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About The International Journal On Green Growth And Development

The International Journal on Green Growth and Development is an effort to stir a debate around emerging "green" concepts and development. The publication aims at building knowledge through stakeholder engagement on policy-relevant issues to understand the many facets of green growth and development. It is a step towards a forward-looking knowledge process for new opportunities linked with growth and sustainable development. The journal showcases new research through peer reviewed articles, opinions, and innovative practices. The new journal will build our previously published *Green Growth and Development Quarterly*.

The publication will cover the following topics:

- Sustainable energy
- Options in natural resource management and ecosystem services
- International cooperation and development
- Climate change
- Best practices in innovation policy, public–private cooperation, and financing
- Theoretical paradigms around green economy
- Analytical tools for informing decision making in environmental sustainability
- Developments in international policy and environmental sustainability
- Transformational development paths to an inclusive green economy
- Resource efficiency
- Natural capital and ecosystem valuation
- Assessment and communication of green growth benefits
- Integrated strategies for poverty reduction and green development
- Green infrastructure development
- Harmonizing economic, environmental, and social development policies
- Mobilizing private investment in green technologies and systems
- Green innovation policies and programmes
- Water management
- Food–energy–water nexus
- Sustainable consumption and production; lifestyles

Foreword

THE WORLD APPEARS to be moving towards a paradigm shift in development, which is being driven by several factors. The Club of Rome in its publication *Limits to Growth* over four decades ago warned the world about the consequences of pursuing a pattern of growth that merely extended past trends and practices. The study was received with interest by a few people, but many government officials, economists and policy makers criticized it, vehemently alleging that work to be a repeat of Malthusian philosophy. Soon after the release of this publication came the first oil price shock which led to quadrupling of oil prices in the global market in a very short period of time. That development gave rise to concerns related to the finite nature and geopolitical aspects of global hydrocarbon resources, and energy issues became an important part of growth and development strategies.

Since 1992, when the UN Framework Convention on Climate Change (UNFCCC) came into existence, the world has been seized of the growing challenge of climate change, and evidence of human responsibility for changes in the climate in recent decades has only grown with successive reports of the Intergovernmental Panel on Climate Change (IPCC). Increasing rates of depletion and complex problems of access related to some crucial resources globally have only added to concerns about the increase in emissions of greenhouse gases, a large part of which result from growing fossil fuel combustion. All in all, these factors are bringing about a change in thinking worldwide which is tending towards economic decision-making on consumption and production of goods and services. There is widespread articulation of policies by which these take place at a level and in a manner in which impacts on the environment and problems of depletion are taken fully into account. This has led to a new approach which perhaps goes far beyond conventional economics, and deals with biological and physical science dimensions of development. This is what is generally referred to as green growth and development.

If a transition is to take place towards greener models of growth, then substantial intellectual effort is required to define pathways that are available to us and directions by which we can move towards outcomes that represent green growth and development. It is with this in view that this journal is being launched, and it is hoped that this publication will provide a forum for publication of scholarly work dealing with every aspect of green growth and development as well as a platform on which debate and discussion would take place to enrich our knowledge in this rapidly evolving field.

The following pages constituting this issue are the result largely of invited articles, all of which have been peer-reviewed. The journal will follow a very transparent and objective policy of subjecting all papers that are published in the journal to rigorous review by distinguished researchers and professionals. It is our hope that the journal will not only represent knowledge that is evolving today, but also go back to aspects of the pioneering work of economists like Kenneth Boulding and Nicholas Georgescu-Roegen which have growing relevance to development policies today. We invite the readers of this first issue to give us their comments and advice on how to develop this fledgling publication into an established and robust source of peer-reviewed scholarly literature in a field that would have growing relevance to human activities in the future.

R K Pachauri
Director-General
The Energy and Resources Institute

ARTICLE

Rousseau, Rio, and the Green Economy

CARLOS LOPES[1#]

Abstract: *The Social Contract by Jean-Jacques Rousseau emerges as the most compelling and seminal piece of political theory. It explores legitimate political order in the context of classical republicanism. This paper delves into the following questions around Rousseau's thesis: What would Rousseau make of the contemporary multilateralist surveillance regime, gridlocked in key areas that have direct links with human security? How would he square with a society that seems to be at odds with the nature–society equilibrium that he staunchly advocated for? Will Rousseau be able to lift today's generation out of the collective myopia that focuses on individualism as the gateway to a prosperous future?*

Keywords: *social contract, collective action, governance, justice*

Introduction

JEAN-JACQUES ROUSSEAU emerges as the principal source of knowledge for 19th century philosophy. It is rare for one man to epitomize such a wide range of attributes — democrat, romantic, educational theorist, botanist, composer, the man who stood for the underdog, and the philosopher. In the 1760s, Rousseau's influence on education, sexuality, politics, and the self were brought into sharp focus in four of his most compelling literary pieces: *The Social Contract*, *Emile*, *Julie*, and *The Confessions*.

The Social Contract emerges as Rousseau's most compelling and seminal piece of political theory. It explores legitimate political order in the context of classical republicanism. In his treatise 'man is born free but everywhere he is in chains', Rousseau asserts the inalienable rights of the individual and the sovereign 'will' of the people. According to Rousseau, freedom is natural, basic, and innate. His idea of a form of social organization that guarantees social autonomy, and still holds sacred the values of a socially cohesive community, is a recurrent theme in *The Social Contract* (1913).

Rousseau's fundamental belief in collective law remains a timeless principle. According to him, equity and freedom are essential lubricants to a functional society. His principle of collective governance is kindred in

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spirit to a multilateral policy system that advocates sustainable development as the principle of governance and institutional infrastructure. Today, 300 years after Rousseau's birth, 20 years after the original Rio Earth Summit, and following decades of multilateral negotiations, Rousseau's principles of social responsibility, civic freedom, and collective sovereignty are undergoing sharp scrutiny. In short, Rousseau's well-worn Social Contract has unmasked the complexity of re-configuring the world's problems into a singular, dominant global governance regime.

What would Rousseau make of the contemporary multilateralist surveillance regime, gridlocked in key areas that have direct links with human security? How would he square with a society that seems to be at odds with the nature–society equilibrium that he staunchly advocated for? Will Rousseau be able to lift today's generation out of the collective myopia that focuses on individualism as the gateway to a prosperous future?

The rise of inequality across the world has revealed new governance challenges and made obvious the shortcomings of the two most critical institutions, the state and the market, to act as regulatory forces. Can the principles of Rousseau's Social Contract help to square this circle? Three centuries after Rousseau's compelling plea for social autonomy, multilateral institutions have not succeeded in mending the broken pieces of a Social Contract. Some of the questions that plagued Rousseau's world on inequality, freedom, poverty, nature, and society remain relevant in today's society. Nation states converge and diverge on how to achieve the tenets of sustainable development, the same way Rousseau's ideas divided the public opinion of his time.

The article will present arguments for a parallel reading of Rousseau's principles of the Social Contract in a post-1992 Rio Earth Summit world. If indeed sustainable development is considered as a governance model, it would be important to understand what the Rio+20 Summit added to this model. Finally, it will be crucial to examine the perception of asymmetries in today's multilateral regimes and governance.

The article shall point to the fact that both Rousseau's principles and those of the two Rio Summits are essentially about change and that both argue for an institutional regime — a regime to uphold change through rules, social justice, and freedom. Institutions, such as the 'sovereign' state or an international regime, such as the United Nations are seen as necessary to chart the course of change. In essence, they determine its contours, and oversee and regulate its enforcement. Rousseau juxtaposes the natural versus the unnatural. He concedes that the maintenance of a Social Contract is contingent on the process under which members of society determine the social order (Rousseau 1913). This social order is not natural; it is created and maintained by humans in society. When acknowledging the role of social order, Rousseau is also alluding to the complex machinery, processes, and sustenance mechanisms that need to co-exist along the vision of the social order he advocated for. In today's more complex world, the arguments for a maintenance regime for sustainable development and a fairer society have become compelling.

Rousseau's Social Contract and 'Sustainable Development': What Parallels Can We Draw?

There are five conceptual arguments that can serve to read Rousseau's contribution to contemporary debates.

First, Rousseau's world of the Social Contract has several parallels with a post-1992 sustainable development world. As stated earlier, both Rousseau and the iconic Earth Summit are part of change processes. In many ways, the entire concept of sustainable development can be seen as a process of change. However, it is an active process of regulation and self-regulation as well as adjustments and re-adjustments, with transmutations at all levels.

Second, Rousseau's Social Contract proposals cannot materialize without some form of associations and an institutional architecture that will devise and uphold the 'rules of the game'. Equally, a sustainable development regime is maintained by an international structure, i.e., a global system. Its enforcement and management will need robust institutions to monitor progress.

> The problem is to find a form of associations, which will defend and protect with the whole common force the person and goods of each associate, and in which each, while uniting himself with all, may still obey himself alone, and remain as free as before.

This is the fundamental problem of which the Social Contract provides the solution (Rousseau 1913).

Rousseau's essential yardstick for success resides in the way institutions are sought as a means to maintain social order and cohesion. Rousseau's state of law comes to full representation in an environment of economic institutions. A Social Contract is borne out of this institutional glue. The existence of a state of law represents institutions and describe the rules therein that determine the manner in which individuals in society deal with each other (North 1990). Rousseau's Social Contract is strongly equated with good institutions. It can only be sustained if the individuals within the system do not attempt to dislodge it. In this view, the state of nature is the natural default action for humankind; yet, the danger is that when the state of nature is in place, resources tend to be wasted in expropriation and rent-seeking activities (Cervellati 2005).

Third, Rousseau's narrative of freedom has the same motivations as the notion of sustainable development and the principles embodied in Agenda 21. Agenda 21 — the blueprint for how countries can achieve sustainable development — gives voice and agency to all stakeholders. It puts development at the centre of the debate and local actors as the frontrunners in deciding how strategies can be formulated and actions implemented. Rousseau's freedom narrative may sound ambiguous and even contradictory. In *Book I* of the Social Contract, Chapter VI, Rousseau poses the challenge as he sees it:

> Find a form of association, which defends and protects with all common forces the person and goods of each associate, and by means of which each one, while uniting with all, nevertheless obeys only himself and remains as free as before.

The question remains: Why must the move to a political society leave everyone as free as before? How does one reconcile the freedom of citizens along with the coercion that a government has to apply to make its citizenry obey its will? It is clear that the principles of sustainable development cannot be understood in the absence of real freedom.

Amartya Sen's idea of expanding the concept of development to include freedom understood as access to basic entitlements is linked to the tenets of sustainability and the Rousseauian ideal. According to Sen, deprivation is strongly associated with the absence of entitlement to "some good rather than the absence of the good itself" (Sen 2009). He argues that in a famine context, the default analysis is not an absolute absence of food or poverty, but rather the absence of entitlement to the food that is available. Sen asserts that famine tends not to occur in a country where free press and openness is observed. In short, when victims of famine are able to make visible their plight, governments are compelled to respond. To a large extent, he poses a fundamental question to Rawls and other political theorists such as Rousseau: if justice is reduced to the product of a contract, who will uphold the interest of non-contractors, foreigners, and future generations? These interested parties may be overlooked.

The Rousseauian idea of the 'general will' is a metaphor for social autonomy. It is indicative of the sustainability of societies acting collectively to ensure that future generations do not have to bear the burden and correct the wrongs of present generations. The notion of intergenerational equity mirrors Rousseau's 'general will' as a symbol of law that will work for the collective good of citizens. Our collective force in a Rousseauian world is when our dependence is de-personalized, and we embrace the community as a way of escaping social ills. The 'general will' exercises the main role of reconfiguring forms of dependence. It ensures that society is properly structured to uphold the freedom of each individual. The 'General' — Rousseau's short hand for the state — will also establish the rule of law to ensure that all members of society are equally treated. Rousseau's sense of 'enlightened self-interest', in which individual members of society are recognized by propping up each other's self-esteem, is the same vision as found in Agenda 21. This is a vision that reinforces the principle that by acting today in harnessing the Earth's resources, one is merely acting in one's own and in the interest of future generations.

Fourth, the notion of power also allows a comparator of Rousseau's 'General' to the dominant state and the multiplicity of non-state actors in today's complex world. The management of global problems goes beyond the responsibility and purview of the unitary state actor. This is a very different reality from Rousseau's

world where the state was 'omnipresent'. The implications of managing global issues, such as climate change, trade, or transboundary resources are not respectful of borders. They tend to 'leak' and 'spill' over national boundaries (Castree 2003).

The state may exercise its legitimacy and authority within national boundaries, but non-state actors in the form of international regimes continue to assert their authority and governance models, with many countries facing the same global challenges. Today's dominant state, protagonized by the principle of sovereignty, is losing ground. International regimes are in high demand for the expansion of collective territoriality of the state and reduction of transaction costs. They act as providers of information and facilitators of inter-state cooperation (Hasenclever *et al.* 1997).

With international regimes wielding greater authority in the regulation of global governance processes, the role of the state has been weakened. Rousseau's Social Contract does not reflect the proliferation of non-state actors in an increasingly complex world. Global challenges, such as biodiversity, climate change, and international trade remain state prerogatives. Boundaries confer both sovereignty and exclusivity to the state. When some state powers are shared or ceded to international regimes as part of a process, it is done with a prerogative to roll back any decision contrary to sovereignty interests. As Paterson argues, the 'fundamental [yet largely unacknowledged, and certainly unexamined] commitments in this understanding of global environmental politics are of an inter-state understanding of global politics, a liberal understanding of political economy, and of the neutrality of science' (Paterson 2001).

A *fifth* parallel between Rousseau and the post-1992 world can be found in the immediacy of institutions as emblematic structures for change. It is worth noting that Sen offers a counter argument to Rawls, and even Rousseau, on the importance of institutions as upholding the rule of law. Rousseau's Social Contract is intimately linked to an institutional order as the main legislator of rules that predetermines social behaviour. The naive assumption is that the right set of institutions will prevail. Little importance is given to contradictory human behaviour. As Immanuel Kant put it: '*even a race of devils could, if intelligent, produce just institutions and a just society*' [emphasis by author] (Kant 1957). Current international governance and decision-making processes unmask this assertion.

Sen's depiction of Sanskrit literature on ethics and jurisprudence outlines the difference between *niti* and *nyaya.* A careful analysis of both terms reveals their association with justice, but they both summarize different notions. *Niti* is used to refer to correct procedures, institutions, and formal rules; whereas *Nyaya* is a more all-encompassing term that looks to the world that emerges from the institutions we create, rather than merely mirroring the structures of institutions. Hence, Sen, similar to Adam Smith, Douglas North, and J S Mills points to the importance of having a more holistic representation of institutions, looking at them not just through the

prism of realization, but, more inclusively, taking into account other factors, such as human behaviour.

Understanding Sustainable Development as a Governance Model: Contribution of Rio+20 to the Model

When in 2012, activists, policy-makers, and stakeholders met in Rio de Janeiro under the auspices of the United Nations, the intent was to chart a course for the future of humanity. This 'new' resolve was reminiscent of the commitments that global leaders rehearsed before with a pledge to lift people out of poverty and protect the Earth. The Rio+20 Summit was intended as a celebration of the original Earth Summit of 1992. Beyond a celebration of past commitments, Rio+20 was also meant to reaffirm political commitments and help global leaders take concrete actions to move towards a green economy. Twenty years after the iconic Earth Summit, the world has become a more complex place where poverty and inequality remained staple attributes. So, what is the verdict? Many pundits describe Rio+20 as a 'non-event', 'failure in leadership', 'vague agreement', or 'weak outcome'.

Scientists and activists alike had pinned their hopes on a conference that would emphasize the expediency of a world in distress. But, it is not just the Earth's life system that is under threat; the fact is that more than one billion people go to bed hungry every night. This stark reality is certainly an aggravation of what Rousseau observed in the 18th century, at least in size and complexity. Rio+20 may appear as a demonstration of how the world is getting worse rather than better.

Critics of Rio+20 seem to have forgotten the controversy of the 1992 Earth Summit. It was perceived by some critics that the summit failed to set a new direction for life on Earth. When one attempts to fast forward 20 years ahead, one can quickly discern the remarkable positive evaluation the conference received since.

Whatever the complexion of the immediate evaluation of the 2012 United Nations Conference on Sustainable Development, it is nevertheless clear that countries failed to design their cooperation mechanisms in ways that provide a new momentum for the implementation of Agenda 21. The Summit simply laid bare the fact that global commitments — with strict targets and uniform measurements of progress — were politically unrealistic (Papa and Gleason 2012). Therein lay both the challenge and the paradox.

Three hundred years after the birth of Rousseau and the foundation of social autonomy, can global leaders come up with a 'blueprint' to regulate the affairs of so many diverse people, economies, ecosystems, and social formations? How can this uniformity in measurement enable and kick-start action on key principles associated with the Social Contract, i.e., equity, freedom, the rule of law, etc.?

Yet, kick-starting some of the principles of sustainable development has further polarized the world in 2012 Rio; global leaders have channelled their energies in

defining what green economy is and what it is not. The term achieved diplomatic momentum at the summit. Many developing countries were concerned that this new concept will replace sustainable development. Those, who advocated just sticking to sustainable development, felt that major policy matters on finance and technology were deliberately forgotten in the interest of an even looser term. Hence, the debate was given an ideological and semantic resonance.

Some countries, mostly from the South, asserted that the green economy is simply a component of sustainable development and should not be used to dictate the pace of international policy governance. For richer countries, greening the economy — through clean energy — could be a safe pathway to increase economic growth and create new 'green' jobs. Subsequently, the efforts to adopt a green economy road map with environmental targets, goals, and deadlines met with great resistance at Rio.

In addition, some critics argue that Rio+20 was a failed opportunity in its interpretation of the 'Sustainable Development Goals (SDGs)', a replacement for the UN Millennium Development Goals (MDGs). SDGs were omitted from the General Assembly Resolution, which provided the mandate for convening the Rio+20 Summit. However, SDGs have now regained a new momentum since Rio.

Rio produced the typical asymmetrical relationships with the EU insisting on emphasis on energy, water resource efficiency, land and ecosystems, as the critical areas for measuring the SDGs; whilst the G77 and China placed more emphasis on greater balance between the three pillars of sustainable development. Another vexing issue is related to the MDGs and how these are translated as development agendas across the developing world. Many developing countries are concerned that the high visibility that is given to SDGs might drive the original MDG targets and indicators into obscurity. They would instead like to see a better manifestation of how the MDGs and SDGs can be integrated.

Another problem evident in 2012 Rio was the lack of robust institutional arrangements that will champion the implementation of actions decided in Rio in the same way that trade is strongly equated with the World Trade Organization. But perhaps more controversial is the issues of finance and technology and the means of implementation. The cleavage between developed and developing countries on this topic was even starker. Developing countries argue that leapfrogging environmentally sound technologies should mean structured support from industrialized nations. This was a key plank of the argument of developing countries in 1992 and remains a constant in the negotiations 20 years later. The question of new and additional financial flows and respect for the agreed aid target of 0.7 per cent has also been avoided systematically.

The overriding question remains: Should countries commit to new goals and implementation of new concepts, such as the green economy, if they are unable to secure pledges made 20 years ago? It seems that Rio+20 did not succeed in answering these questions and failed to chart a clear course that will support many of Rousseau's ideals on social justice and freedom.

Sustainable development: An impractical tool for global governance?

Sustainable development was born out of a historical context. The theory was an attempt to resolve the tension between environmental concerns resulting from the ecological consequences of human activities on one hand and economic, social, and political concerns on the other. The central tenet of sustainable development resides in the concept of equity and social justice for all. This is often associated with the Rawlsian theory that suggests a bias in resource allocation to benefit the least advantaged societies (Rawls 1971). The intergenerational solidarity principle, translated into the will that resource management of today should not compromise the well-being of future generations, remains popular.

More than two decades after the concept was given visibility by the Brundtland Report, our understanding of sustainable development is still evolving (Newman 2006). Indeed, subsequent international conferences, such as the World Summit on Sustainable Development, held in Johannesburg in 2002, reinforced the need for change in the way societies produce and consume as a precondition for achieving sustainable development (UN ECA 2008–09). In fact, the Economic Commission for Africa's *Sustainable Development Report* emphasizes the importance of moving towards sustainable consumption and production to fulfil the dual aspirations of economic growth and poverty alleviation.

The terminology sustainable development also implies balance, i.e., the ability to use the different capitals — social, natural, and physical — in ways that do not jeopardize natural support systems (Kates *et al.* 2001). The amount and distribution of the various capitals matter (Kates and Dasgupta 2007). The terminology has achieved greater political legitimacy as argued by Brundtland: "the 'environment' is where we live; and 'development' is what we all do in attempting to improve our lot within that abode. The two are inseparable" (United Nations).

Yet, in spite of this evolution, sustainable development continues to suffer from definitional vagueness (Happaerts 2012). Most critics of sustainable development tend to see it as far too normative and ambiguous, incapable of bringing practical solutions to complex development and environmental problems (Newman 2006). To break away from this inherent fuzziness and ambiguity, the term 'sustainability' is invariably used as a substitute for the absence of clarity in the path towards development. As Holling argues (Holling 1973), sustainability is the capacity to "create, test, and maintain adaptive capability". Development, on the other hand, can be a process of environmental management that is evolutionary in nature.

Sustainable development model: The 'absence' of a 'blueprint'

The so-called new engines of global growth, such as Brazil, Russia, India, and China have a collective GDP coming closer to that of Japan, France, the United Kingdom (UK), Italy, Germany, and the United States (US) put together (Nayyar 2008). These new engines of growth also need to look at their roles in acting as models or champions for sustainable development. What is their potential for

achieving sustainable development? China is an example of a country that has achieved growth, but has only recently started linking growth to the principles of environmental preservation.

Critics argue that the concept of sustainable development needs to be more flexible and dynamic, so that it is able to lend itself to ecological and social realities. Sustainable development is a process of transformative change across scales and governance regimes. It thus requires an enabling environment, robust institutions, and a set of rules to be adhered to. These are not processes that one can 'stumble' into; rather it needs continuous direction and focus.

Perception of Asymmetries in the Current Multilateral Regimes and Governance

The challenge of a multilateral governance model that advocates sustainable development cannot be severed from one that is able to set global agendas, legitimize principle of common actions, and bring global communities to commit to a process of implementing change at local, national, and international levels. This operational space can only happen in architecture with actors that 'play' the role of multilateral diplomacy. For instance, the United Nations provides the critical platform for multi-party negotiations, a vehicle for change. It is also the 'stage' where forms of multilateral diplomacy can be evaluated and even contested.

Principles such as 'common but differentiated responsibility', 'subsidiarity', 'the polluter pays', have become synonymous to an institutional structure that is largely perceived as an enforcer. As in Rousseau's Social Contract, the seeds for a transformative development are deeply rooted in the capacity of the perceived institution and how it induces change.

The asymmetries of the world hitherto anchored mainly on the North–South divide have become even more diffused and stratified, with wide-ranging inequalities ranging from technology, science, and even to the basic production system. Thus, the expectation that the North will provide the key to unlocking development in the South is a 'pipe' dream. Many of the big Organisation for Economic Co-operation and Development (OECD) countries have channelled their energies elsewhere and concerns on how efficient and clean technologies can be transferred have remained rhetorical questions. Global leaders, such as the European Union, have not succeeded in persuading a disinterested USA to take a stronger role in the management of global commons (Vogler and Stevens 2007). Consequently, the paradox is that the role of the United Nations in managing the state of equilibrium between the three pillars of sustainable development has become more difficult. The South's prevailing viewpoint focuses on environmental degradation as the chief culprit to their growing problems of poverty and deprivation (Najam *et al.* 2006). The voices of the G77 and China seem to have become even more

discordant than before. Yet, we are in a world where coalition politics and key networks increase their bargaining power.

How can Rousseau's Social Contract principle be given more relevance in a complex world, where present generations are held accountable by future generations? Justice between generations is becoming even more compelling. With growing environmental degradation and economic stagnation, the idea of justice between generations was felt acutely in the 1970s. Indeed, the welfare of future generations has resonated throughout the generations as a predominant ideology, often expressed in 'faith in the future'. The Renaissance — 'rebirth' from sleep — and the 18th century Enlightenment period, all promoted the idea of progress in human affairs. In the 19th century world, this continued interest on human progress was associated to the Industrial Revolution. However, by the 20th century, the future was mired in pessimism with World War II, the Holocaust, and the spectre of a nuclear war.

Whatever the strength of this 'master narrative', the notion of intergenerational equity and solidarity shaped the global governance regimes. One could argue that previous political theorists have not sufficiently thought through the notion of reciprocity. Indeed, the utilitarian principle based on the 'greatest good for the greatest number' seemingly placed more emphasis on the quantity of life rather than the quality and how this will put future generations at risk. Rousseau, Kant, and Locke present a challenge to the notion of reciprocity. In short, if our current actions have implications for future generations, how can our lives be affected by unborn generations?

Obligations to future generations present a central ethical problem, both in terms of how to approach the reality of an aging population in most of the developing countries and significant parts of Asia and Latin America, and a booming younger population in Africa. Let us consider this conundrum. In the interest of intergenerational equity, how can we draw up a new Social Contract that will take into account changing demographic dynamics?

The answer to this 'riddle' will lie in the ability to rectify the youth asymmetry that the world is currently witnessing. In its latest report on the global population trends, the United Nations said that the world's population will increase to 7.2 billion and is projected to reach 10.9 billion by 2100. Population growth is likely to increase in the world's poorest countries, with high fertility rates, concentrated mainly in Africa. It is estimated that half of the population growth between 2013 and 2100 will be concentrated in just eight countries — the Democratic Republic of Congo, Ethiopia, Niger, Nigeria, India, Tanzania, Uganda, and the US.

The current youth dynamics in Africa presents a challenge. It is reported that in less than three generations, 41 per cent of the world youth will be Africans. It is believed that between 2010 and 2020, Africa will add an additional 163 million people to its potential labour force. In addition, the labour force of Africa is set to increase outgrowing China by 2035. Approximately, 54 per cent of Africa's

youth is currently unemployed and more than three-quarter live on less than US $2 a day. The continent also showcases a tendency of youth with higher education levels to be unemployed. Another constant is that government programmes aimed at promoting youth employment tend to be inefficient. This is the case for at least 21 countries in Africa.

This generation of young people has a huge potential to expand Africa's productive work force, promote job creation and entrepreneurship, and harness the enormous resources that the continent is endowed with. Poor investment in the youth of today and tomorrow can constitute a curse for the continent. Balancing the development sheet needs to be done in ways that do not leave a majority of the world's population dienfranchized.

But, how prepared is Africa to deflect the potential tension that can arise from an urban youth population that is rapidly growing, educated, unemployed, frustrated, and lacking a political space? Given the relative stagnation of employment in the 15–24 age bracket, how can Africa design and use a new social contract to ensure that the marginalized youth are not written off and are fully absorbed in the economy?

The real challenge of the 21st century will be the ability to address this demographic mega trend in a manner that will preserve the interests of future generations. How can a new Social Contract realign the disenfranchised, the old, the young, and the poor back to the centre of a development agenda? Today's elderly generation in Europe or Japan is able to enjoy a relatively prosperous old age mainly because their working lives were comparatively more prosperous than those of their parents. To what extent can Europe or Japan sustain its social welfare system without re-negotiating a new contract with Africa's youthfulness?

Rewriting a new Social Contract implicitly means that there is a level of dissatisfaction with the way our world is configured presently. How do we create a redistributive system that is 'solidaristic' and helps to enhance both intragenerational and intergenerational equity? How do we create new institutions that can lift people out of poverty based on a Social Contract that seeks to provide security and welfare to the poorest in the remotest outposts of the world?

The Rio rationale 20 years ago is not radically dissimilar to the Rousseauian ideal of freedom and justice, and the need for a participatory form of democracy that becomes the model of choice. A wholesale shift from the Rousseauian ideal to a new contract that will take into account intergenerational equity and ensure that institutions are aligned to societal needs will be hard to develop. However, there are real risks for policy-makers and humankind in general if we dismiss these ideals as utopian. The collective interest is strongly rooted in the ability to institute the behavioural response that will ensure—whilst cognizant of a risk-sharing approach—opportunities are provided to future generations.

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ARTICLE

*Low Carbon Green Growth as an Inclusive Development Model: Assessing Policy Changes and Initial Lessons from Developing Asia**

XIANBIN YAO[1#] AND VENKATCHALAM ANBUMOZHI[2]

Abstract: *As the world's most populous region and the most vulnerable to climate risks, Asia is at the centre of a paradigm shift towards low carbon green growth. This shift must incorporate economic and social inclusion, and environmental sustainability in the strategic policy making and implementation. Many developing Asian economies have started this paradigm shift, bringing clean energy access to poor, stressing industrial competitiveness, developing green technology markets, and supporting decent job generation. What has been the initial experience with the paradigm shift? What can policy-makers learn from the experience and further advance the policy agenda? How can an action-focussed approach be structured to support the continuing policy learning and advancement? This article paper addresses these questions. Drawing on multi-country studies by a number of Asian national research institutes, the paper proposes a meta-policy analysis approach to support the policy learning. Using this approach, the paper identifies five factors that have clearly contributed to initial successful introduction of the new approach. These include (i) a strong state articulation of low carbon green growth strategy, (ii) decentralized policy making and implementation, (iii) sectoral targets to link energy efficiency improvement with technology innovations, (iv) high levels of private sector participation, and (v) regional cooperation for harnessing financial resources. The article concludes by recommending a regularized process to continue with the meta-analysis approach for policy learning and action.*

Keywords: *low carbon development, Asia, comparative analysis, meta-policy analysis*

Introduction

CLIMATE CHANGE CHALLENGES are fundamentally development concerns. For the Asia-Pacific region, the climate change-cum-development challenges are doubly daunting due to its inter-dependence on natural resources, densely populated coastal areas, and considerable poverty levels. Developing Asia is expected to be

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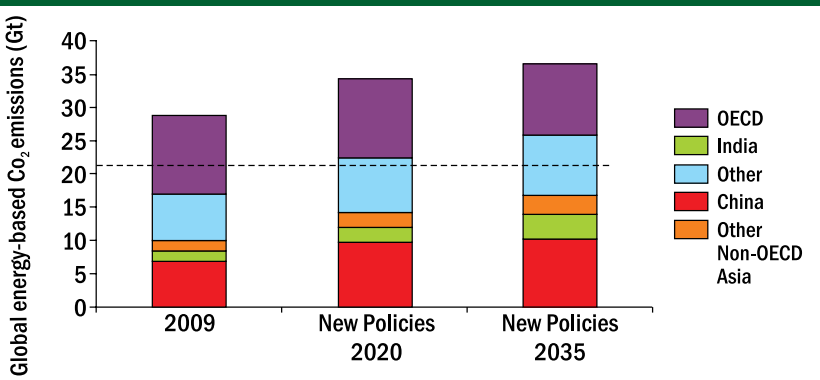
at the centre of the global agenda on low carbon green growth. Asia has much at stake in the fight against climate change it is the world's most populous region and has had high economic growth. Nowhere are production, resource consumption, and emissions growing faster than in developing Asia (ADB 2011, Cline 1992, Howes and Dubes 2012, Ravindranath and Rao 2012, Rose 2009, Thavasi and Ramakrishna 2009, Stiglitz 2010). Figure 1 depicts carbon emissions in 2009 and projected scenarios in 2020 and 2035.

Figure 1: Projected Global Carbon Emission Scenario in 2035



CO_2 = carbon dioxide, Gt = Giga tonne, ppm = parts per million, OECD = Organisation for Economic Co-operation and Development
Note: Other non-OECD Asia refers to developing Asia minus China and India. In 2009, Indonesia, Thailand, and Vietnam jointly comprised 46 per cent of emissions from this group. *Source*: International Energy Agency (2011).

The concept of low carbon green growth underscores the economic dimensions of sustainable growth that is inclusive. Many countries now see opportunities for low carbon energy shifts and improved environmental management that could deliver economic benefits and are introducing the concept in their development planning and implementation. In addition to high profile initiatives in Korea and Japan, other emerging economies, such as China, India, Indonesia, Malaysia, and Thailand as well as Bhutan, Mongolia, and Singapore have registered interest in embarking into low carbon development programmes under the premises of Nationally Appropriate Mitigation Actions (NAMA). A recently published book by the Asian Development Bank (ADB) (ADB–ADBI 2013) and ADB documents (ADB 2009, 2012, 2013) show how the concept has been debated upon and adopted to the central stage of national policy making and development planning in many Asian countries.

Drawing on the outcomes of that research, this article addresses a few follow-on policy-relevant questions. How the initial experience with the paradigm shift has been? What can policy-makers learn from the experience and further advance the policy agenda? How can an action-focused approach be structured to support the continuing policy learning and advancement? This article addresses these questions. Drawing on multi-country studies by a number of Asian national research institutes, the article proposes a meta-analysis approach to support the

policy learning. Using this approach, the article identifies five factors that have clearly contributed to initial successful introduction of the new development approach. This article first presents the meta-policy analysis approach, which is followed by a detailed meta-policy analysis of actions taken by the study countries and highlights key conditions for sustaining the low carbon green growth implementation. The article concludes by recommending a regularized process to continue with the meta-analysis approach for policy learning and action.

Meta-Policy Analysis Approach

A meta-policy analysis approach is similar to the comparative research method. Rather than utilizing statistical analysis to examine variables for comparative analysis or using fuzzy-logic theory, a meta-policy analysis method involves in-depth longitudinal assessments of single instance or group of instances (Plyvbjerg 2001, 2006; Sabatier and Smith 1993). Putting it differently, the meta-policy analysis at national and sub-sectoral levels, combined with a case study analysis, is an investigation of a contemporary phenomenon within its real life context to explore causation in order to find underlying principles (Yin 2008). In the present case, the analysis will seek to understand factors, which catalyse low carbon green growth. Through employing this meta-policy analysis approach, we endeavoured to provide what methodological theory called a detailed examination of an aspect of a transformation process to develop or test explanations that may be generalizable to other transformational events (George and Bennett 2004).

The meta-policy analysis is designed after the Inter-governmental Panel on Climate Change (IPCC) approach used to prepare its Assessment Reports. The IPCC bases its assessment on published literature, which includes peer-reviewed and non-peer reviewed knowledge sources (IPCC 2007). Thousands of scientists and other experts contribute to writing and reviewing the reports, which are then received by governments. For this meta-policy analysis, an Asian network of national research institutes was established. This research network is a convenient framework for combining knowledge from wide range of sources. It had the goals of (*i*) coordinated exploration of past policy actions and possible future trajectories, (*ii*) development of insights into key questions of low carbon green growth policy formations, and (*iii*) prioritization of key factors in order to enhance our ability to identify robust policy changes taking place at different levels of the government. By this network process, we coordinated several assumptions related to low carbon green growth within the context of developing Asia and introduced feedbacks that are absent in conclusions available in peer-reviewed publications. This type of hybrid meta-policy analysis is needed in the all-too common situation when researchers have difficulties in summarizing overall results of several studies on public policy (Barret 2005).

Our intent was to assess the current policy changes towards a new paradigm rather than test previous development theory. Consequently, insights were

extracted from on-going research studies carried out by national research institutes and inductively cobbled into the framework. In inductive models, some sort of cognitive framework is needed to guide the search for causal factors (Casillas and Kammen 2012, Never and Betz 2014). Accordingly, we selected adoption of inclusive growth and sustainability perspective as a cognitive framework for conducting our analysis. Bowen and Ranger (2012), Howes and Wyroll (2012), Salim (2012), Kumar (2012), Wyes and Lewandowki (2012), and Zhu (2012) posited that access to low carbon energy supply and use occurs within a socio-economic system as comprising a seamless web of technological, social, political, and economic casual factors that support the occurrence of a new development regime. This perspective on low carbon green growth is appealing because it integrates effectively with a number of well-regarded public policy theories. A key promise that the approach agree on is that successful transformation strategies are not arbitrarily designed and built; they must be designed and built for and into the societal development.

When the theory of low carbon development is influencing inclusive growth, there might be a set of necessary public policies that support the new development regime (Bowen and Stern 2010, Murshed 2009). Accordingly, the multi-country case studies attempt to track the evolution of low carbon green growth in China, India, Indonesia, Thailand, Vietnam, Singapore, and compare it with Korea and Japan for significant policy influences that supported the new development paradigm in these countries. The appeal of choosing these countries for comparative purposes stems from the markedly similar development paths of their economies and structural transformation taking place at sectoral and sub-national levels. All countries have a long history of fossil fuel dependent growth, but now they have pressure to make their future growth more inclusive and sustainable. All countries rely on imported energy resources and have ambitious plans to reduce carbon emissions, expand their renewable energy sectors, and improve energy efficiency and believe in regional cooperation as the best way to tackle climate change and accelerate green growth (Garnaut 2011, Howes and Wyroll 2012).

The policies we included for meta-analysis consist of national development plans, sectoral plans and targets for energy-efficiency improvement and renewable energy mix, policies that support market capitalization, local government actions, private sector development, and economic integration. Since GHG reporting remains sparse in the region in assessing the policy impacts on GHG emissions, we studied in detail the National Communications (NC) to United Nations Framework Convention on Climate Change (UNFCCC). In both the initial examination of emission profile and subsequent investigation into policies that effect changes, we organized policy dialogues involving national research institutes, senior government officials, and other stakeholders to correct any endogenous effects and include feedback.

Analysis on Policy Factors Effecting Low Carbon Green Growth in Developing Asia

In this section, we compare and contrast the results of meta-policy analysis to highlight factors that drive low carbon green growth in the studied countries. This in turn provides an opportunity for distilling insights for policy changes by policy-advisors and policy-makers in different countries who plan to move forward with their low carbon development agenda.

The guiding hand of the governments in supporting national development goals

The governments of the studied countries have a long-standing history of strong centrally led economic, planning. Those economic plans aim to harness environmental, economic and social benefits. Over the period 2007–2012, all the studied countries incorporated emission reduction strategies in their national development plans. In the lead-up to the UNFCCC Summit in Copenhagen in 2009, many developing countries for the first time articulated a specific target for curbing carbon emissions (Zhou *et al.* 2010). Apart from the National Climate Change Programme, China's 12th Five Year Plan laid out a series of relevant climate change mitigation targets up to 2015. Additionally, the government aims to reduce nitrous oxide emissions by 10 per cent by installing extra capacity of non-fossil fuel power generation, including 70 GW wind, 15 GW solar, 120 GW hydropower, and 40 GW nuclear, among other quantitative targets.

India launched the National Action Plan on Climate Change in June 2008, with eight missions covering mitigation issues prior to its voluntary Copenhagen pledge of reducing emissions intensity by 20–25 per cent of 2005 levels by 2020. The National Solar Mission aims at generating 20,000 megawatts (MW) of energy from the sun by 2022 and making India a global leader in solar energy deployment through the extension of electricity access to poor. Other targets relating to this objective include 2 GW of offgrid solar plants, 20 million square metres of solar collectors, and 20 million solar lighting systems distributed in rural areas, thus saving about 1 billion litre of kerosene every year, which is about 8–10 per cent of the country's total annual consumption (Mathur 2012). India's 12th Five-Year Plan is also expected to align the planning process with these targets, and for the first time included a specific chapter on climate change.

Indonesia has voluntarily pledged to reduce its emissions by 26 per cent compared with business as usual by 2020, and up to 41 per cent with international support. At present, land use and land-use change, particularly forestry and peatland, comprise 85 per cent of national carbon emissions. The country's National Action Plan addressing Climate Change articulated through a Presidential decree issued in 2010 includes low carbon actions in its Medium-Term Development Plan, 2010–14 and supports activities including the development of data, information and communication, strengthening of institutional capacity, and science and technology development. While Thailand has not specifically articulated a low

carbon green growth strategy through Royal declaration, its Energy Conservation Programme and the 15-Year Renewable Energy Development Plan lay out targets that clearly align with low carbon pathways (Chotichanathawewong and Natapol 2012). According to these programmes, 44 per cent of the country's savings are intended to be found in the transport sector, followed by industry (37 per cent) and buildings (17 per cent).

With a target of 5.6 GW of renewable energy, 3.7 GW is intended from biomass, 0.8 GW from wind, 0.5 GW from solar, 0.32 GW from hydropower, and 0.16 GW from methane in municipal waste, Vietnam has developed the 'National Target Program to Respond to Climate Change', which assigns ministries, sectors, provinces, and cities the task of developing and implementing plans to reduce carbon emissions, assess climate change impacts, identify responses, and integrate climate change concerns into strategies, programmes, and plans. Vietnam's laws and policies directed towards energy efficiency, conservation, and renewable energy further align its development plans with a low carbon path. The inception of South Korea's Green Growth programme can be traced to green stimulus packages and the 5th Year National Action Plan in July 2009. It put forth the 4th Comprehensive National Action Plan for Climate Change 2008–12, the Five Year National Action Plan for Green Growth, and the Basic Law on Low Carbon and Green Growth in January 2010. Singapore launched the National Climate Change Strategy in March 2008 and the implementation of the Sustainable Singapore Blueprint started in April 2009 (Doshi 2012).

In accordance with the Copenhagen Accord, Japan has a target to reduce GHG emissions by 25 per cent, compared to the 1990 level, by 2020, on the premise that a fair and effective international framework, in which all major economies participate, is established and ambitious targets agreed by the major economies. In November 2009, Japan also announced that it would aim at 80 per cent reduction in its emissions by 2050 and support a target for halving global emissions by 2050 (Kainuma 2012).

Table 1 summarizes the targets of the major Asian economies under study across four major indicators — carbon emissions, renewable energy, energy efficiency, and deforestation. Across all countries under study, within the energy sector, energy efficiency and renewable energy are the two key options to address energy security and economic growth, as well as climate change. Further, given the relatively low base of renewable energy installation and the challenges of higher up-front investment costs, the plans to reduce energy intensity and cut the share of fossil fuels in countries, such as China, India, Thailand, and the others in Table 1 are fairly ambitious. Most of the countries also have targets for increased forest cover. Although these low carbon development plans strategies are very different in-terms of scope, the objectives are determined by governments; all of them are best judged in terms of achieving one of the three co-benefits of environment, economic, and social.

Table 1: Nationally Appropriate Climate Change Mitigation Targets of Major Asian Economies

Country	Emission Targets	Renewable Energy Targets	Energy Efficiency	Deforestation
China	Reduce 40% to 45% emissions intensity (2005–20) Reduce 17% emissions intensity (2010–15)	11.4% by 2015 15% by 2020 up from 8.3% in 2010	Reduce 16% energy intensity (2010–2015)	Increase forest cover by 40 million ha by 2020 from 2005 level Increase forest cover to 21.7% by 2015, from 20.36% in 2010
India	Reduce 20% to 25% emissions intensity (2005–20)	15% by 2020 up from ~ 4% (2010) 20,000 MW solar by 2020	10,000 MW energy savings by 2020	Increase forest cover by 20 million ha by 2020 from 2010 level
Indonesia	Reduce 26% to 41% emissions below BAU	15% by 2025 (incl. nuclear)	1% average annual reduction in energy intensity (2005–2025) Reduced elasticity of electricity/GDP to <1 (2025)	Forestry as net carbon sink by 2030
Thailand	Reduce 30% energy emissions below BAU	20.3% by 2022	8% reduction in energy intensity (2005–2015), 15% reduction (2005–2020) 25% reduction (2005–2030)	Forest cover to be 40% of total land mass (target introduced in 1991, 2010 level is 37%, up from 25% in 1998)
Vietnam	–	5.6% by 2020 9.4% by 2030 up from 3% (2010)	Reduction in elasticity of electricity/GDP from 2 (2010) to 1.5 (2015), to 1 (2020)	Increase forest cover to 16.2 million ha in 2020 from 14.3 million ha (2010)
Japan	Conditional reduction of 25% emissions below 2000 levels	16.0 TWh by 2014	30% reduction in energy intensity (2006–2030)	–
Korea	30% reduced emissions below BAU in 2030	6.08% by 2020 up from 2.7% in 2009	–	–

BAU = business as usual, GDP = gross domestic product, ha = hectare, MW = megawatt, TWh = terawatt-hour.

Notes: 1. All emissions targets by 2020 unless stated otherwise.

2. Emissions intensity refers to the volume of carbon emissions produced per unit of GDP.

3. Energy intensity refers to the volume of energy consumed per unit of GDP.

4. The absence of specific targets for particular issues does not indicate an absence of policy, rather, the absence of a stated national target. For example, the Government of the Republic of Korea is implementing a large number of policy actions relating to energy efficiency, but does not have a specific national target.

Sources: Howes and Dobes (2012), Chotichanathanwewong and Natapol (2012), Mathur (2012), Patunru (2012), Toan (2012), and Zhu (2012).

Decentralization of energy policy making and renewable energy uptake

It is crucial that low carbon growth identifies priority areas of action and champion on key strategies to bring inclusiveness. For decades, expansion of renewable energy programmes has been perceived as a strategic necessity for enhancing domestic energy security in developing countries of Asia. Extending national grid infrastructure to remote areas is proving to be a difficult, costly, and time-intensive process in many countries, perpetuating poverty and health damages from traditional biomass cooking practices. Decentralized, offgrid renewable technologies, such as small-scale solar and biogas, present a very real opportunity for remote communities to share the rising living standards being experienced elsewhere, and further promote national economic expansion.

The studied countries have put in place measures to enhance the share of renewables in their energy mix by decentralization of energy policy making. While this may have been driven primarily by the desire to enhance energy diversification at the national level, this is increasingly being viewed as a catalyst for the creation of markets at the local level that can provide opportunities for employment, new industrial growth, and increase in economic activity and trade.

China, through the Renewable Energy Law and other policies that focus on giving more decision-making power to provincial governments, has been able to increase the use of renewables massively. It contributed for substantial emissions reduction during 2007–10 (Zhu 2012). The 11th Five-Year Plan provided a major thrust to resource diversification and resulted in enhanced wind, hydro, and nuclear capacities. A significant number of large hydropower projects were constructed in 2010, the capacity of small hydro power in rural areas was stepped up, and the Ministry of Water Resources and the National Development and Reform Commission proceeded with the checking and rectification of 5,200 problematic hydro power stations and strengthened the construction and management of small hydro power stations. As a result, the installed capacity of hydropower exceeded 200 GW and the grid-connected operational capacity of wind power surpassed 30 GW. The 12th Plan has put in place a target to increase the share of renewable energy in primary energy consumption from 8.3 per cent to 11.4 per cent by 2015 and aims for 15 per cent non-fossil energy consumption by 2020. With the steady development of the solar photovoltaic (PV) market, the PV industry has seen continuous development of off grid, low carbon energy supply in China. Driven by the development of international as well as domestic markets, the price of solar generation has been decreasing, and in 2010 the newly increased installed capacity of generation units in the global PV market grew at about 120 per cent, reaching above 17 GW. In September 2010, the Notice on Strengthening the Management of Golden Sun Project and Solar Photovoltaic Demonstration projects in buildings was issued. With regard to solar thermal applications, a subsidized programme exists for rural families to purchase solar products, which has resulted in the installation of 168 million square metres of solar heaters, substituting about 22 million tonnes of fossil fuel (Zhu 2012). Biomass energy has also enjoyed

diversified development in China. By 2010, China had 6.7 GW of biomass-based generation capacity, including bagasse power generation, straw, and forestry-based power generation and urban waste, biogas, and land-fill gas power.

A comparison of several policy instruments employed to enhance the uptake renewable energy at country level are summarized in Table 2. Renewable energy has been recognized as an important element in India's energy mix for over four decades, and the country has among the world's largest programmes for renewables. Grid-connected renewable power contributed to about 19,974 MW of electricity in March 2011, accounting for about 10 per cent of India's installed generation capacity (Ravindranath and Rao 2012). Having initiated its wind power programme in the early 1980s, India had a capacity of 14,158 MW in 2011, with many leading states, where decentralized energy planning enhanced the access to clean energy to off-grid communities (Attridge *et al.* 2012).

In Thailand, energy efficiency and renewable energy development have received an impetus with the 15-Year Renewable Energy Development Plan, the 20-Year Energy Conservation Plan, and the Power Development Plan 2010. The challenge of reducing carbon emissions at local is reflected in the, 15-Year Renewable Energy Development Plan, which stipulated Independent Power Producers (IPP), such ethanol, biodiesel, solar, wind, as hydro, biomass, biogas, waste heat, and municipal waste operators to serve the consumers directly based on demand

Table 2: Comparison of the Current Application of Various Policy Instruments for Renewable Energy Uptake

Country	Feed-in tariff	Renewable energy certificates	Trading markets for energy efficiency	Renewable quotas/portfolio standards	Mandated biofuel blending	Fuel economy/vehicle emissions standards	Capital subsidy, grants, or rebates	Tax incentives	Public R&D institutions	Public investment, loans, or grants
China	Wind, solar, biomass		●	●	●	●	●	●	●	●
India	Wind, solar, biomass, small-hydro	●	●	●	●	●	●	●	●	●
Indonesia	Renewable (including geothermal)				●	●	●	●	●	●
Thailand	Wind, solar, biomass/ gas, waste				●	●	●	●	●	●
Vietnam	–					●	●	●	●	●

factors. With the successful implementation of the plan, a GHG reduction of about 42 $MtCO_2$ eq. is expected by 2022 (Chotichanathawewong and Natapol 2012).

Vietnam's National Strategy for Energy Development until 2020 and vision towards 2050 aims to develop energy quickly and sustainably in close association with the provincial-level socioeconomic development strategies, in parallel with diversifying energy sources and applying energy-saving technologies. Indonesia also plans for increased energy diversification at the local level, with emphasis on optimization of biomass resource use.

Targeted sectoral actions to link energy-efficiency improvement with technology innovations

The meta-policy analysis clearly indicates that the countries under the study also put in place sector level development policies that have clear economic and social co-benefits, and have helped to improve efficiencies and bring emission reductions. Energy efficiency benchmarking was launched in cement, steel, and chemical industries in China and became compulsory for all heavy industries. In the power and industry sectors, efforts have been made across most of the studied countries toward the diffusion of low carbon technologies. These include ultra-super critical thermal power plant technology, dry quenching technology, low-temperature waste heat power generation, and regenerative combustion technology. Both China and India, for instance, have made significant improvements in energy intensity in certain sub-sectors, such as cement and steel, with some plants/units already having state-of-the-art technology (Asuka 2012). China and India have also been eliminating small out-dated and inefficient production capacities across electricity, iron and steel, cement, glass, pulp making, and other sectors.

Many countries have also initiated measures to enhance energy conservation and integrate renewables in the housing and buildings sector. The 11th Plan of China had a target of more than 90 per cent of new buildings to be constructed under mandatory standards for energy saving. Large public buildings integrated renewables into their construction planning and energy conservation projects have been promoted for heating and air conditioning systems in hotels and commercial buildings. Similarly, in India, the Ministry of New and Renewable Energy has initiated several programmes focusing on integrating renewable energy use in buildings. An Energy Conservation Building Code was launched in May 2007, which addresses the design of new large commercial buildings to optimize buildings' energy demand. All buildings with a built-up area above 20,000 square metres are audited by the Ministry's Environmental Appraisal Committees and the State Environmental Appraisal Committees for efficiency improvement. More recently, India put forward a Mission on Sustainable Habitat within its National Action Plan on Climate Change, of which green buildings are an important element.

The transportation sector has played a key role in China's development process, but has also put increasing pressure on oil imports and emissions. The Government of China has supported rail development and accelerated the construction of

passenger-dedicated lines and inter-urban railways, apart from improving highway development and water transportation simultaneously. During the 11th Plan, the Ministry of Transport launched eight major energy conservation projects in companies, test units for fuel consumption access and withdrawal, energy-efficient driving, test units for energy saving in transportation with dumping trailers, construction of a public travel traffic information service system, and construction of energy saving ports. Significant progress has been made in the diffusion of energy-efficient and new energy automobiles. In Thailand, policies exist on waste, especially in Bangkok and other large cities. In India, the National Mission for Sustainable Habitat aims to develop a comprehensive approach to managing water, solid waste, and wastewater and to tap the potential for recycling, reuse, and energy creation in urban centres. Other initiatives, such as the Programme for Energy Recovery from Urban and Industrial Waste, aim to tap power generation potential from industrial waste in India.

Many countries under study have made commitments to emission reduction policies in forestry. The National Mission for a Green India, under India's National Action Plan on Climate Change, aims to increase forest cover on 10 million hectares of land and to increase CO_2 sequestration in forests by 50–60 Mt per year by 2020. The Government of India has allocated funds to support programmes for the conservation, regeneration, and management of existing forests and wildlife habitats. Similarly, China has a target to increase forest cover by 40 million hectares and forest stock volume by 1.3 billion cubic metres by 2020 from the 2005 level (Zhu 2012). Indonesia has taken actions that help maintain existing forest cover, restore lost carbon stocks from degraded or cleared forests, and create new forest areas to increase carbon sinks.

Apart from sectoral-level targets, China and India have also embarked on sub-national and local initiatives to enhance efficiency and reduce emissions. In 2010, the National Development and Reform Commission of China awarded 108 cities the title of National Green Energy Demonstration County. Subsidies are provided for the construction of green energy demonstration cities to facilitate the development and use of renewable energy, and establish a service system for rural energy. In 2008, the Indian state of Himachal Pradesh introduced a voluntary green tax on vehicle users to create a fund for combating climate change — one of the first of its kind at state level. The state government also announced an integrated energy and environment plan, through which the State aims to turn carbon neutral. The State of Gujarat has similarly undertaken innovative measures to bring in sustainable and greener development by enhancing the exploitation of clean and efficient options. For example, a multi-benefit pilot project generating 1 MW electricity from solar panels atop the Narmada branch canal was set up in 2011. Solar panels have been fitted over a 750-metre stretch on the Sanand-Kadi Narmada branch canal to generate 1.6 million units of clean electricity annually (Betz 2012). Besides producing clean energy without causing any pollution, the solar panels would spare a large amount of land otherwise required, if the solar

power project were land-based. It is estimated that the project could prevent the evaporation of about 9 million litres of water annually as the canal will remain covered — a social co-benefit. Japan has already undertaken initiatives to curb emissions, and has extensive experience that can be spread far and wide The Sustainable Shiga Initiative, Low Carbon Kyoto, Carbon-Minus Tokyo, and the Clean Energy Demonstration Town: Kuzumaki Town are among the initiatives taken up by Japan at the local level (Kainuma 2012).

Fixing the sectoral targets also induced national innovation systems and the advent of low carbon technologies. In 2011, China has the third-largest number of green patents in the world after USA and the European Union (Ramanathan 2012). The Government of Korea established the Presidential Committee on Green Growth (PCGG) in January 2009 by a Presidential Decree that led to a strategy for the development and commercialization of 27 core low carbon green technologies (Kang 2012). The Green Technology Network integrates the existing low carbon technology information systems of eight public institutes and provides practical information on 27 core technologies in terms of basic technical information, industry and market analysis, policy actions, R&D progress, road map, etc. The government has also set up a step-by-step investment plan and strategy for these technologies based on current investment priorities, the level of technology progress, and prospects of commercialization. Simultaneously, the government has worked on expanding infrastructure to facilitate commercialization of developed technology.

High Levels of Private Sector Participation

The economy-wide nature of low carbon development and sector-wise target, necessitate the engagement of key stakeholders, such as a private sector. The private sector is made up of local and foreign-owned enterprises operating at different scales, from large corporations, to small and medium enterprises (SMEs), to microenterprises operating in the informal sector. Private actors in the studied countries currently play a role in all of the sectors identified above as critical to emission reduction.

Industry accounted for 70 per cent of energy consumption in China in 2006 (Walsh *et al.* 2011). So, the government launched the 1,000 Energy Consuming Enterprise Programme across nine sectors. With the aim of changing to best available technologies, this initiative saved 150 million tonnes of oil equivalent during the 2007–12 period (Zhu 2012). In 2011, China led the world in renewable energy investment and in 2010 accounted for half of all global manufacturing of solar modules and wind turbines, with the majority of solar technology production made for export. The government has frequently articulated its goal for Chinese companies to dominate clean energy markets and demonstrated its sense of purpose through ambitious policies. Elsewhere, India is now ranked 8th globally in clean energy investment, and Indonesia had the fourth largest growth in this area

from 2005 to 2010 (Choudhury 2012). Whether for export or to meet domestic expansion, growth of private sector in the renewable energy sector presents an important stimulus for innovations in domestic manufacturing in particular, and economic growth more generally. At the domestic level, proliferation of private sector operators as independent renewable energy producer presented a significant opportunity for increasing access to modern energy services to the estimated 1.5 million people in the studied countries over the period of 2001–2010 (REN 2012).

In China, India, Indonesia, and Thailand, the private sector is often seen as having significant resources and capacity for investment, and may also have high levels of efficiency, managerial capability, and operational power, which can be harnessed to achieve low carbon green growth goals. In China, The National Development Reform Commission and the Ministry of Finance provide subsidies for energy efficiency retrofit market from June 2010, offering funding to Energy Service Companies (ESCOs) to execute energy management contracts. Bureau of Energy efficiency (BEE) in India has undertaken many projects to create a framework at the national level for the accreditation of ESCOs. BEE has shortlisted about 35 ESCOS that would help state governments in taking up energy efficiency projects of public sector enterprises.

In Korea, the government introduced the Green Certificate System in 2009. This acts as a supporting mechanism that allows business groups not only to obtain easier access to funds for low carbon technology development, and provides tax breaks, but also incorporates tools and measures to help private enterprises throughout the business stages, including public financing, research and development, marketing, commercialization, and distribution of new technologies. Other types of incentive systems for the private sector, which have been widely practised in the studied countries are summarized in Table 3.

Table 3: Types of Incentive Systems for Engaging the Private Sector in Low-carbon Green Growth Efforts

Types of Incentive (Country)	Beneficiary Private Sector
Pioneer status and tax allowance for 100% of statutory income for 10 years; projects must be implemented within a year of receiving the incentive (China)	Companies implementing energy conservation projects
100% tax allowance on capital expenditure within first 5 years of project (India)	Companies generating renewable energy for their own consumption
Tax exemption on 100% of additional capital expenditure for green buildings and forest conservation (Indonesia)	For enterprises involved in green buildings and forestry
Import duty and sales tax exemptions on solar PV and solar heating equipment (Thailand)	Solar PV system equipment retailers
Sales tax exemption on energy-efficient products (Vietnam)	Full exemption for local manufactures of energy-efficient goods; partial exemption for imported equipment distributors
100% import duty exemptions and 50% excise duty exemption (Singapore)	Hybrid and electric cars and motorbikes distributors
Exemptions on income tax from sales of Certified Emission Reduction (CER) (Korea)	Clean Development Mechanism (CDM) project developers

Nevertheless, early stakeholder engagement is particularly important for active participation of the private sector in setting the objectives and determining the criteria for inclusive growth (Breuer 2011, Choudhury 2012, Friel 2009). Involving private sector stakeholders in the sectoral target settings will ensure the sustainability of low carbon development efforts made by the governments and maximize the co-benefits.

Regional cooperation for harnessing financial resources at lower cost

The success of implementing low carbon green growth strategies very much depends upon strengthening finance and investment conditions that also maximize social co-benefits. An investment of more than $6 trillion will be needed in the region by 2030 in the energy sector alone for making the shift (Hongo 2012) to 450 ppm CO_2 levels. Sources of international financing and financing instruments currently used in the study countries are summarized in Table 4. These categories are sometimes overlapping across borders and changing over time. For e.g., countries such as China and India currently focused on investing in clean energy access domestically, also invest in other countries like Thailand and Vietnam.

Table 4: Source of International Financing and Financing Instruments that Supports Low-carbon Green Growth

	Source	Grants/credits	Concessionary loans	Market-rate loans	Credit line	Credit gurantee	Risk insurance	Equity	Carbon financing	Subsidy	Feed-in tariff	Technical assistance
International	MDB	●	●	●	●	●	●	●	●			●
	Bilateral Development Agencies	●	●	●	●				●			●
	Guarantee Agencies			●			●					●
	International Banks			●				●	●			
	Investment Funds							●	●			
	Private Investors							●	●			●
National	Central and State Governments	●	●					●		●	●	
	National Development Banks		●	●	●	●						●
	Rural Energy Funds	●								●		●
	Foundations	●						●	●			
	Micro-Finance			●								
	Local Banks			●								

Within each broad category, several different types of international financing instruments that support low carbon growth exist. Multilateral development sources include The World Bank and the Asian Development Bank. Bilateral sources are primarily official development assistance provided by the Development Assistance Committee member countries such as Japan and Korea. Political risk insurers, such as Multilateral Investment Guarantee Agency (MIGA) and ADB's Asia Pacific Carbon Fund, have a mission to promote foreign direct investment in the studied countries by insuring private investor's project risks. Obtaining such risk insurance is having leveraging effects on countries, such as China and India (Kim 2012). In other developing countries, such as Indonesia and Vietnam, such risk insurance are also accompanied by international technical assistance programmes. Carbon finance also offers the studied countries a possible source of income for clean energy access projects that also help to reduce GHG emissions. Up to 2011, 15 Clean Development Mechanism (CDM) projects or 0.7% of the total, have been designed to increase energy access for poor households in China, India, and Indonesia (Sachs and Someshwar 2012).

Filling the financing gap will require integration of carbon markets. CDM, among other carbon market mechanisms, can be termed a success but it is still very uncertain whether it can deliver the required financial resources due to oversupply and low demand caused by international and national policies (Ninomiya 2011, Rhee *et al.* 2012). Financing from developed countries through such innovative mechanisms, such as the Japan Bilateral Offset Credit Mechanism (BOCM), will be key as it is also in the global community's interest for developing Asia to cut emissions (Sudo 2012). From the perspective of equity and historical responsibility, developed countries should show leadership and share responsibility in filling the significant financing gap. This must be done in addition to official development assistance, if inclusive growth and co-benefit objectives are not to suffer (Kawai and Lee 2010).

There are already a few low carbon energy collaboration programmes in Asia that have been working reasonably well. For example, Japan has established energy collaborative projects, such as the Energy Silk Road project involving China, Turkmenistan, and the Trans ASEAN gas pipeline network. Lao PDR is trading its surplus renewable energy to its neighbour Thailand, offsetting its emission in a win-win strategy. Bhutan trades surplus energy with India. Myanmar and Thailand have been cooperating on natural gas exports. Developing harmonized standards and synchronization of power-grids will further integrate energy and carbon markets in the region.

However, shortage of R&D capacity and skilled workforces capable of low carbon innovations in developing Asia emphasizes the importance of regional cooperation in pooling human capital resources through increasing the mobility of skilled personnel across countries (Brastasida 2011, Dubochet 2011, Lohani 2008, Foxon and Pearson 2008). In this context, establishment of the Global

Green Growth Institute (GGGI) in 2010 and the initiation of the Low Carbon Asia Research Network (LoCARNet) in 2012 by the Government of Japan is noteworthy.

Regionally coordinated actions would be in the political interest of all governments for the following three reasons. First, a more direct, region-wide push on energy efficiency, technology, investment, and deforestation is essential to add credibility to the voluntary NAMA pledges and national targets without losing economic competitiveness. Second, given the scale of investment required and the deterioration of public finances in many countries, cooperation, consultation, and coordination among governments of this region can leverage private sector capital. Third, because it will take time to agree on the details to implement a global climate deal, it is important to advance with concrete actions to provide the international community with experience and lessons for increased financial and technical assistance to the fast growing economies of Asia.

Lessons learned for up-scaling of low carbon green growth policy actions in developing Asia

This section draws from the country cases to explicate a framework that might allow analysts to predict the requisite policy changes to catalyse low carbon green growth. Five dominant factors appear to be at the core of support for low carbon development in developing Asia. As Table 5 depicts, each of the policy factor elements played a highly influential role in allowing low carbon energy systems to develop in emerging economies of Asia. In all the countries, development of

Table 5: Policy Factor Theory of Low-carbon Green Growth

Factor	Examples
A strong state articulation of low-carbon green growth strategy with focus on co-benefits	China has committed to low-carbon green growth in its 12th Five Year Plan, with the aim of attaining environmental co-benefits and economic competiveness
Decentralized policy making and implementation	Indian government sees a strategic link between economic growth, social development, and green house reductions through decentralized renewable energy planning
Sectoral targets to link energy efficiency improvement with technology innovations	Indonesia's low-carbon green growth policies have been important engine for restoration of forests and the emergence of internationally competitive Small and Medium Enterprise (SME) sector
High levels of private sector activism	Korea has adopted a low-carbon green growth strategy to drive competitiveness through development and use of advanced technologies by the private sector
Regional cooperation for harnessing financial resources	Thailand and Lao DPR are jointly mobilizing investment for cross border infrastructure that distributes renewable energy at lower cost, alleviate poverty, and support entrepreneurial innovation for integrated low-carbon markets

renewable and energy efficiency measures was driven by government funding and supported by private sector with unlimited harnessing potentials of regional cooperation. The governments are employing targeted approaches to achieve the co-benefit objectives in a strategic way low carbon green growth also embellishes the studied countries' efforts to provide secured clean energy to poor. Low carbon green growth strategies were also insulated from political challenge by including them in national development plans. Civic support is also invasive in many countries (Mohanty 2012, GGGI 2012).

What do these five factors mean for the future of low carbon green growth paradigm shift in the studied countries? As Figure 1 indicates, at the global level total carbon emissions show a continuous rise. Under a business as usual (BAU) scenario, even if today's developed economies reduce their emissions to zero, that would be insufficient to achieve 450 ppm — equivalent to a trajectory of annual emissions falling to 21.7 Gt of CO_2 equivalent. That means, currently fast growing economies of Asia must also play a key role in emissions reduction. In all the countries studied, there is potential for large-scale reductions in GHG emissions against BAU trajectories simultaneously maintaining economic growth targets (ADB–ADBI, 2013). Many studies (Asuka 2012, BNEF 2012, Jotzo 2010, Kang and Kang 2011, PWC 2008, Stern 2007, Matsuoka *et al.* 2008) estimate that the world has only until 2017 to shift to a 450 ppm trajectory before a lock-in effect of existing infrastructure requires that all investments made between 2020 and 2035 must be based on zero emission options (Barber 2010, Frankel 2009, Rang 2010, Winkler *et al.* 2007). However, as the meta-policy analysis indicates, achieving these reductions will require up-scaling of the policy actions across sectors, including energy supply and demand, land-use, forestry, urban development and planning, and sustainable transport. Most of these interventions such as increasing cogeneration, improving vehicle efficiency, and reducing electricity system losses will pay for themselves. Nevertheless, a more ambitious regional action is still required.

Scaling up many of the actions, discussed in the previous section, and translating them into a substantial contribution to global climate change mitigation will require stronger efforts at the regional level to bring down technology costs, support the development of new technologies to scale up private sector financing, and provide climate finance that has co-benefits. The regional trading systems can have a significant influence on low carbon green growth, enabling or obstructing the flow of low carbon goods, services, technologies, and investments (Mikic 2010). Free trade agreements that liberalize trade in low carbon goods and services, and investment in low carbon projects is necessary. Kalirajan (2012) found that trade liberalization could result in a 7–13 per cent increase in the trade volume of low carbon technologies, 8–10 per cent reduction in poverty, as well as 8–11 per cent reduction carbon emissions. It is essential that such regional cooperation efforts are supported by targeted capacity-building programmes to share knowledge on good policy practices.

Summary

Recent years have seen a growing number of studies on the need for and the macroeconomic impacts of low carbon green growth. These studies, well-meaning and valuable as they are, are heterogeneous in terms of both methodological characteristics and policy findings, and thus are limiting their value for the purpose of policy learning. In this article, we presented a meta-policy analysis approach providing descriptive assessment of policy actions taken at different levels of governments in Asia, based on the synthesis of a rich literature provided by a network of national research institutes. The meta-analysis takes account of actions taken by seven fast-growing economies of Asia and examines the policy factors driving the changes for low carbon green growth. The results illustrated how, despite having very low per capita GHG emissions, many developing countries of Asia are still making substantial reductions in GHG emissions and energy use with investments, that in many cases, pay the costs themselves. The meta-analysis demonstrates that it is possible to integrate low carbon green growth objectives into sectoral plans rather than treating climate change as add-on to be solved through stand alone policies. Making low carbon development an agenda of the economy rather than an issue concerning any particular ministry, is a key lesson coming from this five-country study, and one that could have lasting consequences in terms of government coordination on climate change policy in the countries studied. Central to this is the strong priority to private sector participation and regional cooperation for scaling up of current efforts to attain full benefits of low carbon green growth. Based on the country case studies analysed in this article, transformative policy changes (up scaling of factor conditions to harness the co-benefits) and funding for readiness activeness (economy wide and sector-specific low carbon technology interventions) are proposed as high priorities for regionally coordinated collaborative actions among the studied countries, as they are likely to achieve the greatest returns at lower cost.

The meta-analysis approach presented in this article, while modelled after the IPCC process of preparing assessment reports, has strong points related to its ability to include qualitative analysis, case studies, and studies in local languages that are not generally reported by the global community. The meta-analysis takes these studies and analysis into account to identify valuable factors that affect policy changes. This approach to assess policy actions through a network of national research institutes in Asia is completely transparent and has the benefit of adopting a developmental perspective to climate change responses. This network is composed of researchers who contribute directly to development of low carbon and green growth policy, and are involved in a policy-making process and contribute their knowledge to decision making and policy planning. Through this network, it is expected that knowledge and experience are shared, research cooperation related to low carbon growth is promoted, and inputs to policy-making are provided. Most importantly, this meta-analysis approach also helps demystify

the relationship between findings in primary studies and their methodological characteristics. Hence, it is recommended to regularize the process for continued policy learning and action.

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ARTICLE

Planning to Make Healthcare More Sustainable

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Abstract: *Annual expenditure on healthcare runs into trillions of dollars globally and varies enormously among countries. Healthcare systems also generate a significant proportion of the world's greenhouse gases (GHGs), linked to climatic change that in turn affect human health. As part of the attempts to mitigate climatic change, healthcare providers are seeking to reduce the GHGs they emit in treating patients. This article discusses attempts to quantify the cost and carbon footprint of healthcare services and a mathematical model is used to quantify how changes in healthcare delivery might contribute to meeting budgets and emissions reduction plans whilst maintaining public health.*

Keywords: *systems modeling, operations research, demand side dynamics, supply side dynamics*

Introduction

The per capita expenditure by governments on healthcare varies enormously among countries, ranging from $0.70 per person per year in Burundi to $4,508 in the United States (US). Although it holds loosely that the health of a population improves with increased expenditure, the relationship between a health outcome, such as life expectancy and spending, is not linear (Wilkinson and Pickett 2010). Although this deviation from linearity may be partially accounted for by factors like environmental quality (Correia *et al.* 2013) and social factors, such as deprivation and inequality (Wilkinson and Pickett 2010), health outcomes are affected by the quality of service provided, which, inevitably is strongly influenced by the purchasing power. Whatever healthcare system is in place for a population, it needs to be efficacious and affordable.

In planning services for the long term, the term 'affordable' may also be interpreted as 'sustainable', especially in the current global economic circumstances as public purses have to cope with the most challenging affordability envelope

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in a generation. However, over the past couple of decades 'sustainability' has emerged as a measurable quantum, which includes not only economic cost, but also environmental and social costs. Concerns over sustainability have evolved as there is now data indicating that anthropogenic activity has contributed to the increasing temperature of the Earth, with potentially serious climatic consequences that can drastically change the quality of human existence.

The notion of climate change has built up around global temperatures driven up by a rise in carbon dioxide and other GHGs released into the atmosphere. The seriousness of climate change as an issue is exemplified by some authors suggesting that it is the greatest threat to human health in the 21st century (Costello et al. 2009), perhaps killing 150,000 humans per year (Schwartz *et al.* 2006) and causing wars and other forms of social unrest. Even with the prospect of horrendous consequences materializing, efforts to reduce GHG emissions and plans for adapting how we might live, have been emerging only slowly (Godlee 2011). For the global population to reduce its emissions to a level considered sustainable and abate global warming, an examination of how we conduct our daily lives is essential. This can only be achieved through inter-disciplinary research that identifies the source of our emissions and ways of curbing them (Cooney 2010). The development of conceptual and numerical models can help with this process through sensitivity analyses.

The particular elements of our living environment, which generate GHGs vary enormously in terms of their impact, yet all contribute to global emissions. They range in size from individual domestic units, which comprises 72 per cent of GHG emissions (Hertwich and Peters 2009), to large multi-site conglomerates and institutions, such as factories, government offices, airports, and healthcare facilities. Sizing emissions through development of a conceptual model for each arena is inevitably an onerous task. However, research is underway, which is starting to scope the GHG given off from treating illness and maintaining the health of the population in general. To understand the sources of emissions generated through healthcare and how different ways of working might reduce their quantity, assessment of healthcare impacts must include hospitals and other medical facilities due to their rates of energy consumption (Charlesworth *et al.* 2011).

In the UK, estimates suggest that emissions from healthcare form a significant fraction of those GHG emissions attributable to the public sector, which overall accounts for 10 per cent of the global total (Hertwich and Peters 2009). For example, the English National Health Service (NHS) is responsible for 30 per cent of all public sector carbon emissions (Gatenby 2011), or 19.7 million T CO_2 eq (GHG expressed in terms of tonnes of carbon dioxide equivalent) in 2010 (Naylor and Appleby 2012). The activities responsible for the emission of these GHGs in the NHS comprise almost two-thirds that are attributable to procurement and 19 per cent to energy use in its buildings (Sustainable Development Unit 2012).

To set the size of emissions from the NHS in context, the GHGs emitted by the English NHS is larger than those emitted by passenger aircrafts taking

off from London's Heathrow Airport annually (Naylor and Appleby 2012). As with spending, the proportion of emissions allotted to healthcare varies among countries. For example, in the US, 7 per cent of CO_2 emissions were linked to the health sector (Chung and Meltzer 2009) versus 4 per cent in England (Naylor and Appleby 2012).

If the NHS meets its self-imposed reduction in carbon footprint of 80 per cent by 2050 (Cole 2009), it will reduce the carbon footprint of England by approximately 2 per cent. Whether this is achievable or not can only be determined through careful consideration and modelling of how operational changes in the delivery of healthcare might manifest themselves in the delivery of this target. However, any reduction in emissions will realize additional health co-benefits associated with mitigation in the health sector (Costello 2009, The WHO 2011, Haines *et al.* 2009). Modelling the sources of carbon emissions can assist greatly in ensuring that these mitigation measures are effective and realistic.

While modelling has been frequently undertaken to estimate the carbon footprint of individual areas of care; e.g., renal care (Connor *et al.* 2010; James 2007), reflux control (Gatenby 2011), dentistry (Duane *et al.* 2012), and the energy used in emergency care (Blanchard 2009), the carbon expended by wider healthcare systems has received much less attention (Zander *et al.* 2011). One of the rare attempts was undertaken by Pollard *et al.* (2013) in which over a quarter of the carbon footprint of delivering secondary healthcare to a region of the UK was simulated on a 'bottom–up' basis. Pollard's approach has since been tested in dentistry in Scotland (2013). Pollard's methodology involves piecing together systems that give rise to larger, more complex systems, as has been used to assess carbon mitigation in energy policy development (e.g., the MARKAL model) (Loulou 2004). It is the first attempt to apply such a model to the health sector. When applied, it can aid in the examination of the broader implications of policy and service reconfiguration on carbon emissions set against current practice.

Healthcare resources are finite and inevitably restrain what can otherwise be delivered. For a healthcare service to be sustainable as well as effective, it needs to be affordable. The same conceptual model, with which emissions of GHGs are calculated, can be employed to estimate the costs incurred of delivering healthcare, thereby permitting the possibility of gauging affordability. Here we discuss whether Pollard's model, having been proven adept at quantifying the GHG emitted from secondary healthcare and at estimating the dual cost-carbon savings achievable in dentistry, is fit for purpose in seeking a better, if not optimum, balance between cost effectiveness and emissions minimization in the delivery of healthcare.

Healthcare delivery within a challenging affordability envelope with high patient expectations and aspirations to minimize adverse impacts on the climate and our ecosystems requires very careful planning. There is a need to create time, to innovate when planning healthcare resources, and potentially do things differently. These actions could take the form of building teams within healthcare

organizations that will be able to take on the construction of complex models and their use and calibration, or possibly to use a tool that has been designed to aid the reconfiguration of healthcare services.

In addition to being made fit for the purpose through modelling the consequences of redesigning healthcare, use of the Pollard Model facilitates demonstration of how small operational changes can link together to create a more streamlined healthcare delivery system. Through publication, the science underpinning its methodology has been validated leaving its developers with the ambition of readying it for widespread use with universally available healthcare datasets. The model removes the need to assemble expensive teams of experts charged with conceptualizing and studying how best to reconfigure local healthcare services.

Because the model is fed with generic healthcare datasets, its application transcends geographical boundaries. Its modular construction enables sensitivity analysis through model runs. For example, the model architecture could easily incorporate concepts, such as using electronic gadgetry to empower patients to monitor themselves within their own homes as well as supplying biochemical, physiological, and behavioural data to healthcare professionals. Other uses for which the model could be developed include the construction of facilities that would, for example, allow healthcare systems to discharge patients more quickly from its more expensive facilities. Current plans for the development of large care homes in China (Jhan 2013) could be readily quantified using the model with their running costs and carbon footprint determined straightforwardly.

To date, talk of sustainability in healthcare is typically focused on the need to control the emissions generated from treating patients. However, it is difficult to argue that any 'green' system for treating patients that is not affordable is sustainable. The model presented here calculates both the cost and the carbon footprint of the way in which a healthcare system operates, thereby enabling a judgement to be made around its sustainability in the truest sense of the word.

The versatility of the bottom–up approach stems from the simplicity of the conceptual model. It facilitates a demonstration of how healthcare is delivered across patient–carer interfaces and is able to aggregate a number of quanta utilized in delivering care; whether they are carbon, cost, or water use. With regard to water, it provides an interesting perspective. It must be noted that the NHS in England consumes enough water and generates enough sewerage to fill London's Wembley Stadium every 16 days (Naylor and Appleby 2012).

The modelling approach described here is very much a work in progress, but can already help manage the consumption of precious resources needed to deliver healthcare whilst, at the same time, ensure that the quality of care and patient expectations are not compromised. Being constructed bottom–up from a low level, the model allows a demonstration of how the current cost base and carbon footprint may be derived for an organization that meets these expectations and needs. The model's architecture lies at the individual component level, whether that denotes an individual heater, light bulb, or mode of transport.

Thereon, the emissions given off by these processes are aggregated at a level against which comparison with measured consumption may be made. Not only does this provide assurance that the carbon footprint or cost of a clinical area or pathway may be appraised, it also allows for demonstration of how changes in clinical practice and internal processes in individual areas contribute to a reduction in cost or emissions within the healthcare system.

Modelling Philosophy

In developing a mathematical model to improve the provision of healthcare, a decision was taken to separate the model's dynamics into demand and supply side.

It was assumed that patients should be treated at the closest site at which the treatment required was available, or, at the site at which the patient wished to be treated. A core philosophy underpinning the model was that patient demand should not be constrained by capacity availability. Where demand outstripped capacity, it was expressed as a 'capacity gap' to be remedied by undertaking changes in the manner in which healthcare services were delivered. Consequently, evaluation of the demand at each site was more straightforward in that it could be driven by the geographic distribution of a local population, the rate at which those members of the population needed healthcare and the sites at which healthcare services were offered.

On the supply side, the model strives to be as simple as possible as it quantifies the resources required to treat the population. It does this through consideration of elements that constitute a patient's treatment (care pathway). Against each of these component parts a cost, a set of resources, and a quantity of greenhouse gas emissions is allocated. As mentioned previously, the simplicity of the supply-side conceptual model allows any quantum to be output from the supply-side model so long as the quantum is consumed at the point of care. Consequently, the model is able to calculate the number of patients that require treatment at a given site and work out the cost and carbon footprint of treating this number of people and crucially, whether or not there is sufficient capacity to treat this number of patients. Key to the demonstration of how feasible the delivery of each configuration is, the model is designed to be populated by those managing and delivering services. In this regard, staff appreciate how changing the way they run services manifests itself in the delivery of targets and savings at the very top level. In other words, the staff can gauge the significance of changing how they operate with respect to 'the bigger picture' by using the model.

The aim of the model is to help those healthcare services to identify the optimum balance in service provision such that carbon emissions are kept as low as possible whilst maintaining affordability and maximizing patient access to services. Different configurations of services are compared and the configuration

which satisfies the most metrics in terms of cost, carbon, and patient access can be readily identified. The tool helps to identify a manner in which care services are laid out whereby cost savings and carbon reduction may coincide and the point of care is available to meet needs in appropriate locations.

The Model Dynamics

In calculating the carbon footprint of large proportions of secondary healthcare in Cornwall, Pollard *et al.* (2013) used data, which outlined the concepts defined in Figure 1. The provision of care, whether it be secondary healthcare, social care, or dentistry, is influenced by a number of factors, including demographic and related to service delivery. Factors relating to deliverability include finance and the availability of resources, which were included in a later study run using the Pollard model to evaluate impacts of dentistry in Fife, Scotland. This latter study is currently being prepared for publication.

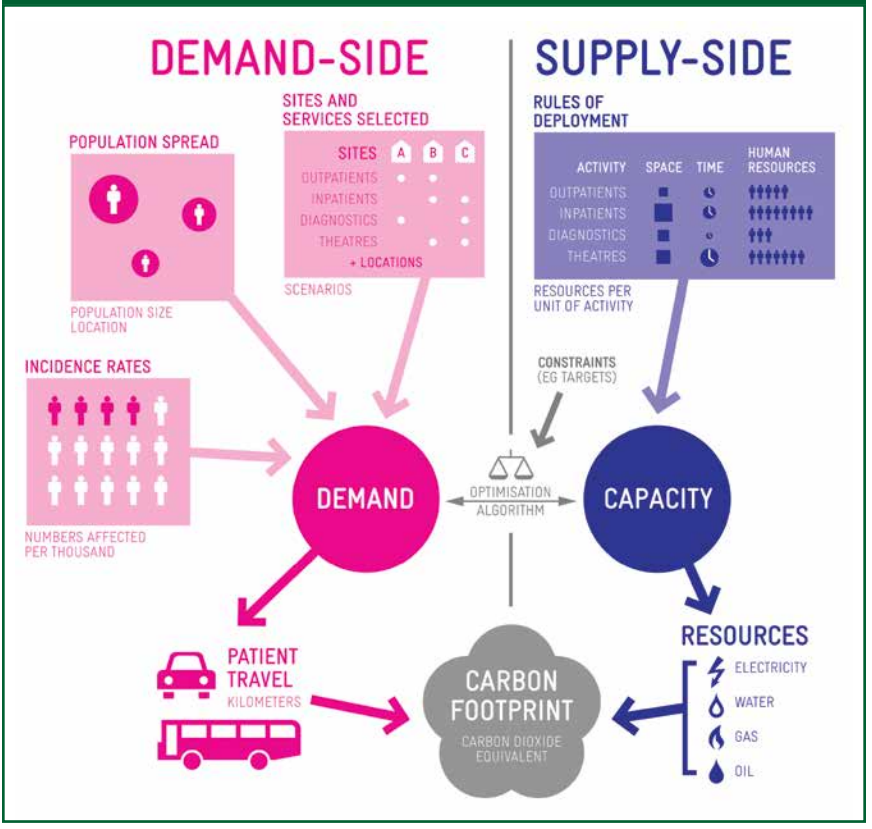
The broad mechanics within the model are as follows. Widely available healthcare data is used to determine the demand for services at sites considered for provision of clinical facilities. Initially, this demand is converted into a currency into which it may be compared against the capacity available on site assuming services are run in 'business as usual' manner. Any capacity gap (in terms of physical space, resources, and staff) is then addressed through conversation with hospital management and clinicians, and iteratively remodelling with the tool to determine a 'best fit' solution which satisfies issues around carbon reduction, patient care, maximum utilization of resources, and affordability. Consequently, demand-side and supply-side elements of the model are run independently.

The data types used by the carbon foot printing capability of the model were outlined by Pollard *et al.* (2013). However, in simulating the cost base of healthcare provision, additional data regarding the origin of these costs, (for example the rules by which human resources are deployed) must be considered. Where possible the model utilizes datasets which are generally available. However, values unique to a locality ideally need to be used although they can be initially estimated using national averages. The model is not unlike any other in that for its output to be sensible and useful, the input data needs to be realistic and accurate.

In more detail

Healthcare is delivered within a variety of arenas each having a unique complexity with regard to the conceptual and numerical models required to replicate them. With regard to secondary healthcare in the NHS, which was the subject of the study by Pollard *et al.* (2013), these arenas comprise outpatients, diagnostic tests, therapeutic interventions, operating theatres, and inpatient wards. As a patient enters secondary healthcare, he or she will access one or more of these arenas per episode of care. Because secondary healthcare is commonly regarded as one of the more resource-intensive domains of the NHS, significant investment

Figure 1: Conceptual Diagram of the Solution Used within the Carbon Model



Source: Pollard (*et al.*) 2013

has been made in recent times to facilitate management of patients outside of secondary healthcare, whether through schemes designed to avoid admission to hospitals or to bring on earlier discharge of patients from them. Consequently, the scope of Pollard's secondary care model includes community hospitals which, in some areas of the UK, can treat the less complex conditions and house patients towards the end of their recovery from surgery or from medical admission, but are not in a condition in which they can return safely to their normal place of residence.

In order to determine the workload of each site earmarked for the provision of healthcare, whether in a community hospital, acute hospital, or GP surgery, the distribution of the local population must be considered. Without this, it is not be possible to model the emissions generated by patient transport. Build on the conceptualization of demographic spread, the model calculates the distance from each potential patient to each site at which services might be located. As

scenarios are built up of differing combinations of sites, there expected travel time and distance can be aggregated accordingly. The model also allows for the provision of selected services at certain sites, which may be driven by services consuming expensive resources for small numbers of patients. Consequently, the balance between the centralization of such services and the burden to patients can be assessed using the model.

To calculate the patient transport needs for each service reconfiguration, the model converts demand for services at each site into the resources required at each site. The work areas modelled in the secondary care model include clinics (for outpatients), theatres and recovery bays (for procedures), beds (inwards), and diagnostic machines and rooms for diagnostic tests. A similar framework has been constructed for the geographical provision of dentistry, which has been piloted in Scotland using dental surgeries as the work area unit.

To ascertain whether the capacity at each site is sufficient to serve the demand likely to alight at each location, units must be chosen which are common to both measures. For example, outpatient demand can be converted to time by using the anticipated duration of each appointment type. If a site's outpatient capacity is expressed in terms of the same unit of time, an assessment can then be made as to whether a configuration of outpatient services per site is sufficient to serve anticipated patient demand.

The current or baseline capacity per service per site, $C0_{i,j}$, can be calculated at each site by using inputs from those delivering the service, whether they be clinicians or managers. The baseline capacity can be expressed as:

$$C0_{i,j} = W_{i,j} X_{i,j} Y_{i,j}$$

where,

$W_{i,j}$ is the days per year that service 'i' is offered at site 'j'

$X_{i,j}$ is the time that service 'i' is offered at site 'j' per day

$Z_{i,j}$ is the number of units (clinic rooms, bed, theatres, diagnostic testing machines) available to service 'i' at site 'j'

Each of the variables defined above can be changed if the capacity at each site is insufficient to meet the demand anticipated, or, if it is likely that too much capacity is programmed to materialize, resulting in waste and unnecessary cost. Iterative use of the model is recommended for 'stepping through' scenarios which have different ways of working, each of which will be analysed for cost, their anticipated emissions, and their expected impact on patient access and outcomes.

With each element of capacity there is a need for resources — in terms of staff, capacity, and equipment. This enables an estimation of the cost, staffing requirement, and carbon footprint of delivering services for each scenario tested. Sites at which services are held may be varied as per the scheduling rules and

manner in which the staff is deployed at each site, leading to variations in capacity at each site assessed for cost and carbon output. A sensitivity analysis then materializes from the output that the model generates for each service configuration, enabling a judgement to be made on which service configurations would enable a healthcare provider best deliver on cost, emissions reduction, and patient access.

Although the model presents expected levels of need and the capacity required to deal with local demand, its modular nature allows for the periodic variability in need to be accounted for, which is vital for planning services. Predicted capacity requirements may then be adjusted to tolerate unseasonal variation. Although it is impossible to ensure sufficient capacity with total certainty, it is possible to make inferences on the capacity needed with a high level of confidence, for example, for 98 per cent of the time using historical data. Such adjustments in the model's predictions will minimize treatment delays within the redesigned system caused by variation in the need for treatment.

The findings to date

Given that the testing grounds have been in rural or semirural geographic regions within the UK, early indications suggest that geographical service reconfiguration has and will continue to have a larger effect on the sustainability of healthcare than undertaking less radical measures, such as gradual switching to low energy light bulbs. As the NHS drives to reduce its carbon footprint by 80 per cent by 2050, the case for radical redesign may be strong. However, radical redesign is likely to incur significant capital outlay. The key strength of the Pollard Model is that it allows those delivering and planning healthcare services to demonstrate how working differently contributes to the aggregated performance of an organization with respect to meeting its targets, whether financial or environmental. The Pollard Model makes clear to those who "do their bit", how their work contributes to the wider organizational picture and to the net rate of return on any capital investment.

The inclusion of greenhouse gases emitted from patient transport included in the carbon footprint of healthcare organizations invites consideration of the boundaries inside which the carbon footprint of healthcare should be calculated. Questions around model scope could be extended to examining whether the complete life-cycle of goods procured by the healthcare system for the treatment of its patients should be in the carbon footprint of healthcare organizations. In the study of Pollard *et al.* (2013), which considered the delivery of secondary healthcare in Cornwall around outpatients, diagnostics, theatres, and inpatient wards, it was found that per patient treated, patient transport comprised the most significant proportion of carbon footprint despite outpatient services being the most decentralized. This was due to the utilities consumed in the delivery of the remaining modalities of care. Even so the Cornish study encompassed approximately 30 per cent of the carbon footprint of delivering secondary healthcare in Cornwall.

Expansion of the model to include the procurement of goods used by a healthcare organization is possible, but is difficult to achieve using the bottom–up principles. Healthcare is thought to be interconnected with eight broad sectors either upstream or downstream (Huang *et al.* 2009), each of which would have to be modelled 'bottom–up' if the complete life-cycle of supplies were to be included in the model's scope. Patient transport, on the other hand, is less difficult to include due to finite number of residents within each geography and a simple relationship between the distance travelled between each patient and facility and the time it takes each patient to travel for the treatment.

Whereas the baseline condition in the original study by Pollard *et al.* (2013) assumes that patients were treated at their closest point of healthcare delivery, use of the Pollard model in quantifying possible savings in delivering dental care within Fife, Scotland assumed a different baseline for patient travel (Duane and Pollard 2013). Results from a patient travel survey were used, which illustrated the impact of patient choice versus the scenario where patients were treated at the site closest there domicile. In effect, actual patient journeys aggregated to approximately double the case if patients were treated at the site closest their domicile.

With regard the cost savings possible though reconfiguration, the Fife study demonstrated that through increasing the utilization rate of dental surgeries it was possible to rationalize the number of sites at which dental surgeries, were located. Interestingly, any increase in patient travel incurred through reducing sites from 22 to 13 was less than the savings expected through redirecting patients to their nearest site for treatment.

In the case of patient travel, the Fife study quantified the electricity required for delivering dental services to Fife's residents. As the number of dental surgeries was increased or decreased, the electricity which was proportionate to the number of patients treated remained constant between each scenario, whereas fixed power per site varied with the number of sites modelled.

The Fife study also looked at the clinical staff required for each service reconfiguration. Given that in theory, significant human resource savings could be possible through rearranging services, whilst maintaining patient safety and standards of care. A question must be asked whether a study might be worthwhile, which quantifies the long-term effect on healthcare, if services are geographically reconfigured with resulting savings recycled into preventative medicine.

To realize the significant gains in terms of cost and carbon reduction that service for redesign might bring, it is likely that capital investment would be necessary. A key feature of the Pollard model is that it allows those providing healthcare services to demonstrate the effect that operational changes might have on the 'triple bottom line'. As a consequence, the Pollard model acts as a vehicle by which the net rate of return of investment may be calculated and adjusted as different ways of working are considered.

Conclusions and Future Directions

The Pollard model has been validated as being fit for the purpose of simulating how the cost and carbon footprint of healthcare delivery might vary with different ways of working. As part of this capability, it demonstrates the degree to which the burden shifts between patient and healthcare organization as services are redesigned geographically. It represents a unique opportunity for those delivering and commissioning health care services to show whether or not aspirational changes in cost base or emissions are achievable and what changes at the point of care will be necessary to make aspirational targets.

The Pollard Model is able to identify the resources required at specific geographical locations to meet the care needs of the population. This need can be partitioned by the urgency at which it is required resulting in health and social care, comprising a multi-faceted, complex system. To avoid system bottlenecks and capacity shortfalls, the rate at which these resources are deployed for the less-urgent care can be scheduled around the need for immediate and more pressing treatment. In addition, simulations depicting alternative care practises; e.g., domiciliary care and empowering patients to self-monitor their conditions, could be deployed in ascertaining the best use from geographical configurations once they are discovered. Moreover, this exercise may involve iterative simulations 'homing in' on what will be best practice within and across a number of inter-linking care sectors. To facilitate this, a suite of software packages will be constructed around the Pollard Model.

Finally, it is important to note that the approach described here is not limited to reducing the carbon footprint or increasing the sustainability of healthcare systems in high-income countries alone. The model can be used to improve other environmentally damaging and inefficient public services and business operations, and is also suitable for deployment in lower-and middle-income countries, providing reliable data can be gathered. The Pollard model therefore represents an additional highly versatile tool to aid in the construction of a more sustainable world.

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A Green Economy of Permanence: Innovation Insights from Grassroots Knowledge

C SHAMBU PRASAD[1#]

IT HAS BEEN a year since the Rio+20 Summit and a good opportunity to review our movement towards the 'green economy' and the 'future we want' — both popular slogans of the Summit. The agenda for action following Rio has disappointed many for its lack of explicit commitment or strategy for investments to promote green growth, inability to establish market mechanisms for ecosystem services, and inadequate institutions to empower people and their rights to development (Kadekodi 2013).

India's Former Minister for Rural Development, Jairam Ramesh, has rightly suggested that India could be a leader in the world on Green Economy. He goes further to suggest that the green economy in India is about livelihoods and not lifestyles, and India, more than most countries, has a unique demographic reality in terms of its growing population and needs to grow green to capture this demographic dividend. While there have been several initiatives in India that have indicated the potential for green development, Indian policies for encouraging the green economy has not kept pace with green developments at the grassroots. We continue to lack mechanisms that can learn more from these experiences and provide institutional innovations that could root these ideas in our day-to-day planning. Policies in India tend to be high on rhetoric and make the right kind of noises about sustainable development and its ever-changing dimensions. However, they often do not provide a vision about sustainable futures or a paradigm that different stakeholders can work with. Concepts of ecological literacy, sustainability science, sustainable transitions, whole systems approach or systems thinking, resilience and complexity science, or adaptive management are just some of the ideas that figure prominently in sustainability discourses globally. Indian policy frameworks seem to have little engagement with this constellation of ideas and possibilities.

Communities and people are conspicuous by their absence in many policy statements. Experts see them as passive recipients of the products of the new

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economy and not as active agents in the production of knowledge. Even as discussions on climate change take place globally that indicate the importance of engaging with communities, it is the absence of trust on community knowledge and ways of engaging with it that has been the bane of many Indian policies. Indian planners would do well to reverse the current overreliance on the experts and bank on the creative potential of peoples knowledge. Luckily, the vibrant civil society in India has always shown alternative visions of sustainable development and the green economy. Indian economists such as J C Kumarappa have highlighted the possibilities of an 'economy of permanence' much before the energy crises and ecological debates of the 1970s.

Co-creating New Knowledge with Communities: Two Indian Examples

Community, people, or indigenous knowledge has been recognized, but it is often seen as one opposed to modern science. Creating spaces for knowledge dialogues can however enable a co-creation of knowledge. The Centre for World Solidarity (CWS) recognized people's knowledge that was developed in a particular region of Andhra Pradesh based on the Gonchi Irrigation System. The Gonchi System was a technical system that enabled farmers irrigate their paddy lands of 200–300 acres.[2] This however went along with a system of social regulation that enabled equitable access for all farmers and livestock in a water-starved region. With farmers in bore well irrigated areas facing an acute crisis due to overmining of ground water for irrigation, CWS with its partners introduced water budgeting tools to enable

Exhibit 1: A social-scientific village audit of groundwater in Waddicherla, Andhra Pradesh, with public display of water tables encouraging communities to think and act on social regulation

[2] For more details on the Gonchi System, see http://www.cwsy.org/html/publications.html

Exhibit 2: Women taking on newer roles and leading climate smart agricultural innovations such as SRI in Odisha

eco literacy on water and enabled the community to recognize problems that were beyond individual and household levels (Exhibit 1 for a village groundwater use audit). The collective action by farmers that began in a couple of villages in 2004 has since expanded to over 200 villages with local partners working with CWS in making connections between agriculture, water use, and energy efficiency. Green innovation here is not about a new product to be sold in the market, rather it is about creating conversations on knowledge and democracy that enable the economy to green.

The second example is about an innovation where farmers have used ideas that originated as far as Madagascar in Africa. The System of Rice Intensification (SRI) has enabled farmers to grow more rice with lesser inputs and has been tried by over a million farmers even though the agricultural establishment has been reluctant to research it. SRI has been adapted by small farmers in remote corners of India by social groups that have been ignored and considered as incapable of innovation. Women have been in the forefront of organizing themselves for collective action and have shown how a community-based extension model, that is neither private sector driven nor dependent on public sector extension, can make and transfer new knowledge (Exhibit 2). Green innovations in SRI have been in the technical aspects of rice farming, the use of biopesticides, mechanical weeders, organic matter, lesser water, seed, and fertilizers. Technical innovations in SRI have emerged from open sourcing knowledge and learning alliances where farmers have had an opportunity to share ideas with researchers through new knowledge commons. Institutional innovations have shown how departments other than agriculture, like livelihood missions of rural development, can bring greater poverty, gender and, ecological focus in agriculture.

The two examples are illustrative of the innovations that are emerging in contemporary India. Traditional knowledge in both SRI and the social regulation of groundwater is valued but not museumized. The process of building new knowledge for a green economy enhances the capacity of stakeholders to deal with complexity brought about by changing weather patterns and also help in coping with vulnerability. These innovations are not dependent on either the state, following the Rio agenda, or the market driving change. Yet, they are perhaps more in tune with communities voting with their ideas for the 'future we want'. Indian planners and researchers would do well to think along with, instead of, for communities. If India sees itself as being a leader in the new green economy, communities should be both represented and actively involved in shaping a new future. Policies need to work on creating spaces for collective experimentation that can drive not just an economy that is green but an economy of permanence based on alternative values and paradigms.

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Closing the Loop: Behaviour Change from Theory to Practice

RUTH MOURIK[1#] AND SEA ROTMANN[2]

THE INTERNATIONAL ENERGY Agency's Demand Side Management Implementing Agreement has initiated work that aims to focus on behavioural changes in energy use, which is one of the biggest challenges towards a more sustainable society. This research sets out to provide clear recommendations for policy and programme improvement and best practice. Over 40 case studies on transport, building retrofits, small and medium enterprises (SMEs), and smart metres from more than 10 countries* were analysed. This research is innovative in two aspects: although modest in intention, it is the first empirical exploration of the ways in which models and theories underlying behavioural projects and programmes may affect particular outcomes and what are the circumstances for those outcomes. The other innovative feature is the use of storytelling to describe findings and cases. We found there are many stories to be told — heroic stories, learning stories, horror stories, and love stories, and it was found that storytelling is a very effective way to convey the often complex interdependencies and factors influencing behavioural change.

The scroll showcases a love story on changing lifestyles, starting with people's homes, which was a part of the Swedish Sustainable Järva Programme. Sustainable Järva is a five-year rehabilitation project where the neighbourhoods around Järvafältet — largely formed during the Swedish 'one million home programme', 1965–75 — are being renovated and developed into a 'new' urban district with a strong environmental profile. The project is part of Järvalyftet (Vision Järva

*The case descriptions can be found on the IEA DSM Task 24 NING site (www.ieadsmtask24.ning.com), and on a Wiki dedicated to Task 24 (see www.ieadsmtask24wiki.info). These case studies were provided by the participating countries and other experts from countries that support this task. The participating countries are the Netherlands, New Zealand, Switzerland, Italy, Austria, Norway, Sweden, Belgium, and the UK.

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Once upon a time.... There were six neighbourhoods around the field of Järva that were in urgent need of improvement. The area had been constructed during the 1960s and 1970s as part of the 'one million home programme', initiated by the Swedish government to tackle a growing housing deficit in the country's urban areas. The neighbourhoods contained housing units for more than 60,000 people, but the socio-cultural context had changed and the buildings were turning old and outdated.

Every day.... People in the area were experiencing economic as well as social challenges. Many of the foreign residents were unemployed, had difficulties learning the Swedish language, and the younger generations were lacking good opportunities for education. The houses they lived in were terribly inefficient and the area in general did not work for the needs of its current residents. Several investments had been undertaken during the years to improve the situation, but nothing helped and the people felt no one was listening to them.

But, one day... The city of Stockholm decided that it would once again invest in the area, to improve the living conditions for the people living there. But this time it would be different; they had realized that the circumstances were radically different in the 1960s and 70s. They realized that in order for the 'upgrading' to be successful, they needed to include the residents in the process – from the beginning.

Because of that... The Järva dialogue was initiated during the fall 2009 and for one week 10,000 residents contributed with more than 30,000 opinions and suggestions about how the area should be developed and improved. Based on these contributions, the vision Järva 2030 was formulated and measures were planned to address the four areas of (*i*) improved housing and urban environment, (*ii*) everyday security, (*iii*) better education and language teaching, and (*iv*) more jobs and entrepreneurship.

But then... It was also realized that the area and the buildings had been constructed before the energy crisis without considering the environment, and thus the project Sustainable Järva was introduced to also bring about an environment, climate, and energy focus in the development.

Until, finally... The dialogue with the residents continued and together with all stakeholders many great measures were planned to promote sustainable lifestyles, satisfaction, and well-being. The ultimate goal of the project is to make Järva as a model and inspiration for sustainable development for similar areas, both nationally and internationally.

And, ever since then... The neighbourhoods around the field of Järva have become a place where people want to live!

2030), which is a programme initiated by the city of Stockholm, to promote social, economic, and ecological development in the area. It is a joint investment, including several different actors — local stakeholders, politicians, government administrators, entrepreneurs, residents, etc., — where the overall goal of the project is to make Järva into a national and international model for sustainable rehabilitation that promotes environmental responsibility while still preserving the area's unique and historical values. As such, the programme combines many stakeholders with varied backgrounds and takes a more systemic perspective as starting point. The project revolves around several working areas, where energy-efficient renovations of seven selected apartment blocks (350 homes) constitute a major and important part. Other areas of focus are renewable energy, as well

as sustainable transportation and cycling promotion measurements. In order to promote a sustainable lifestyle, the project also — apart from technical solutions — has a Whole System focus on social aspects, such as information, involvement, and education (See Exhibit 1). The ambition is that with better knowledge and more influence the residents will become inspired and capable of making use of 'new possibilities' that comes with technological advancement.

The programme's more systemic perspective provides an important learning that retrofitting can be a 'gateway' into other more habitual behaviour changes around, for example, lighting and appliance use and even domains beyond the energy domain, such as waste and transportation behaviour. We collected many more stories and learnings. For example, we found that Italy's Time of Use Tariff for electricity consumption is a typical hero story, promising a silver bullet technology and solid economic approach (Smart metres plus time-of-use tariff to encourage peak load shifting). However, we often find that a lot of our hero stories are actually learning stories, like the neoclassical economics-inspired SME programme in New Zealand. This programme found that it was only successful in getting SMEs to take up their subsidies for energy audits and corresponding interventions, if a trusted industry association ran collaborative learning workshops with the SMEs first. Another love story is the New Zealand Warm Up New Zealand (WUNZ) building retrofit programme, which realized that it is not about the energy savings, but the associated huge health benefits from insulating cold and draughty houses, especially for the poor.

The second way of using storytelling in this project was in telling the stories of each of the theoretical models used. We found that the neoclassical or behavioural

Exhibit 1: Communities in action

economics approaches, which are most common in buildings retrofits and smart metering rollouts, are inherently insufficient to change people's behaviour as they assume that incentives plus information provision — with maybe some clever nudges — will make people change their behaviour. As most energy use is wholly habitual, and not only rational, these approaches are often of limited success when outcomes are actually measured. The more systemic social approaches, such as the one used in the Swedish example, have more engaging stories. They sound like something you would like to be engaged in, rather than a top–down approach. However, they also bring their problems as they usually take a lot of collaboration, are hard to evaluate and on first look, are more costly. The morale of most of our stories is that there is definitely no silver bullet model or story that will always succeed in changing people's energy-efficiency behaviour. The evidence suggests that trying to design approaches without tailoring them to the specifics of the context is itself a cause of failure. The best story we can tell is that a mix of interventions will probably get you long-term success, which means that projects need to be:

- tailored to different — national, local, organizational, and domestic — levels
- tailored at both the individual and social level
- aiming at changing both the investment and habitual behaviour
- targeting multiple motivations, not only economic and informational ones
- adding strong quantitative and qualitative evaluation — of actual and perceived/modelled behaviour changes — into project design
- focussing on the lifestyle in which energy is key to performing functions

Guyana Low Carbon Development Strategy

CONTRIBUTED BY OFFICE OF CLIMATE CHANGE OFFICE OF THE PRESIDENT GUYANA

Background

GUYANA, A TROPICAL, English-speaking South American country, roughly the size of England, bordered by the Atlantic Ocean on the north, and Brazil, Venezuela, and Suriname to the south, west, and east, respectively, is rapidly emerging on the global climate change landscape and is establishing green growth leadership globally.

With a total land mass of 215,000 square kilometres and a population of just 756,040 people concentrated on a narrow plain that lies 1.4 metres below sea level, Guyana is extremely vulnerable to flooding. Climate change has been exacerbating these vulnerabilities. In 2005, excessive flooding caused damages equivalent to 60 per cent of Guyana's GDP.

The hinterland, south of the coast, is covered with more than 18 million hectares of pristine tropical rainforest covering approximately 80 per cent of the country's total land mass, with an annual deforestation rate of less than 0.1 per cent for over 20 measurable years. This makes Guyana one of the few tropical forest countries with a high forest cover and low rate of deforestation (HFLD). The country is also endowed with an abundance of natural resources, an extensive and fertile savannah, arable croplands, rich mineral deposits of gold, bauxite, and diamonds, and abundant fresh water and hydropower potential.

In spite of its natural wealth, Guyana remains a poor developing country with a vast potential for robust economic and social development. The country stands at the crossroads of two global forces. On one hand, there is pressure to exploit its natural resources, and grow and develop, with increased GHG emissions. On the other hand, the challenge of climate change requires responsible mitigation actions, which could place constraints on natural resource exploitation. Even in the absence of any action, climate modelling has indicated that by 2030, Guyana will experience significant increases in temperature and sea-level rise, a greater

risk of storm surges, and changed rainfall patterns, with adverse impacts on food security, and public health and livelihood.

Guyana's Strategy

In its search for a win–win solution, Guyana turned to its most prized asset — its rainforests. Deforestation and forest degradation are responsible for approximately 17 per cent of global total greenhouse gas emissions. However, the Economic Value to the Nation (EVN) of Guyana's forests, excluding titled Amerindian lands, is equivalent to payments of approximately US$ 580 million a year. A conservative estimate of the forests' ecological value to the world is US$ 40 billion annually. Even prior to the Copenhagen climate change negotiations and agreement, Guyana's policy-makers challenged the pervasive development dilemma head on. If the international community were to acknowledge the vital services Guyana's forests provide, and were willing to pay for these services, the traditionally incompatible forces of environmental protection and economic development could be unified. It was on this rationale that Guyana's Low Carbon Development Strategy (LCDS) was born.

The LCDS, a vision of the country's former President Bharrat Jagdeo, boldly charts a new, green development path for Guyana. According to this strategy, payments received for the conservation and sustainable management of its forests and forest services would be applied towards alternative low-emission economic activities, thus generating green jobs. These include hydropower development at Amaila Falls, situated in Guyana's interior, that will meet 90 per cent of Guyana's domestic energy needs, titling of Amerindian lands, and the establishment of an Amerindian Development Fund to support alternative livelihood projects to enable the economic empowerment of the Amerindian native people of the hinterland, water conservancy and drainage infrastructure for better flood management, farm to market roads for agriculture in non-forested areas, establishment of a micro and small enterprise development fund to promote alternative livelihoods for vulnerable groups, and institutional strengthening and capacity-building within all national agencies and partner bodies engaged in climate change mitigation. These represent a first wave of projects under the LCDS.

The Process

The first draft of the LCDS was launched on June 8, 2009. Following the launch, the LCDS was taken to country-wide stakeholder awareness consultations and extensive outreach sessions across Guyana. To ensure transparency and accountability, a Multi-Stakeholder Steering Committee (MSSC) — including representatives of indigenous NGOs, conservation NGOs, women and youth organizations, the academia, civil society, and the private sector — was established to oversee the LCDS. The entire consultation and awareness process

was independently monitored by the International Institute for Environment and Development (IIED), which reported that the process was credible, transparent, and inclusive and highlighted the government's commitment to transparency and accountability during the preliminary consultation process. The LCDS was also considered and approved by the Cabinet and Parliament of Guyana.

Financial Aspects

Following approval of the LCDS, the Government of Guyana signed a Memorandum of Understanding (MoU) with the Government of Norway on November 9, 2009 for payments of avoided deforestation and forest services, first-of-its-kind in the world. Under the MoU, Norway has committed performance-based payments of up to US$ 250 million by 2015. Guyana must deliver on agreed indicators, which will be independently verified, prior to Norway's release of the payments.

Payments are made through a financial mechanism, the Guyana REDD+ Investment Fund (GRIF), with the World Bank as trustee. International financial institutions and development agencies serve as partner entities to support locals in implementing the LCDS projects. To date, Guyana has earned the two tranches of payments amounting to US$ 70 million, which has been deposited in the GRIF and is on track to receiving a third tranche. This partnership between Guyana and Norway is the world's second largest Interim REDD+ scheme and the first national-scale effort, with Guyana being one of a few countries in the world that is being paid for the climate services provided by its forests.

Conclusion

This process of LCDS has not been without any challenges, but these challenges have not proven insurmountable. In fact, they have served to build a useful dossier of lessons and experiences that help to mould best practices for the world over and an opportunity for Guyana to demonstrate global leadership in REDD+ and green economy. In a period of just three years, the LCDS has moved from concept to implementation and can serve as a working example that can be replicated in other rainforest countries.

This article was featured in Volume 1, Issue 1 of Green Growth and Development Quarterly published in October 2012.

For more details, contact Shyam Nokta, Adviser to the President and Head, Office of Climate Change, Office of the President, Guyana at snokta@op.gov.gy

Dr Vijay Kelkar on Inclusive Green Growth

TERI: *The concept of 'green growth' had its genesis in the vision underlying the recommendations of the Thirteenth Finance Commission (TFC), where the concept was articulated as, rethinking growth strategies with regard to their impact[s] on environmental sustainability and the environmental resources availability to poor and vulnerable groups. What inspired TFC to consider Green Growth as its vision?*

Vijay Kelkar: The Commission was looking for an overall approach that would serve as an organizing principle in the context of fiscal federalism in India. The Commission came to the conclusion that 'growth' could be a key organizing principle in the context of India. This growth could be characterized by two things. First, this growth should not be indiscriminate in nature, but should be 'green' in the sense of economizing environmental resource utilization. Second, this growth should be inclusive in nature. India is a federal state, which is characterized by one of the highest inequality levels in the world, with a difference in per capita income ratio of 6:1. When compared to other federal states, such as Germany, Switzerland, USA, and Canada, it is clear that we should have done better. Growth in India should be inclusive over space and consider making lagging regions a part of growth process.

TERI: *In recent global debates, the concept of Green Growth per se has acquired a new 'political' meaning. For example, during the Rio +20 deliberations, many developing countries in particular considered green growth as a possible compromise against their other inclusive growth or social policies. What is your comment on that?*

Vijay Kelkar: I think the reason why there are growing concerns is because countries like India are undergoing a demographic transition, which is opening new avenues for economic growth that these economies did not have earlier.

Dr Vijay Kelkar is the Chairman of the Forum of Federations, Ottawa; a Member of the Board of the India Development Foundation, New Delhi; and the Former Chairman of the Thirteenth Finance Commission, Government of India.

Countries may be concerned about losing this growth window. Green growth should not be seen as a political concept as it is no different from the concept of high-quality growth that does not omit environmental concerns from deliberations on progress. That is the reason they are saying, please do not use this constraint on growth. There is no rationale as to why countries cannot yield dividends following growth and development, which is both green and inclusive.

TERI: *You played an instrumental role as an architect of the National Exploration and Licensing Policy (NELP) that promoted competitiveness in the Indian hydrocarbon industry. Green growth and development is also about enhancing the competitiveness of domestic industries; what lessons from your international experience could be useful for India?*

Vijay Kelkar: Japan was one of the earlier movers as a country that started talking about green growth. It is inspiring to see a country that is resource-poor, in terms of natural resources, achieve high quality growth. By using technology, innovation, and promoting policies that have enhanced the competitiveness of domestic firms, Japan has been able to participate in international trade with many nations. India, in my view, is a rising trading power and can create new avenues of growth by trading in goods that economizes on resource consumption. India can also trade in labour-intensive and skill-intensive goods where we are competitive. We have lot to learn from countries, such as Japan and South Korea, who are doing very well.

TERI: *What are the key aspects of growth and development in India? What emerging challenges is the country set to face? What innovations does the TFC suggest to address these challenges?*

Vijay Kelkar: I think the key aspects of growth are giving a much larger fiscal space to states, cities, and the third tier, because India has the challenge of different dimensions, with huge disparities among states, and to address these issues they are going to need resources. Growing urbanization will be one of the key defining challenges for the next two to three generations for which cities and municipalities will require resources. Innovation is required so that cities can grow in a way whereby they can be called green cities in terms of their demand and consumption of natural resources. Here, we should not adopt a straitjacket approach to all cities, but rather encourage innovations in individual cities.

Far more innovation has to be allowed at the state level, city level, and corporation level. In this regard, one of the innovations by the TFC is to give a larger resource base to not only the states, but also to the third tier of the country, which are the cities and the Panchayati Raj Institutions. If they are given more resources, then according to local conditions they can innovate to come with their own solutions. A predictable, sufficient, and secure fiscal base is required to secure local public goods for green growth, with state grants linked to their environmental performance. One of the key innovations of the TFC was goods and services tax

(GST), for providing lasting resource base to facilitate such innovations by states and third tiers of the government.

Provisions under the 72nd and 73rd Constitutional Amendments give the basis for strengthening the third tier of the government, which are rural-local bodies (Panchayats) and urban local bodies (Municipalities). These provisions have still not been implemented adequately. I called this the unfinished agenda of Rajiv Gandhi, who had emphasized the transfer of funds, functions, and functionaries to the third tier. According to the basic philosophy of the TFC, once the funds are transferred to the local level, functions will greatly follow. Therefore, funds become the driver of the change.

Of course, ensuring fiscal discipline in terms of the use of these funds is a challenge and they should be well directed, otherwise they will prove to be wasteful like subsidies. All subsidies are environmentally unfriendly; subsidizing fertilizers destroys the soil, subsidizing electricity leads to over exploitation of ground water, and subsidizing kerosene leads to adulteration and causes greater air pollution. Instead of subsidizing inputs, direct income transfers could lead to growth and development, and the protection of vulnerable groups. A good fiscal arrangement along with the required social safety nets could lead to inclusive and green growth or, in other words, high quality growth.

TERI: *In your opinion, you talk about factor reforms in the context of growth and development. How do you view these in the present context?*

Vijay Kelkar: I think that the factor reforms in the context of India are very important, including land reforms, labour market reforms, and capital market reforms. In case of India, there is no regulated land market, and absence of land records often leads to conflicts. Labour market reforms are essential, especially if the country want to reap demographic dividend. For this, labour laws are important to ensure high productivity employment in the country. Asian tigers including a country like Vietnam have been successful in labour market reforms and could serve as a useful model for India. Similarly, capital market reforms are important to ensure well-functioning markets and promote efficiency and productivity in firms. Natural resources also should be considered as a part of the factor reforms to ensure green growth and development in India.

TERI: *What is your opinion on the role of the knowledge community in India?*

Vijay Kelkar: My mentor, Mr Lovraj Kumar, would always tell me, "Vijay, in an open society, more knowledge needs to be mobilized." Knowledge communities are important for facilitating debates that lead to the formulation of good policies. They also give feedback to policy-makers so that early corrections can take place. TERI is a role model for think tanks in India. And, I want to place, on record, my deep appreciation for Dr Pachauri for creating such a world-class institution, and I wish there are more institutes like TERI.

An early initiative was a small think tank called the 21st century Foundation that was started by Dr Pachauri and some of us. The foundation would bring out a series of policy papers as an input for the government. Some of them were used and some of them were not. Independent think tanks like TERI play a central role. I am currently involved with a think tank called the India Development Foundation, working in the area of education, security, and issues of social development.

TERI: *Finally, how optimistic are you about the Indian growth story?*

Vijay Kelkar: I am very optimistic about the Indian growth story. What is going on in this country is like *Manthan*, which produced first poison and then ambrosia. In the mythology, the poison was taken by Lord Shankar; in the case of our country, it may be the people of India who are taking the poison. However, the new generation inspires optimism — they are global, ambitious, and knowledgeable. I just close my eyes and imagine… one billion educated Indians will mean more innovation and democratic institutions — who can stop us?

This interview was featured in Volume 1, Issue 1 of Green Growth and Development Quarterly published in October 2012.

Book Review

Low Carbon Green Growth Roadmap in Asia

RITU SINGH[1#]

Low Carbon Green Growth Roadmap in Asia and the Pacific
By United Nations ESCAP, KOICA. United Nations Publication, 2012.
ISBN: 978-974-680-329-8. 176pp

DEVELOPING COUNTRIES IN the Asia-Pacific region have experienced rapid economic growth in recent years by taking advantage of globalization and export-led growth models. However, compared to the rest of the world, the region uses three times the resources to create one unit of GDP. In the wake of the 2008 financial crisis, there has been an increasing demand for newer policy options for the greening of economic development. A transition to a green economy would require policy interventions at various levels and collaboration among different stakeholders, including governments, research and academia, the private sector, and civil society groups.

The publication *Low Carbon Green Growth Roadmap for Asia and the Pacific* is targeted towards decision-makers for achieving inclusive and sustainable growth, without the need for a conventional 'grow first, clean up later' path in the Asia-Pacific region. The book has been published by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), with support from the Korea International Cooperation Agency (KOICA), under the East Asia Climate Partnership.

The publication has also been supplemented by a compact disc that provides factsheets and case studies from countries around the world. As depicted in Figure 1, the roadmap suggests five tracks incorporating various policy options and strategies for low-carbon green growth in the region.

The first track comes as shifting focus from 'quantity growth' to 'quality growth', so that net growth is maximized. The track informs that for improving the quality of growth and reducing the hidden costs as GDP losses, investment in human, social, and natural capital is also considered essential.

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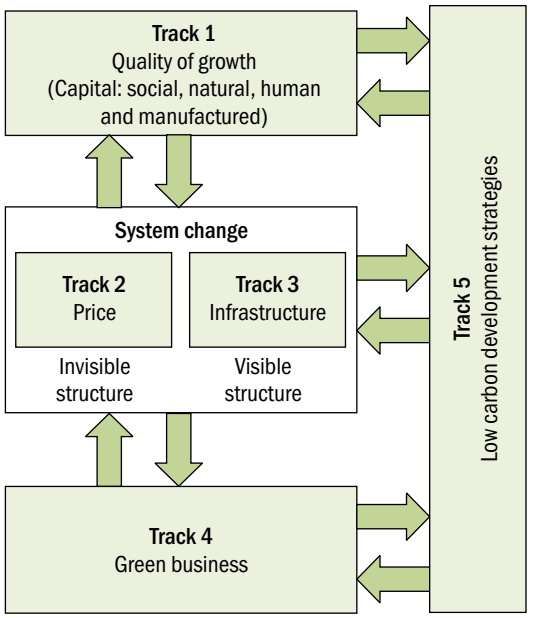
The second track guides reforming invisible structures, such as institutional arrangements, policy instruments, and changing behavioural dynamics. For instance, environmental taxes levied on natural resources, energy, pollutants, and transport could shift the tax base from income to resource consumption, and ensure revenue neutrality while internalizing externalities. Similarly, policy reforms including fiscal measures, such as phasing out subsidies on environmentally harmful activities and products, should be encouraged.

Figure 1: Five Tracks for Low Carbon Green Growth



Source: Adapted from UNESCAP (2012), p. 34, 41

The third track highlights changing visible structures, such as physical infrastructure that includes urban design and planning, buildings, transport, energy, water, and waste systems. This could re-orient economic activities to align with eco-efficiency and avoid a lock-in into energy and carbon-intensive infrastructure. Policy initiatives for solid waste management should follow a 'reduce, reuse, and recycle' approach for which countries, such as Japan and Australia — who have introduced extended producer responsibility to reduce waste — serve as good examples.

The fourth track focuses on government initiatives in creating favourable conditions through reducing uncertainty and risk for investors so that businesses flourish in a green economy. Growth engines could consider four areas – namely, green industry, green technologies, green financing, and green jobs. On the consumer front, awareness and eco-labelling can play an important role. All these would have to be supported by legislation and policy.

The fifth track stresses on low-carbon development strategies by combining economic development and climate change in an integrated, comprehensive, consistent, and coordinated manner. Given the global consensus to limit the increase in global temperature to less than 2 degrees centigrade by 2050, economies could

engage in low-carbon development strategies. Apart from providing institutional frameworks, global partnerships could also help to mobilize funds, transfer learning, and build required capacities in developing countries.

Countries such as India are federal in nature, therefore institutional frameworks would need to recognize strategies that could be adopted at the sub-national and local levels. Hence, there is a need to understand whether these case studies would be operationalized in the Indian context. An examination of co-benefits resulting from low-carbon green growth could help in informing governments at the national and sub-national level. A detailed enquiry on a sector-wise approach and resulting co-benefits can take this work to the next level. Understanding existing socio-economic paradigms needs to be done simultaneously while examining new paradigms. For example, the ecological economics school of thought would argue going beyond measures that internalize externalities and consider incommensurability of entities such as biodiversity. For example, India's National Environment Policy of 2006 recognizes incommensurability through the concept of Entities of Incomparable Value (EIV). Noted academic Georgescu-Roegen emphasized on the importance of considering inconvenient variables, such as energy and matter flows and institutional inertia. Hence, debates around low-carbon green growth would need to consider a plurality of viewpoints as expressed in various schools of thought.

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Guide to Authors

The *International Journal on Green Growth and Development* aims to facilitate knowledge and learning processes, which will help in enhancing the capacity on emerging 'green' policy concepts. We invite contributions for subsequent issues.

Type of contribution	Description	Length (approx.)	Illustration
Articles (will be blind peer reviewed)	Covers analysis through original research, reviews, and commentaries on topics of policy relevance. This section will be subject to peer review.	4000–8000 words	As required
Green Showcase	Features research, good practices, and initiatives	600–800 words	Preferably 1
Green from the Grassroots	Features insights from initiatives that involve interaction with communities and people	600–800 words	Preferably 2 photos

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- Photographs should be high resolution (jpeg format)
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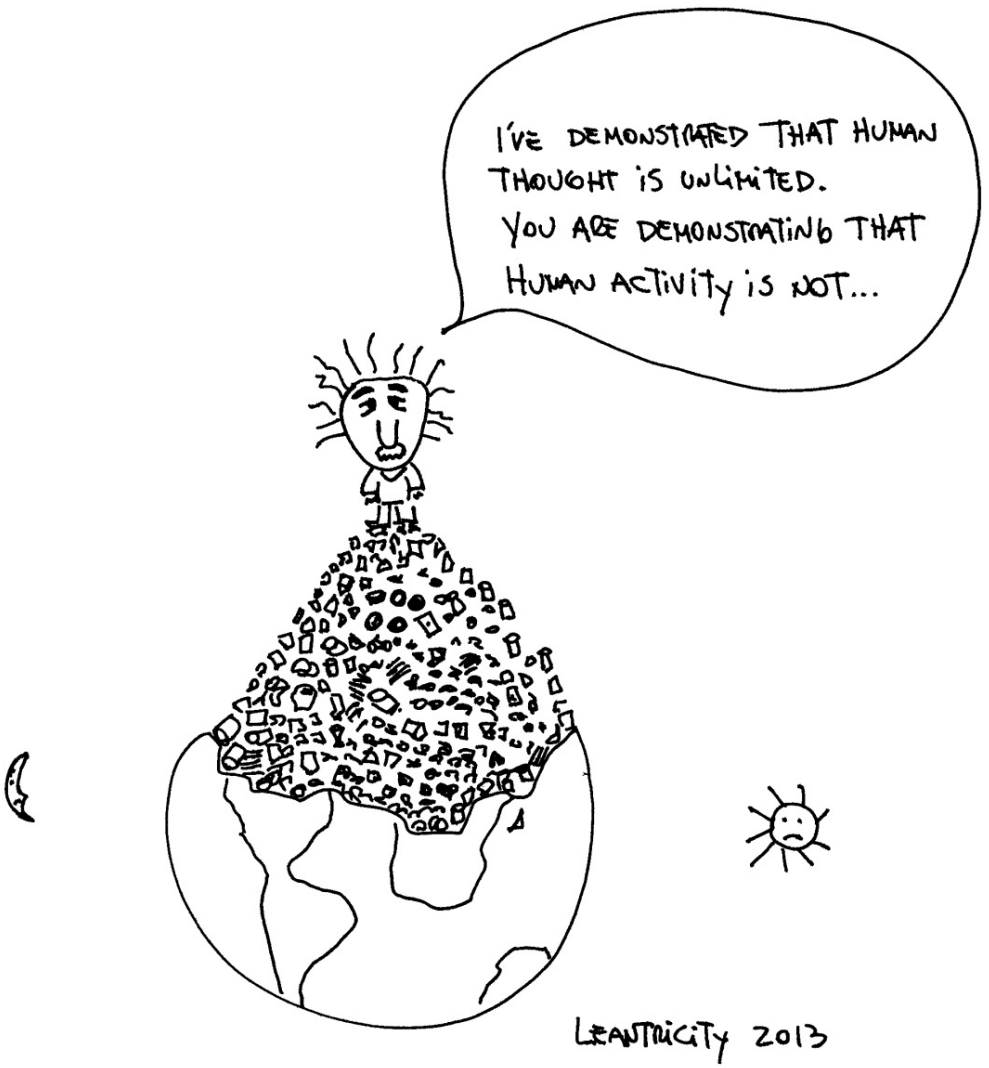

By JP Garcia for Leantricity. Website: www.leantricity.es

The International Journal on Green Growth and Development

The International Journal on Green Growth and Development is an effort to stir a debate around emerging "green" concepts and development. The publication aims at building knowledge through stakeholder engagement on policy-relevant issues to understand the many facets of green growth and development. It is a step towards a forward-looking knowledge process for new opportunities linked with growth and sustainable development. The journal showcases new research through peer reviewed articles, opinions, and innovative practices.

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