harvest and post-harvest level.

The project team and participants worked together to contribute to the education of families recognising that conservation of local and natural resources is a way to ensure food and energy needs for both current and future generations. The achievements of the project are shown in the number of technologies introduced and adopted, as well as changes in people's skills and aspirations.

The project introduced many technologies and equipment. These include:

- 20 solar photovoltaic panels for lighting
- 17 gasification stoves
- 26 bio-digesters
- 2 water heaters for families with solar thermal energy with for domestic use and milking process
- 20 items of equipment for water harvesting
- 9 water pumps
- 20 items of equipment for improving or starting composting
- 21 greenhouses
- 1 modified national thresher
- 1 gasification drying system

Some practical measures were introduced for improve the farm production.

- 21 orchards strengthened with f 6,000 seedlings for 55 families
- 10 seed custodians
- 50 kinds of seed shared
- 50 fruit trees planted
- 20 facilities for raising local hens and fattening chickens;

The above application of technologies brought about changes in knowledge and perceptions among participating families. Evidence of this includes:

- 20 families with greater awareness in the process of composting for agroecological management
- 21 families applying different technologies for rice or wheat crops
- 50 participants trained in SSL
- 10 products and by-products recognised to be processed and/or used in other activities
- 10 artisan alternatives shared as possibilities for the use of wheat and rice by products such as straw
- 31 recovered recipes and new recipes
- 10 activities/technologies on average included in farming systems
- Wheat and rice sowing achieved for five harvest cycles

The project team also linked students' knowledge through a proposal for a degree thesis on mountain rice with the use of effluent from biodigesters compared to other fertilizers used in agroecological fertilization.

Through pathways to recover traditional mountain crops, the project was able to show the potential of sustainability-focused experimentation. The process opens up new opportunities to improve health as well as social conditions.

The project has provided many important lessons:

- People can creatively use virtual tools. Their methods reinforce knowledge-sharing by facilitating the exchange of people's daily work. Art and music are fundamental in virtual and face-to-face processes. At the same time, a combination of virtual tools, arts and traditional customs was very effective.
- Intergenerational learning has been essential to achieve participation by parents and grandparents .
- The technology baskets approach enabled the project teams to take into account the reality of each family individually.
- Some traditional customs were also effective in activating solidarity economies. *La mano vuelta (community works)*, *el combite (the treat)*, *la minga (collective works)* were put it into practice through field workshops. These were used, for example, in creating community funds for machinery and equipment and the sharing of knowledge in alternative economies such as community stores and Alter Nativos markets.

The philosophy of the project lies in "learning by doing", with the support of community leaders, youth, older adults, and the professionals at the UTA Foundation. Young and adult members of the RedBioCol-Colombian Network of Biomass Energy also supported the project by sharing their experiences with a network of more than 75 community-based organisations. In fact, RedBioCol identified the potential of more than 100 members outside of the project community in supporting the scheme either as producers or consumers. New allied donors were also identified, such as Green Empowerment and the Vatheur Foundation, to achieve a very important complement that ensures continuity.

In many respects the results of the project exceeded the proposed objectives.

Cultivation of wheat and rice was once again carried out by families with recovered seeds that have been preserved over time by a few families and have been passed on to a further 21 families. The project has empowered former wheat-producing areas of Boyacá and Santander where there have been proposals from eight new families to plant wheat. Rice seeds are now adopted in higher areas with the support of families who will continue sowing and harvesting. Moreover, building on the lessons from the project, seven communities established community baskets.

Finally, the results of the project reveal that integrated family agricultural production systems ensure a transforming independence towards more sustainable lifestyles, resulting in an more relevant strategy for the current social and health situation in Colombia.

Farmers engaged in the Community Baskets	21 Farmers
Families joining the projects through home gardening	55 farm households
Types of technologies, tools and equipment introduced or recovered	16 technologies, tools and equipment
Communities established Technology Baskets, building on the project	7 communities
Annual Greenhouse Gas emissions reduction - 20 Bio Digesters - 19 Solar PV Panels - 2 Solar Water Heaters	 - 134.610 tCO_2e - 0.654 tCO_2e - 0.240 tCO_2e **Total: 135.504 tCO_2e**

Augmenting Climate Change Adaptation and Financing through Sustainable Urban Lifestyles

Seeds of Opportunity

Africa's urban population is projected to increase from a baseline of 409 million in 2010 to over 1,300 million by 2050. The continued population growth and urbanisation put pressure on ecosystems and climate, through the increased use of wood and the rise in CO_2 emissions that occur when constructing the necessary housing. Disasters and climate change-related vulnerabilities are also increasing, putting further stress on rural and urban societies as well as worsening people's living conditions. However, there is not sufficient capacity to mitigate the negative consequences and protect against the shocks.

Without concrete measures to strengthen all actors, including the public and private sector as well as citizens, many societies in Sub-Saharan Africa including Malawi may not be able to achieve their global ambitions and political commitments as presented in the Sustainable Development Goals (SDGs) and Paris Agreement to reduce land and ecosystem degradation, end poverty, minimise waste and pollution, develop sustainable cities, and ameliorate climate change.

The project in Malawi led by Seeds of Opportunity proposed a unique framework integrating the construction of affordable and sustainable urban housing, with schemes to mobilise finance. The project teams and urban citizens collaborated to shape sustainable and resilient urban living conditions.

Malawi has a population of approximately 19.2 million and is one of the fastest urbanising countries in the world. Within these scenarios, it has been pointed out that Malawi consumes up to 1,708,074 m^3 of natural forest wood annually in-order to facilitate the construction of housing[1]; and in some urban contexts as many as 76% of residents live in substandard housing and/or informal settlements characterised by lack of access to public services, tenure insecurity, and inadequate housing.[2] These factors therefore point out that achieving SDG 11 (make cities inclusive, safe, resilient and sustainable) in Malawi is closely aligned to how well institutions and communities transition to sustainable consumption and production patterns.

On the other hand, environmental degradation is increasing the occurrences of disasters and engendering climate change vulnerability in both rural and urban contexts. However, anecdotal evidence suggests that many countries such as Malawi fail to develop and implement various climate change policies, strategies and programmes because most of the existing specialised climate finance modalities are inaccessible to developing countries and/or are under-capitalised. Furthermore, there are still some concerns that Official Development Assistance (ODA) flows to developing countries might decline despite increasing levels of climate change vulnerability.

1 Mpakati-Gama, E.C., Brown, A. and Sloan, B. (2016). Embodied energy and carbon analysis of urban residential buildings in Malawi. International Journal of Construction Management 16(1), 1–12.
2 Government of Malawi (2017). Malawi Growth and Development Strategy (MGDS) III (2017-2022). Ministry of Economic Planning, Lilongwe.

These challenges bring about some clear opportunities.

Firstly, some researchers have pointed out that as much as 60% of the area expected to be urban by 2030 is yet to be built. This therefore presents new opportunities for developing countries to utilise circular economy approaches, the housing sector and innovative sustainable urban development paradigms as a means to spearhead radical lifestyle transformations that can promote environmental resource management and sustainable development.

Secondly, there is now new impetus on non-state actors to develop updated financing models and solutions to help with the mobilisation of climate finance and financing of climate change projects across various regions. Such innovative models would help societies in Malawi in tackling sustainable lifestyles challenges including the promotion of eco-friendly houses to facilitate climate change mitigation, building the knowledge and capacity of communities on strategies to reduce resource consumption, and developing new frameworks to augment the mobilisation of finance for climate change programmes.

Last but not least, innovative construction technology has become available. Some changes in materials (e.g. from burned bricks to cement) and module-based construction could reduce GHG emissions and air pollution associated with construction while saving costs.

The uniqueness of the project lies in its scheme to take advantage of the cost saved in the construction to enable citizens to engage with the actions on climate change mitigation and adaptation through the innovative finance models.

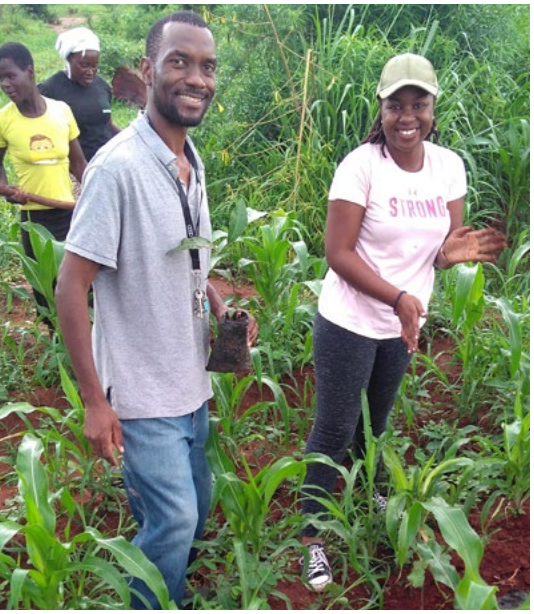
Seeds of Opportunity developed the Polycentric Infrastructure and Community Development Paradigm for Sustainable Urban Transitions (PICD-SUT) framework to provide guidance to communities and institutions on actions to simultaneously facilitate sustainable consumption and production patterns, and create climate resilient sustainable cities in developing country cities (i.e. SDG 11, 12 (ensure sustainable consumption and production patterns) and 13 (climate change management)). Under the PICD-SUT framework (Figure 1), it is hypothesised that consideration should be made at the house-construction stage to use building materials with lower embodied energy and low carbon footprints. In the case of the project in Malawi, cement blocks were used instead of conventional kiln fired bricks since the baking of bricks perpetuates deforestation. Additionally, for each house built, 100 trees were planted to promote climate change mitigation and offset the impact of cutting down trees used in construction.

At the house-use stage, solar photovoltaic panels for electricity and solar hot water geysers may be used to replace the heating of water through open fires or electric geysers. A novel innovation that has been incorporated in the framework is the allocation of part of the house rentals as environmental finance. In this case, 5%-15% of the rental sums collected from houses constructed under organisations using the PICD-SUT framework are aggregated and allocated/disbursed to finance community-led programmes for climate change adaptation, afforestation and biodiversity conservation. Additionally, since some funding under the PICD-SUT framework goes towards the establishment of afforestation schemes, there is also potential for the afforestation schemes established to be registered on a carbon offset scheme. By incorporating these approaches, the framework not only promotes climate change mitigation but also creates new revenue streams for communities and organisations to receive financing from international carbon offsetting schemes. With Malawi's housing deficit as high as 60,000 dwelling units, it can be assumed that if organisations and individuals successfully build these 60,000 dwellings using the PICD-SUT framework, this would translate into a monthly aggregated sum of approximately USD1,200,000 ((USD200 monthly rent X 10% of the monthly rent) X 60,000 units) for investment/allocation to community-led climate and biodiversity programmes. Arguably, this USD1,200,000 can form a new sustainable stream of financing to address finance gaps in various SDG-related programmes.

Figure 1: Polycentric Infrastructure and Community Development Paradigm for Sustainable Urban Transitions (PICD-SUT) framework

The project sets the following objectives:

1. To put low-cost Modular Sustainable Dwelling Units on the market.
2. To establish a Pay Rent to Plant a Tree scheme as an off-site carbon sequestration scheme to reduce the carbon footprint of urban dwellers.
3. To promote the wide-scale development of affordable Modular Sustainable Dwelling Units through revenues generated from voluntary international carbon offsetting schemes.
4. To provide capacity building and knowledge dissemination on sustainable building strategies and resource efficient lifestyles to the general public, housing contractors and local authorities.
5. To build synergies and partnerships with sustainable construction materials research and development initiatives.



Various actions were carried out to (i) engage communities and non-state actors in climate change activities; (ii) empower policymakers on the roles they can take to facilitate sustainable urban lifestyles; and (iii) to build affordable eco-friendly houses. From the onset of the project, it was deemed more appropriate to partner with community-based organisations when undertaking capacity building activities since most of these organisations already have established links and networks with local communities. This approach was adopted as it would help with sustaining the impact of the project even after it ended, as the community-based organisations would eventually use their resources to integrate the outputs of the project into their successive activities and projects. The community-based organisations that were involved in the project's knowledge transfer and capacity building activities were Green Zone, Forum for Rural Development, Mzati Youth Organisation and Umodzi Youth Organisation.

In a similar manner, government schools are under-resourced in many ways so efforts were made to establish links with primary and secondary schools to facilitate the imparting of knowledge on sustainable consumption and production patterns to students. Schools benefiting from the project included Mbayani Primary School 1 (total enrolment 2,198 students and 50 students in the Wildlife Club) and Njamba Secondary School (total enrolment approximately 480 students and 30 students in the Aware and Fair Club), Ntenjera Primary School and Likulu Primary School. The project is committed to donating a total of 1,200 trees to these schools so that they can establish woodlots for internal use and/or benefit of the surrounding communities. The woodlots are crucial as (i) they serve as a demonstration of a carbon sequestration strategy, (ii) they augment ecosystem based adaptation by helping with reducing soil erosion, and (iii) they provide a renewable source of firewood and timber.

The eco-friendly houses that were designed and built as part of the project demonstrate both environmental and socio-economic benefits. On the environmental side, the houses were designed to have less adverse impact on the environment and natural resource consumption by utilising alternative building materials and incorporating solar water heaters, solar photovoltaic panels and water harvesting technologies. Each house was provided with four waste bins (i.e. paper waste, plastic waste, organic/composting waste and other waste materials) so that waste could be easily separated for recycling. Of equal importance is that our project beneficiaries had opportunities to learn about various factory and on-site cement blocks moulding techniques and how cement block moulding can be turned into an entrepreneurship opportunity.

Urban dwellers in Malawi endure high living costs and poor housing infrastructure so the project houses were designed to be practical and affordable for an average family. Additionally, in most developed economies, public sector employees in sectors such as health, education and community safety, also known as key workers, are regarded as requiring special access to housing due to their relatively low wages in-spite of the valuable services that they provide. Unfortunately, private landlords in Malawi do not recognise the specific challenges faced by key workers , so the houses under the project were assigned for use by these public sector workers, as well as other groups with limited disposable income and are very vulnerable to socio-economic shocks such as youth (persons under the age of 35), early career personnel (less than 5 years' experience in their chosen career) and single parent households.

Some salient points from the project experiences and learning outcomes include the following:

- The initial plan was to donate trees to various communities and schools with the main intention of promoting carbon sequestration, improving the landscape/biodiversity and improving natural resources management. However, from the beneficiaries' perspectives, fruit trees proved ideal since they provided other benefits such as revenue from the sale of fruit and nutrition when the fruit is consumed. Motivating communities to manage their trees and natural forests calls for fruit trees and forest non-timber products to be incorporated into afforestation schemes. The project's afforestation programme was subsequently modified so that a combination of fruit trees and non-fruit trees were procured and donated rather than just providing non-fruit trees as per the original plan.
- At Mbayani Primary School 1 and Njamba Secondary School it was noted that the drainage systems were channelling and discarding water into open grounds. It was therefore conceived that the drainage systems could be modified so that waste water could be properly channelled and collected to form a water harvesting/ recycling system where discarded water could be collected in-order to be used for watering plants and vegetables in the school gardens. Although this strategy was not considered in the original implementation plan, it was put to practical use at the two schools, indicating some scope to install water harvesting systems at more government schools to enable all year round gardening and crop production.
- The project's main focus was to determine the thresholds for the carbon offsets from the eco-houses and afforestation schemes to be integrated into international voluntary carbon offset schemes. The project has shown that generating carbon credits through alternative building materials used in dwellings yields carbon

credits for the year of production only, rather than on a continuous basis. This means that to achieve the scale for integration into a voluntary carbon market, a minimum of 500 dwellings need to be built annually using the PICD-SUT framework. Additionally, there should be efforts to collaborate with cement block manufacturers so that their output and production facilities are certified since the continuous manufacturing of blocks translates to continuous emission reductions by offsetting brick-baking in traditional kilns.

The innovative framework of urban housing and financing generated multi-dimensional benefits for the participating communities and schools. The residents and workers gained the knowledge and skills to create more sustainable housing. The pilot housing not only showed GHG reduction impacts at the production stage but also presented further possibilities of integrating sustainable technologies such as solar water heater, photovoltaic panel, water harvesting and composting. The pilot has also demonstrated potential cost saving and income generation through cement block production. Moreover, the community-driven activities of the project enabled people to work towards the creation of a sustainable natural environment through the planting scheme, and also identified some key conditions when launching a financing scheme whereby citizens can contribute to the financing of climate mitigation and adaptation actions. Thus, the project opened a door for local participants to proactively create sustainable and resilient living conditions in the urban areas of Malawi.

Urban households living in eco-friendly sustainable houses	Five households
Number of government schools involved in capacity building activities	Four
Number of community-based organisations involved in capacity building activities	Four
Baseline GHG emission reduction from constructing five eco-friendly houses	52.5 tCO_2e
Baseline GHG emission reduction from solar water heating systems	12.5 tCO_2e per year
Potential GHG emission reduction from afforestation activities	11.4 tCO_2e per year

Solar energy for improved rural livelihoods in Peru

Fondo Verde

There are countless indigenous communities in Peru without electricity. Photovoltaic systems provide the only source of electricity for the population in these remote areas. Access to electricity through simple and effective solutions could dramatically improve the lives of these communities and contribute to the development of the region. Eco-efficient wood-saving stoves are considered an acceptable and low-cost mitigation strategy, their multipurpose nature encompassing biomass consumption reduction, poverty reduction, indoor pollution and climate change mitigation. Peru has directed its efforts to implement mitigation strategies that avoid deforestation and contribute to the reduction of GHG emissions; however, due to the high economic cost of technological transformation, adaptation strategies to counteract the vulnerability of productive systems are developing slowly. The project aims to use these simple technologies to improve the lives of people living in remote areas, harnessing their inherent power to contribute to the sustainable development of the region and the country.

The indigenous communities benefiting from the project (Loma-Linda-Laguna Community, Nueva Aldea Sector, and Séptimo Unidos de Santa Fe de Aguachini Community, Acolla Sector) are remote villages located in the Amazon, in the tropical region of Cerro de Pasco in Peru. The families cover most of their household consumption needs from forest resources (fruits, wood, firewood, fibers) and also engage in activities such as fish farming, cattle raising and agriculture for family consumption and commercialisation (cocoa, corn, yucca, plantain), on farms that vary between 1 and 2 ha. In addition, they sell standing timber to loggers to supplement their income. It is estimated that the average annual income of these families is USD30, which is far less than a dollar a day. With this, they must purchase basic consumer products, such as soap, kerosene, clothing, sugar, salt, and medicines. Monetary income is generated mainly by the men, while the women take care of the house and children and work on the farm where they grow the family's staple crops. The lack of electricity can be considered as one of the factors contributing to the impoverishment of the rural population, making them more vulnerable and isolated, with limited possibilities for development due to the lack of means of communication and information. Residential wood combustion is considered one of the main sources of local air pollutants. CO, soot and some organic compounds are products of incomplete combustion and the amounts depend on combustion efficiency. In these communities biomass combustion and smoke exposure has been associated with chronic respiratory symptoms.

In this context, the project aimed to achieve global climate benefits and at the same time contribute to improving the quality of life of the poorest local communities. The project activities resulted in mitigating climate change through the reduced use of fossil fuels and the unsustainable exploitation of biomass energy resources, which encompassed initiatives that provide better access to modern energy techniques, including the introduction of solar energy for electrification, and eco-efficient wood-saving stoves.

One of the long-term objectives of the project was to improve the living conditions of the most disadvantaged, marginalised and impoverished so that they could rise above the poverty line. The project focused on the most disadvantaged and exploited communities whose income is less than one dollar a day, in order to restore their dignity and respect. The project provided such communities with access to solar energy collection technologies to enable

a partial transition from the traditional kerosene-based method to one that uses the sun's heat (sustainable and efficient rural electrification). Likewise, at the level of intervention mechanisms, the project provided eco-efficient "wood-saving" stoves as an acceptable and low-cost mitigation strategy, its multipurpose nature encompassing the reduction of biomass consumption, poverty reduction, indoor pollution and climate change mitigation.

In this way, CO_2 emissions, deforestation and the CO_2 footprint are reduced. In addition, the training programme supported more than 100 indigenous people, including women, who make up more than half of the beneficiaries.

The project enabled around 40 homes to receive electricity from solar energy and eco-efficient stoves as an alternative to traditional wood-burning stoves for cooking, heating and water heating.

The project is one hundred percent self-sustainable - The installation of alternative energy generation systems with solar panels is technically and economically feasible. Technically, the solar panel systems are easy to transport and install, being modular and scalable since their components can be assembled and disassembled, and being able to increase the power generation capacity by increasing the number of solar panels. Solar is also a renewable energy generation system that does not harm the environment. From an economic point of view, the direct beneficiaries of the electrical energy produced would be the indigenous community, who due to their scarce economic resources would be unable to cover the costs of installing the solar panel systems or other energy generation systems.

This new photovoltaic mechanism was implemented in two communities, and will benefit 40 families and a secondary school which consists of: (1) 40 solar kits of 300W sized for basic daily use in the spring and summer seasons (lighting, cell phone charging, mini radio, TV and basic electrical appliances), and use on weekends in autumn and winter ; and (2) Solar kit of 2000W/day premium daily use (lighting, TV, DVD, blender, frigobar, laptop, mini radio.

The experience in the Loma-Linda-Laguna community, Nueva Aldea Sector, showed that the greatest advantage of the 30 eco-efficient stoves built is in energy efficiency, low wood consumption and elimination of indoor pollution. The eco-efficient stove is based on the complete combustion of wood and achieves a significant reduction in the amount of wood used and no smoke generation in the combustion process. It saves fuel use by 50% and sends the smoke to the outside of the house. Thus, women and children are not exposed to the smoke as the traditional wood-burning stoves.

With the support of SLE, Fondo Verde transported and installed 40 solar systems and eco-scoops, as well as providing training and performance evaluations. Fondo Verde used its 18 years of experience to provide the community with information about the project, including training methods, orientation and guidelines in the selection of community leaders. The project team worked with the local community to ensure an informed consultation process regarding the elements and requirements of the project. It facilitated the transportation of the solar equipment to the villages involved in the replacement of open fires, and ensured that communities participated in the diagnosis, design and dissemination of the eco-efficient stove, in order to promote the efficient use of forest resources and reduce firewood consumption. The partner communities established a community consultation method to reach a joint proposal with written agreements on solar electrification and home improvement with the installation of wood-saving stoves. The agreements cover the number of households for electrification and the number of stoves in the selected villages. The project established the cost payable by households on a regular basis to cover maintenance and repairs of the solar units. Communities selected leaders through an inclusive process. It is worth noting here that communities selected middle-aged and older women from the poorest families, who are not fully literate, but who are respected and trusted in the community. The women shared their knowledge with other members of the community to enable a combination of new technologies introduced to the area together with the production and resource management knowledge of the community members. This assists them in their local livelihoods, such as cereal and vegetable cultivation, animal husbandry and poultry farming.

The project also provided a room to host the Rural Electronics Workshop for diagnostic problems, repairs, maintenance and training for other residents. In cases where road or water transportation was not available, the communities also agreed to provide other means of transportation from the nearest access point. The communities became responsible for the operation and maintenance of these systems, thus ensuring that the useful life of the system fulfils technical specifications of up to 25 years, thereby benefiting the community during that period of time.

Peru is presented as a nation in the process of improving its energy efficiency, including solar electrification. In this context, the project by Fondo Verde significantly contributed to the introduction of solar photovoltaic energy into rural homes and thus increased the efficiency of this system. The development of the project generated a very rapid positive impact in the beneficiary indigenous communities since the implementation, installation and start-up period of the solar systems and solar photovoltaic power supply took place in a very short period of time. In contrast to conventional lighting methods, the sustainable and environmentally friendly system is efficient and potentially lasts 25 years, with a low maintenance rate and high independence. The eco stoves are more energy efficient and reduce pollutants. The 30 eco stoves in the Loma-Linda-Laguna Community, Nueva Aldea Sector, are efficient in terms of firewood consumption, cooking time and CO_2 generation, thus meeting the expected goal of saving significant amounts of firewood and positively impacting the economy and health of families.

It was concluded that the use of both technologies can be feasibly applied in rural communities, demonstrating that solar-electrified villages can be

technically and economically self-sufficient. Management, control, ownership and distribution responsibilities have been transferred to the solar electrified village. The efficiency of the eco-efficient stove in terms of reduction in firewood consumption, CO_2 emissions and cooking time has been established. The impact on some tree species with high wood energy potential has been minimised, as the stoves contribute to reduce the pressure on the preferred species and vegetation. The results of the project confirm that the implemented eco-efficient stoves benefit the environment and raise the quality of life for the beneficiary families.

Now that they have a better life, the participants, together with Fondo Verde, are preparing to start planting trees and protecting forests in the region. By adopting inexpensive and sustainable technologies to solve problems related to the basic needs of the community, the local population, even the most vulnerable ones, can be empowered to become agents of sustainable development for the region and the country.

The model of this project could easily be implemented elsewhere in Peru, where Fondo Verde and its community partners can transform the region and teach us about the natural and human potential to grow with sustainability.

CO_2 Reduction from 40 Solar PV systems for households	331,776 $kgCO_2e$ per year
CO_2 Reduction from 1 Solar PV system for the school	55,296 $kgCO_2e$ per year

Accelerating City-Community Engagement to Leverage Emission Reduction through Activities that Transforming Energy-Use

ICLEI Southeast Asia

Like many other emerging economies, energy demand in the Philippines has been rapidly increasing over the past few decades. This trend is likely to continue given the expected urbanisation in the country and its continued dependency on imported fossil fuel for its primary energy source. The government of the Philippines has put in place a legal framework for energy efficiency in the urban context, enacting the Philippines Green Building Code (GB Code) in 2015, and the Energy Efficiency and Conservation Law (EE&C) in 2020. However, both these pieces of legislation are mainly aimed at larger buildings consuming more electricity, leaving a gap for the residential sector though it is also one on major electricity consumers.

In light of this, ICLEI Southeast Asia worked with two local governments and other expert organisations to grow the capacities of local governments and other relevant actors toward a greater uptake of energy efficiency measures. Unfortunately, the COVID-19 Pandemic forced the project team to substantially alter their plans, but nevertheless the project paved the way to greater energy efficiency in urban contexts by improving access to information, conducting energy use surveys and lectures, and providing knowledge products.

The Philippines is an emerging economy that has shifted from agriculture to industry resulting in rapidly growing cities and greatly increased energy demand. Conventional fossil fuels are the main source of primary energy with 31% of the total primary energy supply met by imported oil and coal in 2030.[1] Further, it is expected that by 2050, 68% of the global population will live in cities, meaning that influencing the behaviour and lifestyles of urban consumers significantly impacts energy use and can help lower emissions in cities.[2] According to the Intergovernmental Panel on Climate Change (IPCC), cities are already responsible for 70% of global GHG emissions and urban populations are still growing. Moreover, buildings are responsible for one-third of global energy demand and one-quarter of global emissions. Hence, cities are key to reducing energy consumption-based emissions.

The aforementioned GB Code is used as a reference to enhance the National Building Code of the Philippines which lays down standards on all aspects of building construction, to ensure safety and integrity. The GB Code aims to improve the efficiency of building performance through environmental design and resource management standards that will save operational costs and result in low-carbon buildings. The Code is mandatory for all new construction or alteration of buildings with a defined total gross floor area. According to the Department of Public Works and Highways, the country will reduce CO_2 emissions by 1.9 million tonnes if the code is properly implemented.[3]

Meanwhile, the EE&C Act institutionalised EE&C as a "national way of life for all Filipinos" and the law sets a legal foundation to realise this vision by establishing professional competency and services, energy labelling and energy performance to address the economic and social challenges of an increasing demand for energy, currently being supplied through imported fuels. The Act sets EE&C requirements and minimum energy performance for government buildings and for designated establishments with annual consumption of 100,000 kWh and

1 Philippine Energy Plan 2016–2030
2 2018 Revision of World Urbanization prospects
3 Department of Public Works and Highways

higher. Furthermore, these establishments and government buildings are mandated to submit an annual energy consumption and conservation report.

However, the two important pieces of legislation have a significant implementation gap. The uptake of green building practices in the Philippines has remained slow. The perceived high cost of getting assessments and certifications, as well as the complicated requirements that only big developers can comply with, are some of the key barriers. Moreover, these two laws cover larger buildings with larger energy use. The GB code covers buildings with a total gross floor area of 10,000 square meters and above. The EE&C Act targets establishments with annual electricity consumption of 100,000 kWh and higher. Looking at energy consumption in the Philippines, the average household consumed 2977.2 kWh/year in 2015 in a country with 19.9 million households.[4] This means that there is a gap in implementing the laws in the residential sector, despite this being a major consumer of electricity and showing great potential to address sustainable consumption and production of energy and reduction of carbon emissions.

Cities such as Pasig City and Parañaque City in Metro Manila are among the local governments that have begun to take steps towards implementing local green building ordinances. These are considered as two of the most economically dynamic cities in the Philippines. Based on Pasig City's community-level GHG emissions inventory with the base year 2017, the electricity consumption accounts for 83% of its emissions. Meanwhile, Parañaque cites the building sector as the top emitter accounting for 37% of total emissions.

Therefore, the project aimed to strengthen sustainable consumption of energy in Pasig City and Parañaque City as well as providing support to the two cities, enabling them to close the gap in the implementation of the GB Code at the local level and improve EE&C across the board.

The project team applied following approaches and activities:

Enhancing the capacities of local governments on the GB Code and EE&C Act: It is vital for the local government units (LGUs) to understand the requirements of these laws in order to mainstream the provisions into local policies and programmes. The project delivered a series of online multi-stakeholder workshops with the LGUs's technical staff. The workshops provided the cities with the latest information on EE&C Act and GB Code, and presented recommendations on the development or improvement of the cities green building and energy efficiency policies and programmes.

Engaging and informing local stakeholders to encourage behaviour change towards energy: The project developed two knowledge outputs on energy efficiency and conservation. These were "A Guidebook for the Energy Advocates'', which served as a reference for conducting a basic energy audit, and "Chuchay Learns to Save Energy", a comic book that follows Chuchay's day as she learns about energy efficiency and conservation.

Launching an online platform. At present, information on sustainable buildings and energy efficiency and conservation practices are distributed by different sites and organisations. Thus, the project launched an online platform that functions as a one-stop-shop resource on EE&C and sustainable buildings including summaries of national policies on energy and sustainability, zero to low-cost energy saving measures applicable to households and small businesses, and other knowledge products. The online platform gained 16,657 unique users and 24,771 page views.

Deploying energy advocates. The project trained and deployed energy advocates to educate and promote EE&C practices to the local communities and act as a feedback loop for the energy concerns of their communities. Due to the COVID-19 pandemic, the project had to change the target of the energy advocates from the original plan of 500 households to 500 city hall employees. The energy advocates provided lectures on EE&C (online for Pasig City and in small groups for Parañaque City) and conducted an energy user survey. The content of the energy user survey was designed to assess and understand the perception, attitude, and behaviour of households with regards to energy efficiency and conservation practices.

4 Statista, Household Electricity Consumption in the Philippines 2000–2016

Development of a policy brief. The project team developed a policy brief aimed at summarising their experience working in the green building sector as well as with local governments. The process was led by the Philippine Green Building Council, one of the key project partners.

Since early 2020, COVID-19 cases in the Philippines have continued to rise at an alarming rate. The global pandemic impacted heavily on the project, with Governments having to focus on their COVID-19 response, resulting in weaker support for project implementation. Various health protocols set by national and local governments also prompted the project team to redesign some components and activities.

For example, in-person training workshops with local governments were held virtually using online video conferencing platforms. Based on the discussion with the SLE Coordination Desk and UNEP, the project reallocated the budget intended for venues and food for the workshops into the procurement of energy audit equipment and personal protective equipment that cities will be able to utilise beyond the project duration to fulfil their mandates under the Energy Efficiency and Conservation Act.

Other major changes were necessary for the Energy Advocates programme. While the local governments prioritised healthcare measures, the energy advocates were not permitted to conduct energy consultations with the targeted 500 households, and changed the target audience to 500 city hall employees instead.

Being flexible and resourceful in times of crisis is crucial during project implementation. Many of the main activities were impacted negatively by the pandemic and the project team had to adjust these activities to ensure results. The project team held discussions on many occasions with the SLE Coordination Desk and UNEP to extend and revise the project implementation strategy.

In spite of changes to some activities and targets, the ACCELERATE project has laid groundwork for the uptake of energy efficiency in buildings and households in urban areas of the Philippines. Highlights of the outputs and outcomes are as follows:

GHG Emissions Reduction and Analysis. The energy advocates conducted a survey targeting energy users, with results providing a valuable basis from which to shape policies and programmes to promote efficient energy use in the communities. It also prompted the design of effective information and education campaign materials to influence consumer choices and affect behavioural change in the local communities. The survey results revealed that women play a significant role in managing households, including monitoring how much electricity is consumed. Thus, women would benefit from better information dissemination. The survey also showed that those with higher levels of electricity consumption because they owned more appliances would benefit more from using energy efficient appliance alternatives. Conversely, households with lower energy consumption should rely on energy conserving behaviours to further reduce their electricity consumption.

The Online Platform and the Policy Brief are also worth mentioning here as tangible achievements, as they continue serving as basic information for disseminating energy efficiency measures in cities across the Philippines.

The online platform was an important part of the information dissemination campaign ensuring that energy efficiency and conservation tips were accessible to more households, thereby reaching many more people have been staying at home and consuming more electricity.

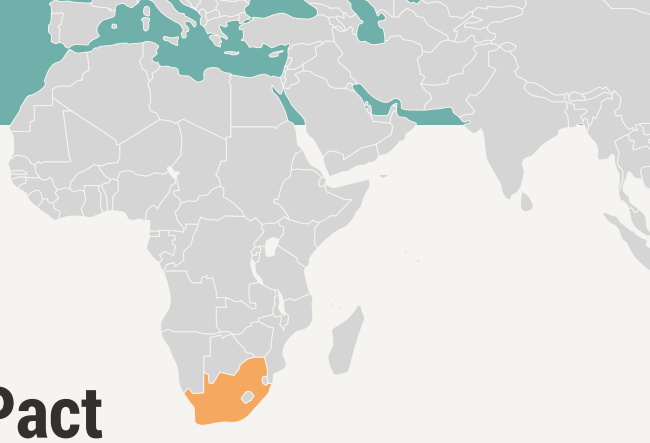
The policy brief looked at the current situation of the building energy sector from plans and policies to the challenges local governments face in localising such plans, as well as providing recommendations on how solutions can be found at the national and local levels. The key challenges identified in the brief are: 1) limited resources to address the competing development priorities of local governments; 2) limited technical manpower required to implement EE&C interventions; and 3) minimal awareness of EE&C at the private sector and household level. The policy brief then recommends the following points for consideration by the national government: 1) promote the interlinkages of EE&C and green building into other development goals; 2) facilitate the knowledge exchange of best practices and lessons learned from different sources and stakeholders; and 3) build the capacity of local governments so that they can develop project proposals and apply for local and international financing opportunities. The brief recommends the following for local governments: 1) engage all relevant stakeholders in all phases of the planning

and implementation; 2) review their existing regulatory requirements; 3) review available voluntary tools to guide local governments in assessing energy use and implementation of green buildings; 4) explore appropriate market and non-market based mechanisms to supplement the implementation of policies and programme; and 5) strengthen capacity building programmes for local staff, and provide information, education and communication to the community.

Overall, the project was able to enhance the capacities and increase awareness of local governments and other stakeholders regarding the benefits of energy efficiency and conservation. Despite being overshadowed by the more urgent pandemic response, it is hoped that lessons learned by partner cities from project interventions will help them plan for a more sustainable recovery. Through the efforts of the project and the national and local governments, sustainable lifestyle changes towards energy efficiency and conservation will be the norm in the post-pandemic era.

Projected CO_2 emission reductions from adapting energy saving measures in households in Pasig City

Potential energy saving (Assuming 9% Reduction in Monthly Demand)	Low Income Households (200,760 households): 1084.11MWh Middle Income Households (139,945 households): 2644.96MWh High Income Households (4,837 households): 217.69MWh
Estimated CO_2 emission reductions from the above energy saving (1MWh = 0.7797 tCO_2)	Low Income Households (200,760 households): 845.28 tCO_2e Middle Income Households (139,945 households): 2062.27 tCO_2e High Income Households (4,837 households): 169.73MWh



The South African Plastics Pact

WRAP (Waste and Resources Action Programme)

The impact caused by massive amounts of plastic packaging has become a global challenge which must be tackled by all stakeholders, especially producers and retailers. The UK and several other countries initiated the Plastics Pact, bringing together businesses to share knowledge and capacity across countries.

WRAP, WWF South Africa and SAPRO (South African Plastics Recycling Organisation) initiated the South African Plastics Pact, building on the success of the UK Plastics Pact. WRAP's proven voluntary agreement approach has been adapted to the South African context with a view to transform the plastics packaging sector to a more circular plastics system, thereby helping keep plastics in the economy and out of the environment. The South African Plastics Pact has joined the Global Network of Plastics Pacts which is managed by The Ellen MacArthur Foundation (EMF).

The South African Plastics Pact launched in January 2020. WRAP and GreenCape, the new Secretariat delivered several workshops with the founding members. Despite facing several major challenges, including a change of Secretariat, COVID-19 and delayed membership fees, GreenCape has, with WRAP's support, been successful in securing more funding and delivering a powerful pipeline of activity. The confidence outside funders have placed in the South African Plastics Pact is testament to the continued hard work and delivery to date from the wider team and Pact membership.

The world produces 141 million tonnes of plastic packaging a year. As a short-life item, most of this packaging ends up in the waste stream within a few months. As a high carbon material, this accounts for 427 million tonnes of CO_2eq. per year. Currently only 20% of the plastic produced each year is recycled, and 32% of all plastic packaging put on the global market annually leaks from collection systems. A significant share of this ends up in the ocean. Each year, at least 8 million tonnes of plastics leak into the ocean, which is equivalent to dumping the contents of one garbage truck into the ocean every minute. 90% of the world's mismanaged plastic arises in Asia, Sub-Saharan Africa and Latin America where the infrastructure and governance systems do not exist to properly tackle plastic waste, and where there is a dramatic growth in plastic packaging (and waste) due to population growth and changing consumer lifestyles.

In South Africa only 29% of all waste is sent to landfill and dumping is the predominant waste disposal. In urban areas only 30-40% of household waste is sent to landfill sites, where much of the plastic is recovered by informal waste pickers either at landfill or kerbside. This figure is much lower in rural areas. As a result, plastic packaging and single use items account for up to 90% of total items collected on beaches in South Africa. Litter accumulation studies in storm water drainage systems found that plastic was consistently the primary form of litter. The rapid growth of plastic packaging usage in South Africa requires an innovative and transformative, system-level response, enabling an agile solution to address the environmental challenges.

The project was built on the preceding Voluntary Agreement (VA) approach which was implemented and proven successful in several countries. Major businesses, government, citizens and NGOs then worked together to develop, launch and implement the South African Plastics Pact. In a nutshell, the Pact sets a series of targets across all actors in the plastics value chain, leading directly to more sustainable practices and lifestyle choices for consumers. This innovative, collaborative approach is at the heart of the model, and forms the basis of the UK Plastics Pact, launched in April 2018, covering 85% of the UK supermarket plastics. This VA approach is now the basis for food waste and plastic packaging initiatives in many European and developed economy countries.

As yet there are no plastic VA initiatives in any developing economy markets; applying such an approach in South Africa would be truly groundbreaking. It would set a precedent, developing a model which could be adopted more widely in many African countries where plastic leakage into the environment is a major problem. Developing economies such as South Africa face a particular challenge in self-starting VAs. With many issues competing for limited government funding and limited track record of taking collaborative action, this action is unlikely to be

adopted without external stimulation and support. WRAP's experience shows that if countries receive external assistance and funding to kick-start the activity needed to develop a VA, national governments and business are motivated to continue to develop and grow the agreement beyond the initial start-up funding.

The first step for the project teams was the mapping of the critical elements required for the pact. The team analysed the plastic packaging market in the country and identified key players of the value chain with their company size and portfolio. The project team organised scoping workshops in Cape Town in late October and early November 2019 to garner support and sign ups with local businesses and organisations. It was agreed that pitching afresh increased membership commitments and momentum, by the end of the visit, nine founding member signatories signed the membership agreement document. Currently, the number of business members is 18 with a target of 20 hoped for launch. Separate face-to-face meetings were also held with many companies, including Retailers, Brands/Producers, Hospitality & Food Service Providers, Trading Associations and Supporting Members, Recyclers and others.

A Steering Committee was also established with 12 members, of which nine were from the private sector, one was from the Government (Department of Environment), and two were from NGOs. At the time of the launch, 34 members signed to the pact, including some of the global brands such as Unilever, Coca-Cola Africa, and Danone.

The launch date changed from March to January 2020. This was due to the additional momentum and focus provided by the project team and an urgency to make the SA Plastics Pact public as it had been in development for some months. To support WWF and take over the long-term lead coordination of the South African Plastic Pact, local coordination and technical support partner was needed. The project team by WRAP and the Steering Committee undertook the selection and appointed GreenCape in January 2020.

The following targets were developed with WWF, SAPRO, EMF and WRAP and reflect the current conditions in SA (e.g. 48% recycling rate for plastic packaging):

Target 1 - Taking action on unnecessary and problematic packaging and plastic products through design, innovation or alternative delivery models.

Target 2 - 100% of plastic packaging to be reusable or recyclable or compostable* by 2025 (*applicable only in closed loop and controlled systems with sufficient infrastructure available or fit for purpose applications).

Target 3 - 70% of plastic packaging effectively recycled by 2025

Target 4 - 30% average post-consumer recycled content across all plastic packaging by 2025.

In addition to the above, a 5th target on job creation and dignity of jobs in the waste picking, sorting and recycling sector was explored. However, it was not adopted as the Steering Committee felt this was beyond the scope of the Pact.

A strong **governance structure** has been set up including the appointment of the Steering Committee and independent Secretariat (GreenCape) to manage the delivery phase of the Pact. GreenCape have successfully taken over from WWF as Secretariat and continue to drive the recruitment of Pact members in addition to defining the data monitoring and technical working groups.

Webinars have been held to share WRAP's knowledge and expertise in detail. The topics covered included but not limited to the following:

- Outlining of the set-up, running and outputs to date from the UK Plastics Pact;
- Data monitoring, collection and analysis procedure;
- Business benefits of setting up and running a Plastics Pact, using the UK Plastics Pact as a case study – for example stimulating a market for recycled content resulting in multiple new plants being invested in and built.

The project team and the Steering Committee members carefully examined some vital elements of the voluntary agreement, such as the overall scope, timeframes for delivery and the baseline. Resourcing and funding structures have been redefined based on capabilities of GreenCape, the local coordinating body and requirements including staffing, working groups and future funding.

The South African Roadmap was completed and launched at the first members'conference on 6 October 2020. The conference was held online via Zoom due to the COVID-19 pandemic and had over 120 attendees in one session. GreenCape proactively shared the roadmap and produced several infographics.

The SA Roadmap was developed in a consultative manner by the following groups.

1. Internal project team (WRAP, EMF, WWF, GreenCape, SAPRO)
2. South African Plastics Pact Steering Committee
3. Wider South African Plastics Pact Membership
4. Government (DEFF, DT&I, DTIC)
5. External technical experts (academia, thinktanks, NGOs)
6. Trade associations including the Informal Waste Sector Trade Association (ARO)

The South African Plastics Pact roadmap included new features which will influence other roadmaps in the wider global Plastics Pact community. These new sections include writing a vision for what the plastics packaging sector will look like at the end of the 2025 target period as a result of the work completed by Pact members, as well as defining leading and supporting roles for increased accountability.

The SA Plastics Pact Roadmap has been shared with Plastics Pact globally as an example of good practice.

In addition to the roadmap, the project team by WRAP, WWF and GreenCape produced a number of documents and influential reports for the sector:

- On Pack Recycling Labelling (OPRL) Guidelines
- Packaging Guidelines 2020
- South African Design for Recycling Guide
- SA Plastics Pact Target 1 list of problematic and unnecessary plastic items (in development)
- SA Plastics Pact Target 4 target list for recycled content (in development)

GreenCape continues to develop a suite of materials for and with the South African Plastics Pact members, building up their own library of resources. They are active participants in the wider Global Plastics Pacts network, sharing many of their learnings, documents and processes.

The South African Plastics Pact has proven that WRAP's voluntary agreement approach works outside of Europe and in developing markets, it has become the flagship Pact outside of the UK. As such, the global demand for Plastics Pacts has increased. Several other Plastics Pacts in Africa are in development (Senegal, Morocco, Kenya and Ghana) for which GreenCape is playing an active supporting role.

After just two years, the South African Plastics Pact is in a very positive position, and having funding for WRAP to continue supporting, sharing and mentoring will be crucial to build on the support to date.

The confidence outside funders have placed in the South African Plastics Pact is testament to the continued hard work and delivery to date from the wider team and Pact membership.

The GreenCape team continues to expand; it has one full-time employee and plans to recruit one more in the coming months. They are hosting the first South Africa Plastics Pact Member Summit in early October via Zoom due to COVID-19 restrictions. GreenCape and the Pact members will continue to take the lead on On-Pack Recycling Labelling (OPRL) and Extended Producer Responsibility (EPR) dialogues with the South African Government, collectively feeding into numerous policy consultations. This strong membership dialogue on key issues (e.g. COVID-19, EPR and recycling sector challenges) will continue to demonstrate the power of collective voice and action in being part of a Plastics Pact.

Further recruitment and expansion of the SA Plastics Pact membership is planned with the aim of getting to over 40 members by 2021. This would develop a stronger income base and also greater market coverage.

Specific target areas for action have been identified and now that funding has been secured, separate projects to tackle reuse options and improve conditions for the informal waste sector projects will begin. Similarly, the joint partnership with the trade union Public Servants Association of South Africa (PSA) will strengthen links to the wider plastics packaging sector in South Africa.

Organisations signed the Plastic Pact	40 members
Expected plastic waste reduction through the achieved target (70% of plastic packages effectively recycled or composted by 2025, compared to the baseline 0f 32.4% in 2018)	123.768 tonnes
Expected GHG emissions reduction through the above plastic waste reduction and recycling (Assuming the total amount of waste is split into four polymer types (PET, LDPE, HDPE, PP) equally)	101,965.6 tCO_2e / Year

Sustainable Livelihoods on Sustainable Landscape

Foundation for People and Community Development (FPCD)

Despite the expansion of timber and mining exports that enabled the economic growth of Papua New Guinea, rural communities representing 82% of the population are kept in vulnerable socioeconomic conditions. Most of them depend on subsistence agriculture and fishing for sustenance, and yet are exposed to cash-based economies and increasing consumer demands. Rapid changes have resulted in degraded land and poor management of natural resources. Some communities have sold their land rights and resources to foreign developers, leading to widespread deforestation, and thereby reducing their capacity to adapt to economic and climatic risks. The project set up by the Foundation for People and Community Development (FPCD) organised farmers in community-driven land use planning and management, and promoted improved livelihood options such as climate-resistant agriculture, community forestry and non-timber forest production.

Additionally, the project introduced some alternative tools such as eco-friendly cooking stoves for households and street lights, on account of the incumbent practice of fuel-wood use accelerating deforestation and carbon emissions. As many unexpected challenges impacted the local societies, the project implementing team and communities had to cancel some planned activities. Despite this, they were able to pave the way to capacitate themselves toward improved resource management and diversified livelihoods.

Timber and mining exports have been expanding and driving GDP growth in Papua New Guinea. However, the overall quality of life for rural villagers has generally declined over the last two decades. Financial returns filtering through to landowners from large-scale commercial extraction are low. The social and environmental impacts of industrial logging in PNG, and Madang, have raised concerns domestically and internationally, and local communities have suffered from unsustainable approaches employed by these companies. Although the 1991 National Forestry Act supports sustainable logging, it has rarely been implemented. Moreover, climate change is expected to impact on the natural environment that forms the basis for community sustenance, due to rising surface air temperatures and sea-surface temperatures, the intensity and frequency of days of extreme heat, and the intensity and frequency of days of extreme rainfall. [1]

Such economic and environmental contexts put severe pressure on living conditions for those living in rural areas, accounting for more than 80% of the total population. In rural areas, 85% of the people are dependent on subsistence agriculture and fishing for sustenance. With recent rapid economic growth, many more rural communities are exposed to cash-based economies and urban living. Associated with these are poverty, economic dependence, unemployment, low levels of education, and drug abuse. Modern generations of PNG children and youth are also faced with pre-arranged marriages, low levels of decision-making power, and violence.[2]

The fundamental problem is the lack of support given to rural communities to retain rights over their land and resources and improve their land-based livelihoods in harmony with nature.

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1 Australian Bureau of Meteorology and CSIRO, 2011. *Climate Change in the Pacific: Scientific Assessment and New Research.* Vol. 2: Country Reports.
2 Serawe, Stewart. 2006. *A Situation Analysis of Young Men in Port Moresby, Papua New Guinea.* The Foundation for People and Community Development. Published by the University of the South Pacific. 96 pages.

PNG rural communities, traditionally, have had an intimate relationship with the land and its resources. Rapid economic changes put pressure on the land, natural resources, and on people's and communities' self-reliance. Furthermore, community knowledge and capacity for managing these natural resources have not been fully utilised to stop further deforestation, and efforts have not be made grow adaptive capacity in the context of increasing climatic risks.

In fact, during the scoping process, the project team of FPCD found that one of the two communities they worked in had already been implementing their initiatives for "a healthy village" and had developed collective capacities to protect the environment and improve livelihood options.

Thus, the project aims to facilitate community land-use planning with climate-smart land-based livelihoods and climate-smart community infrastructure for the people of Sogeram and Sausi in the Usino-Bundi District of Madang province. This aims to ensure long-term family and community resilience to climate change-induced impacts and anthropogenic changes taking place around the community.

Communities, families, youth and children are more likely to be active participants in community development initiatives if their interests and needs are met. FPCD initiated the sustainable livelihoods–sustainable landscapes model to enhance communities' capabilities to address both the immediate and structural causes of poverty. Immediate causes of poverty are usually addressed by improving basic needs, such as clean water supply or food security. Structural causes of poverty are addressed by studying the root causes of poverty – primarily imbalances in power. Only by resolving both these issues will any future improvements in communities be sustainable.

More specifically, key activities included, but were not limited to, the following:

1. Community-level land-use planning: The project team worked with community members, including women and youth, to develop land-use plans. Communities zoned their land according to uses such as conservation forest, climate-smart agriculture, settlements, sacred sites, etc. Land-use maps were sketched by the communities and converted to geo-referenced maps using remote sensing and GIS.
2. Capacity building on climate-smart land-based livelihoods and community infrastructure: The project assessed the potential of each community's lands and livelihood needs. Experts from universities supported awareness-raising, and training sessions were conducted on climate-smart, family or community-based agriculture, forestry and infrastructure such as solar power lighting and improved agricultural processing and storage facilities.
3. Funding proposals development: The project worked with target communities to identify possible community development projects, and prioritise, assist, develop and submit funding proposals for climate-smart land-based livelihoods and community infrastructure to the local District Services Improvement Programme.

Once the project was launched, the project team and community members faced many unexpected situations and events that posed severe challenges to implementation. Sometimes local conditions forced them to give up the planned activities. The COVID-19 pandemic also forced them to reschedule or cancel many activities. The team and communities were able to carry out some of the land-use planning and capacity building for the climate-smart livelihoods. However, they had to flexibly modify most of these activities to meet local demands in the face of a complicated situation. In other words, all activities were opportunities for them to build their capacity for adaptive implementation.

Scoping Field Study: A scoping study and collection of some baseline data was undertaken as the first activity. In the Sausi community, the team learned that the village already had a community development project called "Healthy Village" set up by their local Ward Councilor. As an external partner, the project team of the FPCD found it productive to collaborate with the community, and introduced initiatives that complemented the existing initiative. Sausi's development needs had already been identified through the Healthy Village programme. Development partners should position themselves in the consultations with the Ward Councilor and the Ward Development Committee. The other village of Sogeram was less organised than Sausi in terms of any government-led community development. A total of 51 individuals, including community members and leaders in both Sausi and Sogeram, were directly introduced to the project and its objectives. In turn, they received suggestions of how the project can be implemented in their respective communities.

Land-use Management Planning Workshops: Land-use management planning (LUMP) workshops were carried out in one of the two communities. In Sogeram, 35 family members, including 15 women and girls, contributed to the discussion. FPCD kept a close partnership with one of the participating families. Other participants included those who lived near the planning area but had only limited access to land resources, and family members who formerly sold their land rightsto logging companies and lived in their camps. The participants were tasked to revise earlier land-use plans completed 10 years ago by FPCD and other experts. The initial total forest management area (FMA) was measured as 1,632.19 hectares (Ha). This coverage includes 791.3Ha of planned sustainable FMA area to be harvested using a low impact portable sawmilling operation and following FSC standards and guidelines; 529.4Ha allocated as protection forest or conservation area; and 158.39Ha as a reserve forest. Over the past 10 years, many land-use changes within the forest management area have taken place. These were reflected in the revised land-use plan. They also discussed some issues of the planning area, in particular, the encroachment by surrounding communities and settlers living outside of the Wanang Conservation Area. They cultivate and use forest resources and tracks inside the planning area. They also hunt with dogs in the planning area. The participants shared their views on various pressing issues and exchanged ideas of measures to prevent further encroachment.

However, the other community of Sausi was not not able to organise a LUMP workshop. The FPCD's project team could only collaborate with the Ward Councillor to organise capacity building workshops and additional community development activities, thereby complementing the existing Healthy Village programme. At total of 37 members, including 18 women, from both Sausi Ward Development Committee and the community leaders, participated in the capacity building workshops. However, the principal landowner's family refused to participate. This effectively made it meaningless for the community members to conduct land-use management planning .

Toolkits for sustainable livelihoods: Following the scoping study to identify the needs and opportunities for improving community livelihoods opportunities, the project introduced some tools to enable families to adopt more sustainable and reliable means of production and consumption. More specifically, solar PV home kits to bring electricity to households and eco-friendly cooking stoves were the two technologies that would benefit participating families and communities.

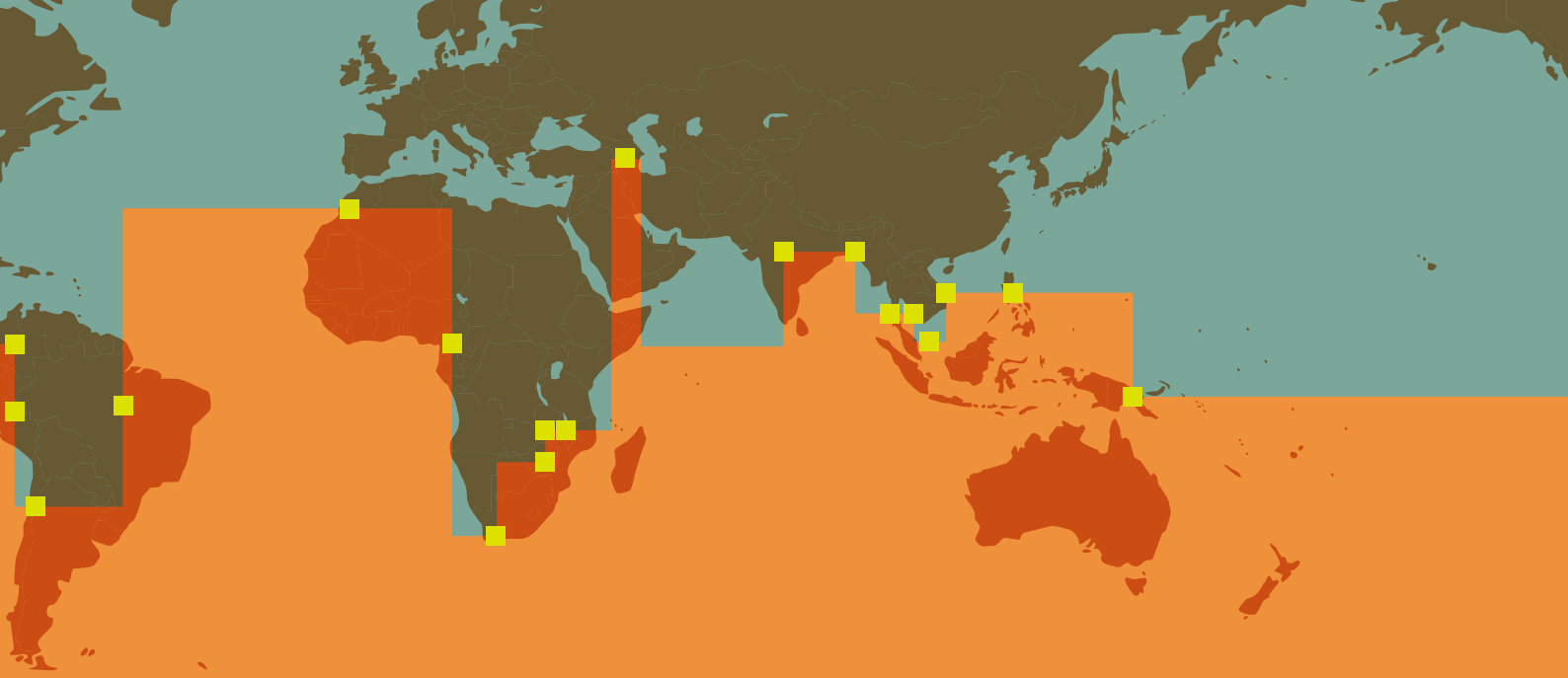
The introduction of the solar home kits was planned to allow families to control their own energy needs, mainly for lighting and charging mobile phones. Because Sausi and Sogeram were situated in locations highly vulnerable to climate change-induced floods, the solar home kits would enable families and leaders to have their cell phones fully charged so that communication is uninterrupted even in a disaster. The project had planned to purchase and distribute 100 solar home kits in the two target communities. However, the project was only able to purchase 22 sets.

Due to the COVID-19 Pandemic, international freight from China was restricted until September 2020, making it impossible to import the kits. Once the restriction was lifted, the project could secured 22 solar home kits which was not as many as planned. Since only a limited number of home kits were available to the communities, the project team set selection criteria for the participants to install them. For example, families with a disabled member or those currently with no lighting were prioritised.

The project also planned to introduce sawdust cooking stoves so that families could utilise available resources. However, the sawdust stoves became unavailable in the domestic market, so the team introduced clean biomass cooking stoves instead. The FPCD's team designed, constructed and tested the stove in Port Moresby. After gaining feedback from those who tried it in their kitchens, the stove was named "FPCD Klin KukStove." In Sausi, 37 participants, including 18 women and girls, attended the training session to test the FPCD Klin KukStove, and 12 stoves were constructed. At Sogeram, 12 participants attended, and 13 stoves were constructed. Thus, a total of 25 households received their first eco-friendly cooking stove, five more than the planned 20. The communities welcomed these stoves. However, being made of concrete, they were too heavy to be carried, so some members used carts to bring them to the local markets and sell their products, such as babequed sausages, to gain additional income. This attracted a great deal of interest both in Madang and Port Moresby, and has the potential to be replicated in other provinces in Papua New Guinea.

The above summary shows how the project team and community members patiently and flexibly adapted to some complicated challenges. They moved toward their fundamental objectives of capacitating the local communities and families in planning and carrying out actions to improve land-use management and enable resilient livelihood options, even in the face of a host of difficulties.

They also developed a community development project proposal in close collaboration with the Ward Development Committee for Ward 12 Sausi, focusing on water supply. Unfortunately, the proposal has not approved for funding. However, the challenging experiences enabled community members, local development committee and the project to identify and address local opportunities for more sustainable livelihoods with sustainable land-use.



Co-Creating Sustainable Ways of Living: 24 Stories of On-the-Ground Innovations
by Atsushi Watabe, Simon Gilby, Ryu Koide, Caixia Mao, Mizuki Kato, Patricia Vilchis-Tella, and Stefanie Chan