Governing Sustainability Transitions in Asia: Cases from Japan, Indonesia and Thailand

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최근 아시아 여러 지역에서 발생하는 각종 환경문제는 지속가능한 사회를 위해 '전환'의 노력이 시급함을 예증하고 있으며 이에 따른 각국 정부의 전환적 시도 또한 주목할만 하다. 유럽을 중심으로 활발히 진행되어 온 지속가능전환 연구는 지속가능 사회로의 전환과정에서 기술개발과 정부개입 뿐만 아니라 거버넌스와 사회적학습이 중요하며 특히 정책결정과정에서 중앙과 지방정부, 시민사회 행위자들의 역할의 중요성을 피력해 오고 있다. 주목할 부분은 앞서 언급한 아시아 지역에서의 다양한 시도들의 경우 지속가능전환을 유도하고 지원할 수 있는 사회변화나 거버넌스에 대한 관심이 여전히 미흡하다는 점이다. 본 논문은 지속가능전환 연구를 아시아 각국 사례에 적용분석하고 특히 의사결정 혹은 집행과정에 있어서 초래되는 사회적 배제와 그 결과를 살펴본다. 후쿠시마 이후 일본의 분산형 에너지 정책, 태국의 개방연소 및 연무오염 정책 입안 과정, 그리고 인도네시아의 지속가능교통 체제로의 전환 과정을 통해 소외된 이해당사자를 포함하는 것이 전환을 촉진시키는 기폭제로서의 역할을 수행할 수 있음을 증명한다. 이는 사회적 포함과 환경적 지속가능성의 양립에 대한 필요성뿐만 아니라 거버넌스가 이 관계를 강화할 수 있음을 전제한다.

주제어: 지속가능전환, 거버넌스, 일본 에너지정책, 태국 연무오염, 인도네시아 지속가능교통체제

1. INTRODUCTION

Researchers and scientists are increasingly warning that the world is fast approaching or even exceeding its planetary boundaries. These warnings are as clear as they are compelling: future generations can expect a lower quality of life if current generations remain wedded to conventional patterns of development. At the same time, academics have outlined the steps needed to transform patterns of development. Their prescriptions draw upon experiences in Europe with the implementation of "sustainability transitions" that are "long-term, multi-dimensional and fundamental transformation processes through which established socio-technical systems shift to more sustainable modes of production and consumption"(Markard et al. 2012: 956).

The seeds for the articulation of the sustainability transitions concept were planted at the 1972 United Nations Conference on Environment and Development (UNCHE) in Stockholm, Sweden. Over the past four decades, the thinking on sustainability transitions has begun to find its way into policy-making processes across the world. Asia arguably has the most to gain from transitioning to more sustainable development models. With numerous environmental hazards - ranging from North Asia's "airpocalypses" to South Asia's water crises - already affecting the region, calls for Asia to rethink its socio-technical systems are also clear and compelling. Nonetheless, if Asia is going to embark on a sustainability transition, the governance reforms enabling that transition need to be clearly set out.

In recent years, a growing number of cases in Asia have emerged that illustrate the opportunities and challenges of transitioning to more sustainable development models. A well-established body of literature on sustainability transitions in Europe has offered revealing insights into these opportunities and challenges. This paper traces the evolution of this literature, from technological innovation systems to a multi-level perspective, to underline the importance of governance arrangements that include marginalized stakeholders in transition processes.

It then offers three case studies − decentralised energy policy in Japan; open burning and haze pollution in Thailand; and environmentally sustainable trans-

port in Indonesia – to underscore that more inclusive forms of governance are drawing upon the stakeholder energies to address sustainability crises in Asia. At the same time, the cases underline that local and national governments in Asia tend to be more involved in these processes than suggested in either the theoretical or empirical transitions literature. This distinction suggests a need for further development of the transitions literature based on work in Asia.

2. SYNTHESIZING TRANSITIONS THEORY

1) Sustainability Transitions

Since the concept of sustainable development was introduced, there have been various attempts in policy and social science to define how societies can become more sustainable[1] (Smith et al 2005; Frantzeskaki & Loorbach 2010). In recent years, a growing number of European researchers and policymakers have begun to explore the extent to which several drivers can induce these transitions (Rotmans et al. 2001; Kemp et al. 2001; 2007a; 2007b; Loorbach 2007).

The strength of the work on transitions is that it offers a vision of the processes leading to a more sustainable world, and of the necessary drivers of those transitions. Often the main source of change is technological innovation. The transition from horse and carriage to the automobile and the fossil fuel regime is one of the most recognised historical cases of a sustainability transition; however, even the earliest work on transition perspectives holds that change involves more than technology alone. Instead, when Kemp and Soete (1992) introduced the concept of a 'transition,' they were drawing inspiration from MacKenzie, who considered the economic and sociological dimensions of technical change. It was the issue of the barriers that prevent the development of desirable, 'good' technological systems that led Kemp to believe that it is essential to address economic

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1) Social/system changes are complex. A range of approaches have been applied to understanding the concepts and ideas of change, for example evolutionary systems theory, innovation studies, transition theory etc.

and social considerations to induce and scale technological change (Kemp 1994).

If recognising the importance of social drivers to a transition process was one of the strengths of this work, another was its emphasis on a long-term, multi-stage and multi-level vision. The work on transitions recognises that environmental improvements can be achieved in the near term through system optimisation; however, as Geels (2008) has argued, sustainability transitions imply a need to completely overhaul that same system over the long-term. For example, Kemp (2007b) has looked at the Dutch Energy Transition Programme 2050, which examined how to make the Netherlands' energy system radically more efficient and sustainable; this study found that a new system would bring ten times the improvement that mere system optimisation could deliver.

There are four main approaches to sustainability transitions: technological innovation systems; strategic niche management; transition management; or multi-level perspective. These approaches focus on different causes, patterns, and drivers, but they share a similar underlying logic and are best viewed as complementary.

(1) Technological Innovation Systems

Innovation models were developed as an attempt to understand why certain technologies were widely adopted while others fail. To do so, scholars combined theories on market failure with evolutionary economics and sociology along with the history of technology. These theories recognise that technology develops within a societal context and that multiple economic, institutional and political factors interact to shift technological paradigms (Dosi 1982; Bijker et al. 1987).

From the early 1990s, two strands of innovative transition theory developed: technological innovation systems (TIS) and strategic niche management (SNM). As its name suggests, TIS focuses on the development and adoption of new technologies and highlights the importance of innovative and far-reaching technological change. As such, it defines a technological system as a "network of agents interacting in the economic/industrial area under a particular institu-

tional infrastructure and involved in the generation, diffusion, and utilisation of technology" (Carlsson & Stankiewicz 1991:94). The most important component of TIS from a sustainability transition perspective is that it starts to acknowledge the need for a system as well as technology itself to drive forward innovative change. It begins to consider not only market failure but also a broader set of system failures that can affect the uptake of new technologies.

TIS is nonetheless largely a supply-driven perspective with limited attention to social demands. Innovative technologies may only succeed if they can penetrate specialised markets that allow them to be developed and improved, to the point where they can compete with incumbent technologies and generate demand. This creates a role for policy and business to actively open niche markets by removing economic, technical, or institutional barriers until new technologies can compete with prevailing technology (Kemp 1994; Kemp et al. 1998; Hoogma et al. 2002). However, TIS somewhat neglects the social processes that enable the introduction, adoption, and diffusion of innovation. A technology is not only successful because of its efficiency, but because it is valued by consumers and supported by current infrastructure and/or regulations (Unruh 2000).

(2) Strategic Niche Management

Strategic niche management (SNM), a second branch of theory, emphasises the need for policy to address both the supply and the demand sides. SNM traces further back to the origins and enablers of change. It emphasises the concept of the niche, derived originally from evolutionary biology, as a space where radical novelties sprout and collective adopters develop (Kemp et al. 1998; Schot & Geels 2007); essentially, a niche seeds systemic change. A major consideration of SNM is how these niches might be created and widened, so as to enable sustainability transitions.

Niches that allow radical innovations emerge and situated within an existing system, and actors expand these innovations through learning and networking. For example, there have been numerous studies on soft-energy paths following the first oil crisis that led to the replacement of a centralised energy system. At some point, when niche innovations have matured and are scaled up, broader

and more durable systemic change becomes possible. SNM therefore focuses on "how niches grow, stabilise or decline in interaction with the dynamics of prevailing systems", and considers how to support and sustain niche creation (Hoogma et al. 2002; Kemp et al. 1998). This is done via carefully designed and appropriate levels of protection to help nurture innovations.

Networking within and amongst niches--to stimulate innovations and firmly nest them in a supportive enabling environment--is an important part of SNM. For example, communities applying alternative energy systems can share their long-term expectations for the future and encourage each other with their respective visions (Brown & Michael 2003; Eames et al. 2006; Geels & Raven 2006). Stakeholder involvement can also be widened to include perspectives from outsiders through social networking. Networking aims to create new platforms where diverse discussions and negotiations take place, allowing both fringe actors and established players to join and promote radical innovation.

SNM is largely a bottom-up approach that can be combined with radical niche innovations from the demand side rather than a well-managed, top-down supply side process. As Geels et al. (2008:11) puts it, a transition is "fundamentally about learning (⋯) exchange of experiences, training and competence building" to support and protect newly emerging niches. The learning process not only offers knowledge accumulation itself but also induces social and behavioural change. Furthermore, whereas learning creates disagreements and conflicts as well as harmonious results, this process needs to be governed and communication enhanced. Geels and Raven (2006 cited in Markard et al. 2012: 957) make a similar point by arguing that niches build momentum "through processes of social learning across multiple experiments, articulating promising expectations and heterogeneous networking" and will "eventually compete with established technologies."

(3) Transition Management

Whether niches are created intentionally or spontaneously, their survival is not guaranteed. In fact, many niches do not make it far beyond their initial creation. Recognising as much, a field of theory has emerged known as transition manage-

ment (TM). TM marks the next progression beyond SNM, broadening its scope to include governance perspectives on the process of transition and long-term social change. Its starting point is to identify the societal problem, then search for solutions, including, but not limited to, technological innovation. It then examines the role of governance in enabling a sustainability transitions.

The management and governance of transitions is important, especially when we consider modern democracies, where policy is made in response to a range of social and political factors. The concept of governance implies a partnership between multiple actors, rather than top-down government regulation. In sustainability transitions, governance is important because transitional social processes occur, in part, due to well-managed processes of deliberation and decision-making. These processes involve the participation of and interaction between a wide range of actors, with diverse beliefs and preferences, using a range of technologies, to create a basket of shared visions. Kemp (2007b: 327), in fact, proposed that, at the heart of TM, lies "a model of reflexive governance that aims to modulate ongoing developments to sustainability goals through changes in governance (participatory and value-focused) and adaptive policies for system change."

When the models for change are driven by the TM process, they are implemented in practice through various forms of social learning such as learning by doing, doing by learning, and networking at niche levels. In other words, while SNM brings issues around networking and social learning to the fore to help understand the formation of niches, TM focuses on governance as one of the key tools of SNM. Loorbach and Rotmans (2010) insist that "TM has been made operational as a combination of problem structuring and envisioning in multi-stakeholder arenas, developing new coalitions, implementing agendas in experiments, and evaluating and monitoring the process (Markard et al. 2012: 959)."

Importantly, TM stresses that transitions no longer depend on the prescription of what needs to be done; rather it facilitates a process to understand what could be done. In other words, transitions cannot be controlled but only directed. In recent years, there has been growing support within academic circles

for TM, especially as concepts around sustainability transitions are applied at the local level (Markard et al. 2012).

While TM usefully places greater emphasis on governance, it presently does not, however, pay sufficient attention to the interaction between social change and governance. To harness social drivers of change, it is crucial to include actors who possess a long-term vision for transitions and who are willing to implement political, social and technological experiments. Moreover, although it stresses the importance of governance, TM is rather vague on how and who will be engaged in the governance process.

(4) A Multi-Level Perspective

The creation of niches is crucial to sustainability transitions, while the management and governance of niches is essential to initiating a transition; however, successfully developed and managed niches do not always reach their full potential. Niches may be necessary but insufficient for a full-fledged transition. Academics therefore developed a multi-level perspective (MLP) approach to illustrate that transitions require change across a nested hierarchy of levels: namely at the niche, regime, and landscape levels.

This approach considers micro-level niches, where radical innovation originates, as embedded within regimes. These meso-level regimes can be conceptualised as the infrastructure and market factors that facilitate paradigm shifts; for example, much of the world is currently operating under a fossil fuel energy regime. Regimes also encompass 'softer' features such as economic cycles and societal trends. The regime is an important level of analysis; however, it too is situated within a landscape consisting of meta-factors such as cultural values and political systems (Geels & Schot 2007; Lachman 2013). Therefore, radical changes at the niche level provide windows of opportunity to achieve fundamental change in regimes, which in turn filter, even more slowly, to the landscape level (Kemp et al. 2001; Geels 2002).

Another distinguishing feature of MLP work is that Geels (2004) and other Dutch scholars have developed MLP interactions through practical policy studies. One of the best examples is a long-term, 30-year project on the Dutch

Energy Transition Programme. Geels et al. (2008) summarised some of their major findings: transitions not only need a single cause, e.g. the introduction of new technologies, but also co-evolutionary processes across multiple domains, such as economic, cultural, ecological and, most importantly, that of governance. The interaction of various social groups and stakeholders, at different scales, are crucial parts of transitions from the MLP perspective. A transition does not just result from the successful creation of an innovative niche; but it requires the governance of all interactions between a broad range of domains and processes, across multiple levels, in numerous stages and with long-term sustainability in mind. To do so, the Netherland's 30 year long-term Energy Transition programme created the Competence Centre for Transitions (CCT) in 2005. CCT runs through mutual learning processes overseen by 'transition professionals' from government, business, NGOs, scientific organisations etc. Importantly, in realising social change, actors who are not mainly involved in, or are marginal to the mainstream structure, tend to play a critical role.

However, this kind of change is not easy. Existing interests, systems and institutions tend to resist radical change, making it difficult to drive forward sustainability transitions. Supporters of the existing system may favour incremental innovation and systems improvements rather than transitional change. Also, due to high sunk costs and social dependencies on the current technological system, many stakeholders can be deeply resistant to large-scale transitional change (Sanden & Azar 2005; Frantzeskaki & Loorbach 2010).

In addition to these barriers and resistances, some theorists criticise the lack of agency implied in MLP, and its implicit assumption of a rather systemic approach to transition, due to its emphasis on rules and structures of the niches and regime. Further, some observers allege it offers limited scope for the analysis of interactions between social and institutional change. When considering the roles and strategies of different citizens or actor-groups in each process, the MLP approach does not address in detail resource distribution or the engagement of potential actors, etc. In sum, the MLP transition approach would benefit from both a greater emphasis on the 'strategic social actors' as underlined in the SNM and 'manageable governance' as underlined in the TM.

Fig.1. The Conceptual Evolution of Sustainability Transitions
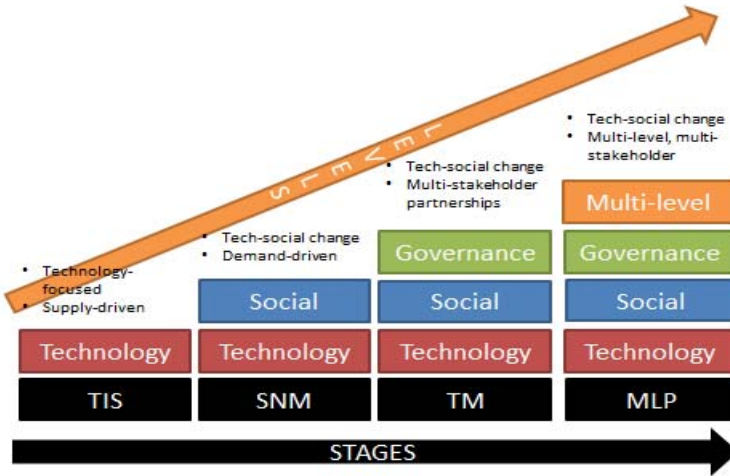
2) Making Sustainability Transitions more Socially Inclusive

In recent years, studies have concentrated more on the demand as opposed to the supply side of technological innovation. This reorientation has helped clarify that a technology is not a single element but rather a constituent agent of change. Technology interacts with people; and both participate in forming a system, much like a living organism. This insight underpins the technological innovation system (TIS) approach. It is from the foundational insights of TIS that SNM sheds more light on social networks, communities of understanding, and other social organisations that make up the demand side. Building on this feature of SNM transition management (TM) recognises the role of good governance to help innovative niches develop, and bring stakeholders with problem-solving knowledge into solution finding arenas. The multi-level perspective expands both the scale of this thinking and its desired outcome, noting the need

for changes to a nested hierarchy of niches, regimes, and landscapes.[2]

This progression of thinking raises an important policy question: how do governments fit into sustainability transitions? Certainly, governments can help overcome some of the barriers to transitions. Several cases suggest the possibility of government-guided shifts to more sustainable systems. Guidance in this case implies not only enacting policies but also boosting public awareness as well as offering funding. In the words of public policy and government expert Hendriks: "The very success of any long-term policy ⋯ often hinges on the willingness of the public and their elected representatives to accept the need for change and to fund necessary programmes" (Hendriks 2009: 343).

As aforementioned, governments can also − but do not always − facilitate transitions. The Dutch national Environmental Policy Plan lists five barriers to sustainability transitions: short-term thinking, fragmented policies and institutional deficits, lack of ownership for environmental problems, long-term uncertainty, and insufficient precautions (Kemp & Loorbach 2005). Government can create or exacerbate all of them − and are especially likely to do so if they are captive to vested interests. Perhaps even more insidiously, when governments are tied to narrow interests they are more likely to sponsor transitions with appealing titles but limited substance i.e. low carbon, green, circular economy. Such programs of change, however, do little to strengthen social networks, communities of understanding, and other social organisations (SNM) or to pull innovative niches forward and bring stakeholders with problem-solving knowledge into solution-finding arenas (TM). They thereby risk undermining changes to nested-hierarchies of niches, regimes and landscapes, as envisioned in MLP.

This realization has prompted efforts to shift attention from governments to governance, underlining that governments do not work alone in the pursuit of public goods. Indeed, a government too must engage in collaborative "process of

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2) In recent studies, researchers such as Markard and Truffer (2008) have analysed the linkage between the TIS and MLP on realising major technological changes. Their view is that the development of the transition approach is not a linear development process from TIS, SNM, TM to MLP, but instead lies with the possibility of combining and complementing each perspective.

decision-making and the process by which decisions are implemented (or not implemented)" (UNESCAP 2009: 1). The shift further underlines that governance is not only an important element in sustainability transitions but also itself can be reshaped in a transformative process from a bureaucratic, authoritarian administration to a participatory and deliberative set of institutions. As implied by this process, there are multiple forms of governance and some may not be good for the long term pursuit of sustainability objectives. Some forms of governance may, in fact, privilege vested interest and lock-in conventional approaches to development.

   The risk that existing governance arrangements prevent transitions from moving forward may loom particularly large in Asia. Many of the countries in the region historically subscribed to a state-led development model that limited opportunities for bottom-up participation (Wade 1988; Haggard 1990; Evans 1995), features of which are still evident today. This risk may be even greater considering the substantial volumes of literature on environmental policy in Asia that suggest a similar state-led approach has been used to reduce pollution or avert environmental crises. Illustrating this line of thought, Michael Rock maintains that "the creation of tough, competent, pragmatic and fair command-and-control environmental agencies with sufficient capacity and legal authority to monitor and enforce new emissions standards was the sine qua non of success in each of these economies" (Rock 2002). The next logical question is what forms of governance have begun to emerge to handle sustainability crises; and to what extent have these forms been able to harness the energies of otherwise excluded stakeholders? These are no longer theoretical but empirical questions, which can be explored in case studies that illustrate some of the differences between transitions in and outside Asia.

3. CASE STUDIES

This section begins with the case of decentralisation of energy systems in

post-Fukushima Japan, highlighting how energy consumers, local governments and some energy companies are building partnerships around saving energy. It then examines open agricultural burning and haze pollution in Northern Thailand, and the opportunities and challenges the Thai government faces in adopting a more bottom-up approach to address the post-harvest burning of agricultural residue. A third case looks at efforts to modernise the transport system in Bandung, Indonesia with bus rapid transit (BRT) and the value of involving owners and operators of informal public transport into the sustainability transition-process.

1) Decentralized Energy Policy in Post-Fukushima Japan

There are usually a number of stages to sustainability transitions; they often begin with a modest initial shift that forms a niche (resembling the early slope in the letter 'S'). Following the 2011 Fukushima nuclear accident, Japan embarked upon a potential transition from a centralised to decentralised energy system. Some of the catalysts behind this transition were straightforward. The aftermath of 2011 exposed weaknesses in an energy system that relied chiefly on ten regionally concentrated utilities to generate, transmit and distribute energy. Another stimulus was the prolonged shut-down of most of the country's nuclear plants, which left Japan increasingly dependent on imported fossil fuels (Ministry of Energy Trade and Industry 2013).

Some of the policy responses were also straightforward. Energy use declined dramatically in the summer of 2011 and remained at lower levels through 2013 due to several energy-saving measures. For the first time in decades, businesses developing alternative energy sources i.e. renewables began to gain market share due to new feed-in tariffs (FIT). How Japan's efforts to put in place demand response (DR) measures were accelerated in response to the nuclear disaster illustrates the importance of bringing energy users into a transition to drive it forward and scale it up. This case study – which draws upon a review of primary source documents and interviews conducted in 2012 – also underlines the need for multi-level, multi-stakeholder engagement to scale change.[3]

(1) Demand Response (DR) Systems

In the immediate aftermath of Fukushima, the Japanese government proposed a number of energy saving reforms. Shortly thereafter, companies in the affected Tokyo and Chubu regions adopted several no- and low-cost measures to limit use of air conditioners, lamps, and personal computers. To a large extent, these measures paved the way for demand response (DR) schemes. Such schemes aim to encourage businesses and consumers to actively reduce energy use, especially at periods of peak demand. DR schemes rely on smart meters that enable two-way communication between the utility and customer. Smart meters sensitise users to fluctuations in energy prices, thus encouraging savings during peak demand, when prices are highest. By effectively lowering demand, additional investment in transmission lines and power plants can be avoided, in theory freeing up resources of utilities to invest in other areas, including alternative energy sources. Currently Japan is piloting several DR schemes, including:

- Time-of use (TOU) pricing, in which customers pay electricity prices that vary according to demand at the time, rather than a single flat rate[4];
- Critical-peak pricing (CPP), which categorises electricity prices into very expensive critical peak, expensive peak and cheaper off-peak periods;[5] and

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3) Study funded by the Ministry of Environment Japan in 2012 using the Environment Research and Technology Development Fund. The study was conducted using several methods: (1) literature review of government documents at the national, sub-regional and local level to identify policies, regulations and institutional setup when introducing the new energy services and technologies; (2) a series of interviews conducted in Tokyo and Nagoya with the private sector to understand steps taken after the 2011 earthquake in terms of energy efficiency measures; (3) a web based survey in 2012 and 2013 to ascertain to what degree citizens were likely to sign up for new energy services.

4) Formal interview with private company Ennet which started to provide commercial demand response related services since 2012 were conducted twice. Once in October 2012 during the pilot stage of their service and the second time in October 2013 after it was officially launched to understand the challenges they faced.

5) ibid

- A peak-time rebate (PTR) programme[6] in which utilities offer consumers rebates for each kilowatt-hour that they reduce below baseline usage. The consumer's bill remains exactly the same if it does not reduce its usage.

DR schemes do not exist in a vacuum; they require the initiative and partnership of several stakeholders. In Japan, local governments have been amongst the chief engineers of change. The Tokyo Municipal Government and the Yokohama City Government, both recognised as embracing innovative approaches to climate change, were quick to make subsidies available for business-led DR schemes. For the 2013 fiscal year, Tokyo earmarked 20 million yen to subsidise the costs of retrofitting buildings with energy management systems such as smart metering equipment to monitor utility transformers, transmission and distribution lines, generation units, and consumption within a building (Tokyo Municipal Government 2012).

The private sector has also been an important player. In 2012, utility Tokyo Electric issued a public tender for business consortia interested in conducting experiments using DR schemes; the tender offer reflected the company's shortage of post-Fukushima power generating capacity. Scheduled to run during the summer seasons of fiscal year 2013 through 2016, five consortia were selected to serve as agents on behalf of the utility (Tokyo Electric 2012). In this role, they offer consumers incentives for reducing energy demand when forecasts suggest that peaks are likely to exceed maximum target levels. The consortia actively target factories, offices, supermarkets and schools to bring down their energy use, while also gathering data from participants who spend time in so-called 'urban laboratories' to further refine programme design.

Japan's national government has also been active in the DR arena, with some of these efforts predating Fukushima. In 2009, even before the nuclear disaster, the Japanese Ministry of Energy Trade and Industry (METI) took the lead in developing a learning platform to examine the possibility of introducing DR schemes in conjunction with a smart grid; similar platforms have been set up at

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6) ibid

the initiative of the private sector. The aforementioned Tokyo Electric project is sponsoring R&D while also providing information to METI to help develop required policies, research programmes or financing mechanisms for innovative technologies. These platforms are intended to lend legitimacy to innovative technology, thereby pushing for strategic technology to become not only a national but global standard.

These initiatives are in fact being carried forward by other cities beyond Tokyo, such as Yokohama, Kitakyushu, Kyoto and Toyota. Here, 'living laboratories' exist in which community-wide energy management systems are connected to smart meters. The connected communities are then used to conduct experiments under a DR task force that recognises the technology's value and potential to gain traction internationally. Meanwhile, the energy service industrial network that was once dominated by energy professionals employed by regional utilities is opening up to companies outside of the conventional energy sector – e.g. real estate developers, information technology firms, air-conditioning manufacturers, etc. The entry of entrepreneurs is effectively expanding the market and potentially may facilitate broader change in the energy sector.

(2) Sustaining and Scaling Energy Transitions in Japan

DR may appeal to and require the collaboration of many stakeholders, but it is not a panacea. Interviews conducted for this case study suggest that oftentimes companies prefer reducing peak demand through measures that do not interfere with manufacturing or business schedules; this suggests a reduction in demand at certain times but similar levels of overall use. Furthermore, in buildings it is also questionable whether all of the tenants will absorb the initial costs of refurbishments to integrate DR schemes. Lastly, without local government involvement in the development of community-wide energy management schemes, DR scheme coverage can only increase at a slow pace – building-by-building rather than community-by-community.

Although DR schemes for single buildings/apartments have begun to be offered commercially, most initiatives are still in their initial stages because of the scale and variety of the technologies involved. Meanwhile, internet surveys con-

ducted in four cities in Japan in 2012 and 2013 show a drop from 43 per cent to 35 per cent in the number of citizens willing to accept mandatory requirements, and the number of those indifferent or uninterested rising to 65 per cent.[7] This suggests the need for continued government engagement to gain further support.

This case study shows that with DR schemes, the important elements for promoting sustainable transitions – namely developing a knowledge base, creating a niche market and the push by the private sector to gain legitimacy for the novel technology – are readily evident. While this push for DR schemes seems to have been accelerated and triggered by the nuclear incident one should note the foundations for this already existed and it was not a wholly new development. Based on the findings of surveys conducted, however, it is clear that, before municipalities introduce additional green regulations or consider setting up renewable energy joint-ventures, further consultations with the local community and enabling reforms from the centre government will be necessary to communicate the costs and benefits of proposed measures.

2) Open Burning in Northern Thailand

Developing countries in Asia face a wide range of air pollution problems including open burning. Open burning is typically practiced for post-harvest land clearing for rice, sugarcane, maize, and other crops. Burning is believed to be the cheapest and fastest way to clear land before planting the next crop cycle. Clearing land is increasingly important as farmers in Asia seek to keep pace with a globalising market for agricultural commodities. But because agricultural burning is not always controlled properly, it can easily spread to forests – interviews suggest that the majority of forest fires result from agricultural land clearing.[8] It also causes what is increasingly known as Thailand's haze problem.

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7) Internet survey conducted in Oct 2013 with 1000 samples from citizens in Yokohama, Kawasaki, Nagoya and Kitakyushu.

8) For this case study, informal interviews were conducted with various local stakeholders

The first time Thailand's haze reached crisis proportions was 2007[9]. In March of that year, Chiangmai city, the so-called northern capital of Thailand, was blanketed for weeks in a murky cloud of particulates. The haze from that year levied a heavy cost on the city. There were 21,336 respiratory patients in Chiangmai's 23 public hospitals that month, compared with 16,718 in March 2006, and 18,025 in March 2008. Ambient air quality data strongly supports the asserted linkage between the marked increase in health problems and the open burning practice; with 24-hour particulate matter 10 levels reaching a peak of 396 μg/m3 on 13 March 2007 – nearly 8 times the WHO guideline of 50 µg/m3 (Kim Oanh and Leelasakultum 2011).

(1) Clearing the Air in Northern Thailand

Thailand's government has not sat idly by as haze became a problem. It was in fact a founding signatory member of the 2002 ASEAN Agreement on Transboundary Haze Pollution, which joined all ten ASEAN Member Countries in an effort to tackle transboundary pollution (Tipayarom & Oanh 2007). More recently, attention has concentrated at the national level. In 2007, the then Prime Minister, General Surayuth Chulanon, established the Forest Fire and Haze Committee for Northern Provinces. However, the committee was disbanded in January 2008 after General Surayuth stepped down from office. Less than a year later, Thailand's newly elected then Prime Minister, Abhisith Vejachiva, issued order No. 126/2009 to establish a National Haze and Forest Fire Committee, and assigned the Ministry of Natural Resources and Environment (MNRE) to provide a chairperson. But even with high-profile ap-

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(officials from the local governments and agricultural offices, farmers), who participated in the socializing meetings organized by the Pollution Control Department (PCD) of the Ministry of Natural Resources and Environment, Thailand in Northern provinces in November 2012 prior to PCD's introduction of then-Nine-Point Plan to address open burning. .

9) The Pollution Control Department (PCD) of the Ministry of Natural Resources and Environment therefore warned people in affected areas to stay indoors to reduce exposure to the haze.

pointments, the lack of interagency cooperation and budgeting shortfalls limited its effectiveness.

In 2010, the National Haze and Forest Fire Committee issued order No. 1/2010 to set up a subcommittee for eight Northern Provinces to: 1) identify countermeasures and develop action plans to address the haze problem; 2) improve public relations with local stakeholders; 3) supervise operations in the provinces; and 4) establish provincial coordination centres to develop working plans and monitoring methodologies as well as coordinating information collection and dissemination with central, regional, and provincial sources. The plan nevertheless suffered a fate similar to the other control efforts.

By 2012, the open burning issue was attracting growing attention from the media, which led the former Prime Minister, Yingluck Shinawatra, to task the MNRE (and the Pollution Control Department, or PCD) with drafting plans to ban outdoor fires during peak periods (Bangkok Post 2012). The PCD, established in 1992 within the MNRE, plays a pivotal role in developing and implementing air pollution policies. It also works closely with other agencies such as Office of Environmental Policy and Planning (ONEP), the lead voice on all environmental policies and financing in the MNRE. In the case of open burning, the Ministry of Agriculture and Forestry at the national level and provincial governments and sub-district administrative organisations (SAO) contribute to the formulation and implementation of activities. The scope and details of air pollution abatement activities are spelled out in the Enhancement and Conservation of National Environmental Quality Act (NEQ) B.E. 2535, 1992 (passed in 1976 and revised in 1992) and the national ambient air quality standards (NAAQs) under this Act.

Following that request, the PCD began holding meetings to brainstorm countermeasures for the coming dry season. It gradually expanded the scope of the dialogue to include not only several divisions in the MNRE but local officials from affected communities. This consultative process produced an Eight Point Plan that became effective on 8 January 2013; some of the actions proposed, such as the public relations campaign, were rolled out in Northern Thailand shortly thereafter. Table 1 summarises the key measures in the plan, and the re-

Table 1: Implementing Responsibilities – Eight-Point Plan

Measure	Responsible Agencies
Prohibit burning of agricultural residue, waste and unwanted flora from 21 January to 10 April, except in areas receiving a waiver. Each province received a quota and defined area for burning during this period. Special permission from local administrators is required for burning during the period.	Ministry of Interior with other key agencies, i.e. Department of Provincial Administration, Department of Local Administration, Governors of Chiang Mai, Chiang Rai, Phrae, Nan, Lampoon, Lampang, Phayao, Mae Hong Son and Tak Provinces Ministry of Transport with key agencies, i.e. Department of Highways, and Department of Rural Roads, for control of open-burning along the highways
2. Intensify forest fires prevention	Department of National Park Wildlife and Plant Conservation and Royal Forest Department, in close collaboration with the aforementioned agencies for measure 1
3. Promote "villages free from burning"	Pollution Control Department (PCD) and the Department of Environmental Quality and Promotion within the Ministry of Natural Resources and Environment (MNRE)
4. Engage private companies to participate in haze and forest fire countermeasures through corporate social responsibility programs	Electricity Generation Authority of Thailand Ministry of Energy Ministry of Agriculture and Cooperatives with key agencies, i.e. Land Development Department, and Department Agricultural Extension
5. Raise awareness by stepping up public relations	Public Relations Department Ministry of Tourism and Sports Ministry of Social Development and Human Security Ministry of Education Ministry of Public Health
6. Establish an early warning haze incident notification system	Thai Meteorological Department Department of Disaster, Prevention and Mitigation in cooperation with the Royal Thai Army, Royal Thai Navy, Royal Air Force, and Border Patrol Police if required to put out large-scale open fires
7. Expand cooperation with neighbouring countries to mitigate trans-boundary haze	Ministry of Foreign Affairs Ministry of Defense in collaboration with MNRE
8. Establish "haze pollution prevention and solution centres" for nine provinces in Northern Thailand	Ministry of Interior with key agencies assigned for countermeasure 1 and Department of Disaster Prevention and Mitigation in collaboration with PCD of MNRE

sponsible agencies.

The lack of accountability of participating agencies also presents a challenge. There are 28 agencies involved in mitigating open burning. The sheer number makes it easy to shift accountability between participating agencies. The fact that the PCD, a department within a line ministry, is leading these efforts makes it easier still for higher-ranked organisations to skirt responsibility.

Insufficient human resources for enforcement at the local level also present a sizable hurdle. A shortage of staff is particularly evident during the open burning peak season. Previous efforts to control the haze problem showed that top-down approaches to implementation struggled due to similar shortfalls. The recent effort to engage with a broader cross-section of stakeholders is a step in the right direction, but it has not helped meet human resource needs.

Arguably the greatest near-term barrier will be generating sufficient funds to support the implementation of the plan. As noted above, funding for implementing the programme came chiefly from the regular budget, with some additional support from the emergency budget. An expanded and separate budget line will be needed to address many of the above barriers. This includes improving the quality and coverage of the data, providing feasible alternatives for local communities, and increasing staffing. These problems are particularly acute at the local level, where there are growing expectations for the provision of public goods but limited resources to meet those expectations.

One of the key challenges is to ensure the proposed measures be followed through. The Eight-Point Plan was approved only for 2013, and thus questions exist about 2014 and beyond. A related challenge involves the institutional arrangements overseeing the Plan's implementation. In theory, creating a committee to coordinate and jointly look into the problems involved makes sense given that no agency can solve these problems single-handedly. In reality, committees often lack the authority to command agencies – they can only request assistance from participating bodies. Most ministries have different priorities and yearly targets, and combating haze is not part of either these priorities or targets. Therefore, agencies in the committee tend to lend their support only when it aligns closely with pre-existing administrative mandates. This does not mean

agencies do not want to cooperate, but rather are restricted by their own yearly targets and organisational structures.

(2) Bringing in Stakeholders

In contrast to previous efforts to manage open burning, the Eight-Point Plan placed a greater emphasis on public consultation to strengthen compliance. In the past, public participation was typically requested only during implementation − that is, after the design of the program had already been determined. However, many stakeholders felt that the purposes of the proposed measures had not been clearly explained and that they were poorly suited to local conditions. Those involved in crafting the Eight-Point Plan expected that greater engagement would help anticipate problems and barriers to implementation. As a result, emphasis was placed on working with communities to identify and disseminate best practices through the plan's consultation process.

To demonstrate this commitment, the PCD organised a series of public meetings in nine provinces in Northern Thailand in November 2012. The meetings attracted 300-500 people per province. Attendees consisted of representatives from local government, community groups, educational institutions, the private sector and the military. The meetings helped not only to solicit local feedback but also to better understand challenges in high-risk areas.

The PCD also explored how the private sector could contribute, through both its regular business practices and corporate social responsibility (CSR) programmes. For example, companies involved in harvesting corn were encouraged to consider a contract-farming arrangement, providing free seeds, planting consultations and guarantees of unlimited crop purchases in exchange for non-open burning agreements. Interviews showed that the private sector was generally receptive to the PCD's proposal; however, some company representatives wanted more details on how they could be involved in long-term solutions beyond contracting.

Above and beyond these efforts, awareness-raising was made a feature of the Eight-Point Plan. The most significant efforts to boost awareness began on 19 January 2013 with the kick-off of an Eight-Point Plan campaign in nine

provinces. Starting in Chiang Mai, the campaign underlined that achieving open burning targets required cooperation from multiple stakeholders. During the 80-day peak period, the haze centres and responsible parties were to monitor haze closely, while simultaneously promoting countermeasures. Each province slightly modified its approach to reflect variations in burning quotas, and to use appropriate indigenous languages.

Another distinctive element of the Eight-Point Plan was to identify and disseminate community-based best practices. The 'Demonstration Villages for Open Burning Free Prototype' encouraged villagers to employ their own methods to mitigate haze. Community-based activities included self-monitoring and self-regulating fires; introducing effective forest fire controls; initiating public relation campaigns; introducing alternative income from non-burning practices; and developing community or tribal-based rules for controlling open burning and forest fires.

There are also efforts underway to encourage villages to create sustainable self-learning groups for open-burning free activities. These groups are expected to motivate other villages to follow suit. Villagers in Lampoon Province, for example, established teams to create firebreaks prior to the dry season to prevent forest fires from spreading into cultivated areas adjacent to the forest. Although this measure does not address the cause of forest fires, it can reduce the damage they cause.

However, the Eight-Point Plan may focus too much on ameliorating the impacts of haze during the peak period rather than providing a long-term sustainable solution to the problem. While there have already been significant improvements in developing and compiling data on air pollution from open burning, greater efforts could be made to improve data quantity and quality, especially in high-risk areas where stations are far from fires or non-existent.

Information sharing could be also improved. During a field visit and public consultations in November 2012, interviews further revealed the difficulties involved in tailoring information to community needs. For example, in Om-Goi District in Chiang Mai province, corn growers are often perceived as uncooperative, still relying heavily on open burning practices. However, in inter-

views local administrative officers admitted that public relations and education programmes failed because 90 per cent of these farmers speak indigenous languages and could not understand materials provided in Thai. Another challenge involves changing the mind-sets of farmers who believe in traditional land-use management and cultivation practices. There are numerous cases where a lack of public cooperation can be traced back to strong beliefs in traditional technologies and practices and lack of access to alternative ways (Kim Oanh 2012; Gupta 2012; Launio et al. 2013).

3) Paratransit in Bandung, Indonesia

Over the past two decades, motor vehicle use has risen sharply in Asia's developing cities, increasing traffic congestion, degrading air quality and contributing to climate change. The poor quality of public transport is a significant contributor to these problems (Senbil et al. 2005). Under-investment in public transport in conjunction with pro-car policies has encouraged middle- and high-income groups to choose private vehicles as their preferred mode of transport (Nugroho 2010). Meanwhile, poorer sections of the population often rely on a wide variety of modes that operate outside the formal transport systems. These modes are collectively known as paratransit, which fills the gap between conventional buses and private automobiles, and is crucial for cities that often lack resources to construct and manage multiple modes (Shimazaki & Rahman 1996). To facilitate transitions in the transport sector, the integration of formal public transport and informal public transport will be of critical importance.

Over the past five years, the sustainable transport and climate change community has focused chiefly on improving formal public transport. Often framed under the heading of 'avoid-shift-improve', support for upgrading public transport as a means to shift passengers to more efficient modes has become a much-recommended solution in international policy circles. Mode-shifting has the additional merit of relying on the existing transport system, while discouraging the purchase of more vehicles. In part due to these strengths, many cities in Asia have begun to plan bus rapid transit (BRT) systems. Operating like

above-ground subways with a segregated lane and advanced service amenities, BRTs have migrated from Latin America and grown throughout Asia. However, often lost in the enthusiasm for modernising public transport are the owners, drivers and paratransit patrons. The following section examines the multi-level, multi-stakeholder governance reforms needed to bring paratransit into an environmentally sustainable transport transition in Bandung, Indonesia.

(1) Moving forward in Bandung

Bandung is a city of 2.3 million people, located over an area of 16,767 hectares in the centre of Indonesia's West Java Province. Like many cities in rapidly urbanising Asia, a recent wave of growth has driven up land prices, expanded city and fostered a growing dependence on motorised transport. Nearly half a million cars operate on Bandung's 932 km of roads, with economic losses from congestion estimated to be in the neighbourhood of US$700,000 per day in 2004 (CDPA 2003; Tamin 2004). As is also common in many cities in Asia, the absence of a pedestrian-friendly environment and the growing distances between housing, work and commercial centres have increased vehicle dependence. The lack of public transport capacity and inter-city travel, especially from Jakarta on weekends, has added to congestion.

The current state of the transport system is well documented in recent vehicle statistics. By 2007, more than half of Bandung's vehicles were private vehicles, mostly motorcycles (Widyarini 2012). Within the remaining public transport fleet, the vast majority of vehicles could be classified as paratransit. Approximately 60 per cent of those vehicles are 10-16 seat public minivans called angkot, while single-seat motorcycle taxis known as ojeks and two seats cycle-rickshaws make up the remainder. The paratransit fleet operates with considerably more flexibility than the formal public transit system. The ojek motorcycles – virtually indistinguishable from personal motorcycles – enjoy the most flexibility, navigating through crowded streets in all corners of the city. Their abundance also illustrates just how central paratransit is to Bandung's public transport system.

In recent years, Bandung has sought to modernise its transport system and

much of the effort has focused on Trans Metro Bandung (TMB). TMB is a BRT system that currently operates along two corridors with 20 fleets, carrying approximately 10,000 passengers per day. The creation of BRT has come at the initiation of the central government. Following provisions in the Traffic and Transportation Law No. 22/2009 and The Blue Sky Program, Indonesia's central government began providing funding for BRT buses. Initially, the Ministry of Transport informed city governments about the BRT and determined if there was sufficient interest in implementing a program. If there was indeed interest, deeper discussions could culminate in the national government providing the bus fleet as a grant to the local government. In return, the local government was expected to finance BRT support facilities, including the physical infrastructure (shelters, sign and road lane); responsible operators; and additional operation and maintenance needs. Bandung city received 10 buses from national government in 2011.

Coordination is also essential at the city level. At the preparation stage, coordination between relevant agencies has also become increasingly important at municipal level. To highlight another salient example in Bandung, the agency of Public Works must engage with the transportation agency to set technical and service standards for operation on existing roads. Then, at the operation period, the need for sound coordination became apparent once buses were delivered to the city government, becoming part of the city's assets. Shortly thereafter, the Bandung government appointed a special task force unit under the transport agency of Bandung city to operate the BRT system known as the Trans Metro Bandung. Under this arrangement, all important decisions needed approval from the city council. Moving forward, the local state-owned bus company (DAMRI) will operate some TMB buses. Currently, the local government subsidises the operation of TMB, and it covers shortfalls in the operating budget. Identifying a business model that can fit within existing management arrangements but does not strain the financial health of the city will be crucial. Elements of the system that can fill these gaps will hence be equally crucial.

(2) Bringing in Paratransit

Finance is not the only reason why paratransit will need to be integrated with public transport; both drivers and patrons rely heavily on the service, making it difficult to make headway without their inclusion. There are nonetheless several challenges to this integration. Arguably the most significant being the differing business models. Paratransit systems are run by small- or medium-sized enterprises that employ groups of drivers in highly competitive markets with varying levels of service and no overarching management. Formal public transport, on the other hand, is managed by large companies with modern management systems. These differing business models have implications for a number of other issues. For paratransit specifically, better revenue management, sectorwide coordination, especially between paratransit types, and competition between paratransit are high on the list. There would also need to be a greater emphasis on improving the quality of service. Improved quality would also have benefits such as a vehicle replacement programme, enabling drivers to exchange shifts, and labour unions that allow drivers to collectively bargain for other work environment enhancements (TRB 1999). Perhaps most crucially, these quality improvements could boost drivers' income.

To be sure, all of the necessary steps will require a process that gradually integrates paratransit and public transport. Strong leadership guiding this process will be essential, as will mechanisms that facilitate engagement with relevant stakeholders. Several cities in Asia have established a city transport council. The city of Surabaya, Indonesia, for instance, has worked with the transport council to create a vehicle replacement programme and a programme that ensures the angkot drivers are paid wages. This may offer lessons for Bandung where integration has yet to begin in earnest. Introducing these reforms will not be easy; it will require flexibility from both the government and those owning and operating public transport. It is also possible that, in an effort to bring paratransit into a modernising transport system, the government overreaches and excludes not only paratransit but many of the poorer residents who depend on it for their livelihoods.

Table 2: A Comparison of the Cases

	Japan Post Fukushima Energy Policy	Thailand Haze Pollution	Indonesia Paratransit
Key Stakeholders	Residences and businesses	Farmers	Paratransit users/operators
Development Stage	Niche developed for demand response and similar energy savings programme	Niche developed for alternatives to open burning	Niche possible but not yet developed for integrating paratransit into the transport system
Governance	· Policymaking process included residences and business · National and local governments steer the process	· Policymaking process including farmers and good practice villages · National and local governments steer the process	· Inclusion of paratransit in policymaking process considered · Local government likely to be actively involved in the process
Challenges	· Waning public support and motivation · Additional regulations local consultations on costs/ benefits of measures.	· Insufficient communication of the impacts of open burning · Lack of human resources and monitoring data	· Drive for modern transport system

4) Comparing Niche Stage Transitions in Asia

As summarised in Table 2, the case studies vary greatly in terms of their targeted problem and proposed solution. The first case focused on demand response energy reforms in post-Fukushima Japan that illustrated the early stage of a possible low carbon transition. The second case centred on stakeholder-centred solutions to the haze pollution generated from open burning of agricultural biomass in Northern Thailand. The third case focused more on owners and operators of paratransit in Bandung, Indonesia.

Yet as also illustrated in Table 2, despite clear differences, the cases also illustrate some important parallels. First, all of the cases are the result of crises that are opening windows of opportunity for potentially transformative change.

Second, all of the cases illustrate the importance of bringing marginalized stakeholders into the decision making process; leaving these stakeholders out of the process could undermine the development of niches. Third, the governance arrangements that are directing these transitions tend to see a larger role for government than is envisioned in the reviewed transitions literature. Fourth, in some of the instances the key barriers to moving a transition forward is the lack of government capacity to meaningfully engage and advance stakeholder solutions. Getting the balance right between government and stakeholder engagement might be important to governing sustainability transitions in Asia. In fact, achieving this balance may be particularly important as governments shift from state-centred to stakeholder driven forms of development.

4. CONCLUSION

This paper started with the contention that sustainability transitions will be critical to transforming conventional approaches to development. It then suggested that while such transitions will be increasingly important in Asia, much of the research has focused on cases in Europe. This is unfortunate not only because of the mounting list of environmental problems confronting the region, but the significant opportunities to draw upon the energies of marginalized stakeholders to drive and scale these transitions in Asia.

The paper then turned to the literature on sustainability transitions, noting that this work has increasingly underlined the need for social change to work hand in hand with technological change. The need for social change is particularly important at the niche level when new approaches begin to take root. It further argued that it will also be critical for governments and civil society to help nurture that virtuous cycle of change. Good governance rather than government will be critical to carrying forward and scaling a sustainability transition. Moreover, this process will be particularly revealing in Asia because modes of governance are increasingly transforming from autocratic and bureaucratic to ones that are more deliberative and consultative.

Yet as suggested by the case study this process is ongoing and getting the balance right between stakeholder and government engagement when governing sustainability transitions in Asia remains a key challenge. While much of the work on sustainability transitions is based in Europe, there may be important distinctions between the governance contexts in the two regions that merit additional research; more specifically, many of the governance systems in Europe have in place fully consolidated deliberative mechanisms whereas in Asia these systems are themselves undergoing transitions. The differences in governance contexts might explain why an outside triggering event such as Fukushima or a sufficiently strong government such as in Northern Thailand may be needed to carry forward a transition. Last but not least, all of the above cases are currently at the niche level; additional research will be needed to see whether and to what extent they become part of a broader shift at the landscape or regime level. As this research advances, the case studies themselves may offer additionally useful insights into key international policymaking processes, including negotiations over a transformational and inclusive post-2015 development agenda and sustainable development goals (SDGs).

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