

**ACHIEVING
A LOW CARBON
SOCIETY**

Transition towards Low Carbon Societies in a Changing World:

Science and Policy for Low Carbon Society Development Pathways

Synthesis Report of LCS-RNet Third Annual Meeting

**-International Research Network for
Low Carbon Societies-**

**13-14 October 2011
Paris, France**

Host

**The French Ministry of Ecology, Sustainable Development,
Transport and Housing (MEDDTL), France**

**The International Research Center on Environment and
Development (CIRED)**

In Cooperation with

**The French Environment and Energy Management Agency
(ADEME)**

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Preface

The International Research Network for Low Carbon Societies (LCS-RNet) was established in 2009 on the initiative of the G8 Environmental Ministers Meeting (G8 EMM). At their 2008 meeting in Kobe, G8 Environment Ministers recognised the need for each country to develop its own vision of a low-carbon society (LCS); what it would look like; and how the transition might be achieved. This would contribute to the goal of cutting global emissions of greenhouse gases by half or more by 2050, to keep the rise of global average temperature below 2 degrees – a level that is believed to prevent dangerous impacts on the majority of the earth’s eco-systems. Given this, the G8 Environment Ministers in Kobe strongly supported the establishment of the research network to help develop those visions and pathways towards LCS.

Earlier, in 2005, G8 leaders met at Gleneagles, UK to discuss climate change and the need for a transition in energy policies in order to achieve low-carbon and sustainable societies. Since then, thanks to great efforts on the part of researchers, policy-makers and others concerned, the concept of ‘LCS’ has gained a great deal of visibility, and LCS research has made substantial progress, accelerating over the past few years. Many developed countries and emerging economies have already set their mid- and long-term targets and are developing scenarios that will help them realise these goals.

In October 2009, under the auspice of the Italian G8 Presidency, world leading researchers who were engaged in work on various aspects of LCS, including scenarios, finance and technologies, gathered in Bologna, Italy, for the Inaugural Meeting of LCS-RNet. Participants at that meeting discussed research needs for mid- and long-term targets, LCS scenarios, economic and technology policies, green growth, individual lifestyle changes, and a range of cross-cutting issues. Amongst the key findings from the discussions in Italy were the need for strong policy signals from governments to mobilise other actors, especially for the financing of low-carbon developments, and the need for collaboration and the sharing of scientific knowledge between researchers and policy-makers.

Following the Italian meeting, our second meeting was convened in September 2010 in Berlin, Germany. There, many participants emphasised the importance of understanding not only inter-linkages between the research community and governments, but also links with a wider range of stakeholders. The need for science to explicitly aid the process of transition was noted.

The 3rd Annual Meeting of LCS-RNet was held on 13-14 October, in Paris, France, co-hosted by the French Ministry of Ecology, Sustainable Development, Transport and Housing (MEDDTL) and the International Research Center on Environment and Development (CIRED), in association with the French Environment and Energy Management Agency (ADEME). The meeting addressed the many facets of the “paradigm shift” in climate policies demanded by the Cancun agreement. In spite of the difficult economic background against which international negotiations are currently taking place, the meeting noted that this paradigm shift offers substantial opportunities to reconcile long-term challenges with the concerns of the current generation. The temptation to postpone decisions needed to tackle a very long-term problem must be avoided.

Immediately after the meeting, a drafting team was set up to prepare the Synthesis Report and identify key findings. This was composed of the LCS-RNet Steering Group plus colleagues from France and Japan. We would like to give our sincere thanks to Prof. Jean-Charles Hourcade, Mr. Baptiste Perrissin Fabert, and Mr. Christophe Cassen, on the French side, as well as Ms. Tara Cannon, Ms. Kyoko Miwa, Ms. Hitomi Kimura, and Dr. Shuzo Nishioka, Ms. Takako Wakiyama and Ms. Tomoko Ishikawa from the LCS-RNet Secretariat. Special thanks go to Prof. Jim Skea for his strong contribution during the review process.

We would also like to express our utmost appreciation to the French Ministry of Ecology, Sustainable Development, Transport and Housing, for their generous support for LCS-RNet activities during 2011. Special thanks are due to Mr. Richard Lavergne and Ms. Johanna Toupin of MEDDTL for their strong leadership in planning the meeting and for their hospitality in Paris, France.

Finally, we also would like to give our appreciation to the Japanese Ministry of the Environment for their generous support for LCS-RNet Secretariat.

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Ten Key Findings

The LCS-RNet workshop addressed the many facets of the “*paradigm shift*” in climate policies demanded by the Cancun agreement. In spite of the *untimely context* in which international negotiations are taking place, the “paradigm shift” offers substantial opportunities to *reconcile long-term challenges with the concerns of the current generation*. We must *avoid the temptation to postpone decisions* needed to tackle a very long term problem.

1. Nature of the desirable paradigm shift

Instead of being framed in terms of *burden sharing*, the climate policies necessary to launch a long run transition towards a low-carbon society must be designed so as to respond the short term demands for poverty alleviation, jobs and protection of welfare benefits. They can contribute to an *economic recovery driven by “green growth”* with a view to securing *sustainable development* involving changes in consumption patterns, technological and lifestyles

2. The risks of lock-in

Without active climate policies, humanity will be *locked-in to carbon intensive development paths*; industrialised countries will *slow down the turnover of their capital stock* while emerging economies will build the bulk of infrastructures in ways that *will be hard to re-shift at a later date*. As well as accelerating climate change, this could exacerbate future pressures on energy resources.

3. Supply-side responses: decision-making against a background of controversy

Feasible transition pathways compatible with desirable climate objectives, environmental concerns and social requirements are available. *Controversies* about the performance, economic viability and environmental soundness of major technical options need to be *managed through public debate* so that the application of a precautionary approach leads to *better targeted innovation* rather than a freeze on low-carbon development.

4. Demand-side response: energy efficiency and beyond

Technological change will not be sufficient by itself for the low-carbon transition. In addition to *energy efficiency*, key parameters include the *dematerialisation of productive processes* through, for example, recycling or product obsolescence, and changes in *lifestyle, behavior and household consumption patterns*.

5. Energy policies and beyond

Energy policies need to be placed in a broader context *encompassing urban policies, transportation policies and agricultural policies*. Urban dynamics affect mobility needs and gasoline consumption. There is a need for *low-carbon mass transportation systems, energy efficiency projects for public buildings* and *integrated waste management*. Land-use policies have to make the provision of *biomass energy compatible with food production*.

6. Innovation and beyond

Technical change will not come as *manna from heaven* and depends on the development of *knowledge and human capital* along the chain from fundamental research, R&D and pilot projects through to industrial diffusion. Well-designed policy packages comprising a *wide range of policy instruments* (carbon taxes, carbon markets, standards, R&D, reforms of electricity markets, urban and land-use policies) are needed both to *trigger long-term transformation*, mobilise the best available technologies and *mitigate short term transition difficulties* such as underemployment, debt and distributional issues.

7. “Green growth” and sustainable development in different contexts

Transforming “*green growth*” from a *slogan* to an *operational concept* means using the low carbon objective to define the frontier for technical and structural changes in view of more sustainable development patterns and lifestyles. In the *developed countries* the challenge is to trigger the *transformation of existing infrastructures*. In *developing countries*, the main issue is the form of new energy, transportation and building *infrastructure under development*. *Pricing environmental goods and services* is essential, but is not a “*magic bullet*”. Pricing has to be embedded in *broader reforms of fiscal systems, institutions and capital markets*.

8. Tailoring low-carbon policy packages for sectors and countries

National level packages that *set the framework* for the low-carbon transition are essential. However, these must be *reinforced* by policy packages which are *country and sector specific*. Many programs may be most effectively - and innovatively - delivered at the municipal level. Together with the *emergence of a carbon price* there is a need for a differentiated set of financial instruments that *lower risk for industry and local authorities* (e.g. renewable energy finance or energy efficiency finance).

9. The need for international arrangements

Policies will not be fully effective without *international arrangements that complement and leverage domestic climate and development initiatives*. These are needed to provide the necessary *financial, technological and capacity building support* to developing countries and to *mitigate concerns about distortions in international competition*. Such international arrangements can be reached on a *regional scale*. However, these do not obviate the need for a *comprehensive global architecture*.

10. Upgrading climate finance in the context of the financial crisis

Carbon finance must be *upgraded* if the paradigm shift implied by the Cancun agreement demands is to occur. The emergence of a *recognised carbon value* is needed to ground this upgrading. *Innovative financial products* are needed to mobilise global capital market players such as *institutional investors*. In addition to triggering a *wave of climate friendly infrastructure investments* climate finance could make a positive contribution to discussions on the *evolution of the international financial system*.

Synthesis Report

One of the striking achievements embodied in the Cancun Agreement was the recognition that addressing climate change requires “*a paradigm shift*” that “*offers substantial opportunities and ensures continued high growth and sustainable development*”.

This paradigm shift is necessary to reconcile policies addressing long term challenges with the concerns of the current generation and to build an international architecture able to support efforts by national, regional and local governments to decouple carbon emissions from economic growth.

There is evidence that the need for a “paradigm shift” is increasingly recognised by some quarters of the general public, even if people do not express it in these terms. Public concerns about the consequences of environmental mismanagement have manifested themselves in developed and developing countries alike. However, in the context of a difficult economic background these may be swamped by other legitimate concerns. Much of the developed world, and certain key countries in the developing world, are currently at risk of a prolonged economic recession or even a depression. The debt crisis and other factors make it especially difficult for governments at all levels to support capital-intensive investments. This may result in the postponement of policies and measures needed to bring about a low-carbon future. In the case of developing countries in particular, it may lead to the “lock-in” of higher-carbon but cheaper technologies, systems and standards.

The challenge is therefore to find prescriptions that accelerate the shift to a low-carbon society despite such short term constraints. The shift toward a more sustainable pathway will be feasible only if it helps to mitigate the current huge imbalances between economies.

1. Nature of a desirable paradigm shift

We need to ensure that the policies promoting recovery will encourage medium- to long-term low-carbon investments and will provide short term environmental co-benefits. Framing the debate in

terms of burden-sharing is unhelpful.

Available long-term scenarios show that, given uncertainty about the pace of technological change, the transition towards low-carbon societies cannot be achieved merely through technological innovation. They show that changes in consumption patterns and lifestyles are also required and that lowering the economic and social cost of this transition is critically dependent upon parallel reforms in the fiscal and financial systems.

Such a large shift ultimately requires changes in the social value system and a widespread acknowledgment of the adverse consequences of mismanaging resources and the global environment. It also requires a better understanding of how economic activity can be redirected so as to reconcile carbon emission reduction and short term economic goals. Debates on the transition towards a low-carbon society should take full account of the way in which the current needs of society can be met, for example by enhancing job creation or alleviating poverty. Framing the debate in terms of burden sharing is in this respect unhelpful.

A key challenge is to set efficient incentives to ensure that policies that promote recovery will encourage actors (whether governments, companies, or individuals) to pursue medium- to long-term low-carbon investments. These investments are usually highly capital intensive, in the infrastructure sectors for example. In the absence of an appropriate financial framework, governments, business and households will be reluctant to pay the necessary upfront costs although the investments would be substantially beneficial over the medium- to long-term.

These decisions will not be made unless their co-benefits, which will be realised over shorter term time periods than will the benefits of climate mitigation, are accounted for. For example retrofitting buildings will likely lead to co-benefits such as local job creation, enhanced energy security, higher skilled labour supply, and a higher quality of life for people. In the transport arena, shifts to less carbon-intensive modes and more public transport would improve safety, reduce congestion and lower levels of local pollution.

Transforming the role of transport in daily life and a new conception of the workplace would also bring more free time for commuters.

Ultimately, current uncertainty about where public and private funding should go is a major obstacle to sustainable economic recovery. Agreeing on a paradigm shift in climate policies would be a way to remove this uncertainty, reduce investment risks and mobilise skills around a common goal.

2. The risks of lock-in

Many scenario exercises show that new policies are needed to avoid humanity becoming locked into carbon-intensive development paths.

As a result of the recession, the turnover of capital stock in industrialised countries will slow down, while emerging economies will tend to build less environmentally sustainable infrastructure that will be difficult to transform at a later date. As well as accelerating climate change, this might also exacerbate tensions over energy resources, especially after economic recovery takes place and demand increases.

The tensions associated with energy security may ease temporarily as a result of the availability of unconventional fossil fuels such as shale oil, or as a result of the increasing availability of conventional oil thanks to new extraction technologies and access to new reservoirs in previously inaccessible zones such as the Arctic - itself a consequence of climate change. Such developments will reduce incentives for new investment in low-carbon technologies.

The risk of moving towards high carbon intensive pathways is critically important in emerging economies since infrastructure, such as major transportation systems or power plants, is characterised by lifetimes ranging from decades to centuries, longer than typical cycles of technological innovation in the industry. Given the unfavourable economic circumstances, technological lock-in is likely to emerge. Far-sighted decisions must be made regarding R&D spend on future technologies and the introduction of currently available sustainable technologies even when the economic situation is not favorable.

Early support for low-carbon options (e.g. energy efficiency, plug-in hybrids, and enhanced energy storage) would help to avoid lock-in. This support

needs to pay due attention to the timing of interventions from R&D through to market deployment. Local specificities, the level of maturity of technologies, and social acceptance (including the availability of adequate human resources) also need to be taken into account. Delaying investment will simply transfer the costs to future generations, and will add to the costs associated with adapting to climate change.

New consumer technologies, urban infrastructures and transportation infrastructures can have a decisive impact on lifestyles. The size of houses and transportation needs between the home, the workplace and leisure facilities all have an impact. But once they are widely established, consumer preferences can be hard to shift.

This is typically the case for achieving modal shifts, such as transitioning from the use of passenger cars to mass transportation systems. The “rebound effect”, whereby efficiency measures within a given technical system cause people to increase their use of energy services as their cost falls is one manifestation of this lock-in. An early penetration of low-carbon technology and infrastructures together with associated institutions is a way of avoiding these lock-ins while ensuring an overall improvement in quality of life.

3. Supply-side responses: decision-making against a background of controversy

More than one energy mix could support the transition to a low-carbon society, but the ultimate social costs and environmental risks must be accounted for.

The feasibility of various energy scenarios is being examined actively by the research community taking into account the need to ensure universal access to energy services, double the rate of improvement in energy efficiency, and double the share of renewable energy in the global energy mix in line with the Sustainable Energy for All Initiative announced by UN Secretary-General Ban Ki-moon.

Energy scenarios help us understand uncertainties about the extent to which energy is provided by carbon free vs. fossil fuels. However, the deployment of major technological alternatives such as nuclear, carbon capture and storage (CCS) and large scale biomass is controversial.

These controversies, which have intertwined technical,

ethical and political dimensions, underline the need for an assessment, at the global and local levels, of the multidimensional risks associated with these options. These include: construction risks, operational risk, health risks, pollution risks, and large scale events such as the recent nuclear accident in Fukushima. These concerns have led some developed countries to phase out nuclear power and some communities to reject the development of CCS technologies.

A number of new long term scenarios examine the consequences of phasing out major alternative technologies such as CCS or nuclear or of a failure in the innovation process which would delay the take-up of carbon free alternatives. There is thus a need for managing public debates around technological controversies in such a way that the application of some form of precautionary approach leads to better targeted innovation rather than a freeze on low-carbon options.

This is all the more necessary given that there is widespread lack of skilled labour, not limited to developing countries, required to develop renewable energy industries. Attention must therefore be given to training needs and the building of human capital at the local level. In addition, facilities and equipment must be maintained in order to ensure both the continuity of a project and the financial flows associated with it.

The economic assessment of alternative options must in any event include the operational and human capital costs necessary for radical safety improvements, transparent risk-assessments and maintenance of the equipments.

4. Demand-side response: energy efficiency and beyond

Structural changes in the production sector and evolutions in lifestyles govern energy demand. The development of energy-efficiency and other new low-carbon technologies must be more strongly linked to these changes.

Most global and national low-carbon scenario studies “assume” an acceleration of the rate of improvement of energy efficiency. However, they demonstrate the need for a decoupling of economic growth and final energy demand that by far exceeds historical rates. This accelerated decoupling requires, at the global scale, more radical change than that implied by energy

efficiency alone. One possible mechanism relates to the ‘dematerialisation’ of productive processes through, for example, the obsolescence of products, recycling of materials, and a lower transport content of production. Another mechanism relates to changes in household consumption patterns. This particularly applies to the transport sector since higher energy efficiency may increase the use of cars for commuting, freight and tourism. As mobility depends not only on the price of fuels but also on indirect factors such as housing costs (for example the “gentrification” of downtown areas indirectly creates energy poverty traps for commuters in the suburbs) and infrastructure (for example access to transport services or interconnection between road and rail), policies should be specifically designed to tackle these issues.

5. Energy policies and beyond

The switch towards low-carbon societies is not purely a question of energy policy. The spatial dynamics of development must also change.

Energy policies have to be put in a broader context encompassing urban, transportation and agricultural policies in both urban and rural areas.

Urban dynamics critically affect mobility needs and gasoline consumption. Cities are hubs of innovation and creativity and will be central to achieving a sustainable future. An increasing number of initiatives are limiting GHG emissions in cities in industrialised countries. For example, Hamburg was granted the title “European Green Capital” in 2011. These initiatives include the deployment of low-carbon mass transportation systems such as bus rapid transit systems, car-sharing arrangements, cycling infrastructure, support for public transport, solar thermal technologies for hot water supply, energy efficiency projects for public buildings, and integrated waste management.

Despite these promising initiatives, further efforts are still needed to control urban sprawl. This is a major challenge in developing countries as huge megacities emerge. New ecological approaches to agriculture and land use could help to increase agriculture productivity and redirect patterns of development in rural areas so as to lower the population drift from rural areas, the pace of which risks entrenching social divisions and adding to environmental costs.

Rural areas can support the development of decentralised energy systems through biomass based on local production in more isolated areas. This can be integrated to a greater or lesser degree with smart grid networks. This promising option has given rise to a range of initiatives delivering electricity to local areas through off-grid energy systems or by bio- and other types of renewable energy supply. But competition between biomass energy, carbon sequestration and food production may create tensions over land-use. This is why well-coordinated land use policies covering agriculture and energy policies at the local, national and regional levels are needed.

6. Innovation and beyond

Innovation implies developing *human capital* along the chain from research, R&D and pilot projects through to industrial diffusion. Increasing the cost-efficiency and social attractiveness of existing technologies is as critical over the short and medium term.

Licence and patents are not the only drivers of contributors to technical change. Technical change also depends on the development of knowledge and human capital. Given the complexity of technology supply chains and networks, a diverse set of policy instruments, including carbon taxes, carbon markets, standards, R&D, electricity market reform, and appropriate urban and land-use policies are needed to trigger and sustain technical change. Well-designed policy packages should promote long-term transformation while mitigating short-term transition difficulties. In order to expand innovative technologies, the construction of novel types of transmission, distribution and storage networks is necessary. In particular, storage will need to be integrated into smart grids to maintain the reliability of future interconnected systems drawing on intermittent sources of energy, such as solar or wind power. Innovation is underway in developing countries, but to maximise its potential suitable institutional arrangements and financial support are needed.

Moreover avoiding carbon intensive lock-in will be achieved by mobilizing the best available carbon savings options and improve their cost-efficiency and social attractiveness. This demands gradual innovation and learning-by-doing processes mobilizing a wide

chain of skills from researchers, project developers and ground engineering.

7. “Green growth” and sustainable development in different contexts

Green growth refers to an economic recovery leveraging more sustainable patterns. It implies transformation of existing infrastructures in the developed countries and adequate choices of new infrastructures in developing countries. Pricing the environment must be embedded in reforms of fiscal systems, institutions and capital markets.

The concept of “green growth” is an enticing one, in that it seeks to use actions to protect the environment as a lever to achieve economic growth. However, there is not yet a consensus as to what exactly “green growth” entails. Transforming “green growth” from a slogan to an operational concept implies identifying and addressing gaps in green growth theory and practice, and assisting in the design and implementation of appropriate policies and measures.

There is however agreement that green growth policies can be seen as a transition tool towards sustainable development. In this respect, they cannot but be different in nature in developed, emerging and less developed countries. Developed economies already have infrastructures in place and the challenge is to transform these into lower-carbon ones; emerging economies are building their infrastructures and, for them, options are still open as regards their content; less developed economies need to manage their energy and natural resources better in order to bring large shares of their populations out of poverty.

In all these contexts, the transition towards low-carbon societies provides an opportunity for a sustainable economic recovery and job creation through large scale infrastructure programs in energy, transportation and construction. Due attention must be given to the impact of these policies on income distribution.

Green growth from the perspective of Sustainable Development thus implies the pricing of environmental goods and benefits (certainly carbon but also the “ecosystem services” provided by, amongst others, unspoilt upstream forests and meadows). But pricing is not a “magic bullet”; it has to be embedded in broader reforms of fiscal systems, institutions and capital

markets. Institutions are necessary to make markets work in order for pricing to be effective and socially and politically feasible. For example, pricing alone has not so far proved sufficient to preserve fishery stocks. Suitable investments will create new alternatives and increase the capacity of firms and households to adapt to the setting of carbon prices (the so-called price-elasticity) thus enhancing the impact of more appropriate pricing.

Pricing needs in many cases to be accompanied by efforts to change the setting of standards and social norms. This has been demonstrated in other areas, such as smoking, seatbelt usage, or domestic violence. Innovation and technologies also impact green growth, with the setting of standards being one key area for government involvement. Support is also needed in fostering the human capital necessary to develop green industries, including the human capital to identify new promising technologies and adapt them to local conditions.

Policies must thus necessarily be tailored to the circumstances of individual countries and local areas. Collaboration at the domestic and international levels is key to enable researchers and policy-makers to build upon each others' experiences. But exchanging experiences is not enough; one challenge is to articulate policies tailored for specific contexts with international arrangements to facilitate their adoption and increase their efficiency.

8. Tailoring low-carbon policy packages for sectors and countries

Well-tailored policy packages are required at national and local levels to meet GHG emission reduction targets and energy efficiency goals.

Tailored policy packages need to take account of both variations *between* countries deriving from cultural attitudes towards the use of resources, and variations *within* countries that reflect local specificities and diverse market, cultural and social conditions. For example, the success of Tokyo's energy conservation program in the building sector cannot easily be transferred to other Japanese cities because Tokyo is the *de facto* centre of business and industry. This discourages businesses from moving to other cities and enhances the success of the program, thus avoiding market leakage.

National level policy packages that set the framework for the low-carbon transition are essential. A phased approach can be an effective stimulus for change. In the short term, the tax system can be restructured by, for example, introducing levies and/or increasing energy/carbon taxation while lowering employment taxes and transfer payments for social security. R&D support can also be ramped up in the short-term yielding long-term benefits. In the short to medium term, wider reforms of the financing system can be implemented. For some countries, the move to carbon markets based on cap and trade is a longer term option. Cap and trade is especially useful for the concentrated and energy intensive sectors where, as in the EU-ETS, the tracking of emissions is eminently possible. Finally, standards, norms and legislation are an indispensable part of the policy mix.

In light of the local specificities discussed above, sector-focused programs may often be most effectively - and most innovatively - delivered at the municipal level. For example, French and German experience has shown that technologies to drastically enhance energy savings and reduce emissions to almost zero in offices and the household sector are readily available, with great potential for job creation. Yet, implementation is slow because, for example, homeowners cannot be forced to refurbish their houses, they want to recoup their upfront costs within three to five years and lower-income families do not necessarily have access to low-interest finance. The shortage of skilled labor is another obstacle. Programs that are designed and delivered locally to take account of specific conditions have the best chance of success in overcoming these obstacles.

Although local specificities are critical, the climate problem will not be solved by layers of bottom-up initiatives alone. The international community should support collaborations between sectors and local public authorities in order to identify the numerous cross-cutting lessons emerging from experience to date. In addition, international arrangements are needed to establish the legal and economic conditions under which these initiatives can be made fully effective.

9. The need for international arrangements

National and local efforts will not succeed without a coherent international framework. International

arrangements can be reached on a regional as well as global scale. Finance is a key component of the international architecture.

While countries, both developed and developing, will develop policies and measures in line with their own traditions and practices, international arrangements that work synergistically with domestic climate and development initiatives are essential to address a number of concerns.

First, uneven efforts to reduce GHG emissions from trade-exposed emissions-intensive industries will have consequences in terms of carbon leakage and may be blocked by concerns about employment. Border levies on imports from countries with weaker policies could mitigate these concerns but may raise trade-related tensions. International agreements regarding such matters can reduce the risk of trade disputes. For example, revenues from auctioning allowances in countries with stronger policies could be transferred to developing countries or used to support mitigation measures in developed countries.

Second, international cooperation will be required to facilitate the re-investment of revenues from countries which derive a large part of their overall income from the export of coal, oil and natural gas and help them start the long transition towards a low energy intensive development pathway.

Third, developing countries need financial, technological and capacity building support for mitigation actions and to redirect their current investment patterns in infrastructure including housing, transport, energy and waste disposal.

Appropriate international arrangements can be set in place at the regional scale. These can include sector-specific initiatives and more comprehensive efforts focusing on policy making, technological collaboration, best practice, strategy setting including energy security concerns, and the formation of close business relationships. They can also include bilateral and regional financial collaborations.

But the existence of these regional arrangements does not obviate the need for a comprehensive global arrangement that could succeed the Kyoto Protocol. Such arrangements are needed to prevent trade disputes, reconcile the protection of intellectual property rights with the large-scale diffusion of alternative techniques and upgrade climate finance.

Finance will be central in the development of such arrangements. Paradoxically, the current financial crisis in developed countries might provide the opportunity for climate policy arrangements to make a useful contribution to the resolution of the most threatening economic crisis since the end of the Second World War.

10. Upgrading climate finance in the context of the financial crisis

New sources of finance suggested by The High-level Advisory Group on Climate Change Financing need to be augmented with innovative financial products that mobilise global capital market players. This will help to clarify the uncertain business environment that currently paralyses investors interested in long-term projects.

Developed countries committed in Copenhagen and Cancun to mobilise US\$ 100 billion a year by 2020 to address the needs of developing countries to cope with climate change. In addition to the Clean Development Mechanism (CDM) which rewards these projects through Assigned Amount Units (AAUs) and Public Finance Mechanisms (PFMs) which bring them up-front grants, possible new sources of finance are envisaged by The High-level Advisory Group on Climate Change Financing (AGF) established by UN Secretary-General Ban Ki-moon: a levy on the revenues from auctioned allowances for international aviation and shipping emissions, levies on credit trades, carbon taxes and financial transactions taxes.

However there are two main obstacles to the mobilisation of these mechanisms at the required level. First is the economic context where governments of developed countries are fiscally constrained and banks are deleveraging making less capital available for lending and making it more difficult to clarify burden sharing arrangements. Second, the likely absence of significant and stable carbon prices casts doubts on the economic viability of projects that depend partly on carbon revenues.

This is why these mechanisms have to be complemented with innovative financial products capable of mobilising global capital market players such as institutional investors (insurance companies, pension funds, bank/corporate liquidity portfolios, and sovereign wealth funds). The challenge is indeed less to find additional

funds, than to redirect investments which will be made anyway in the infrastructure sector (energy, buildings, transportation). This is mostly a problem of lowering the risk perception of low-carbon projects and raising up-front money for long-term investments that are profitable even in the absence of high carbon prices. There is a window of opportunity to bring in institutional investors who are currently looking for products with stable returns.

The challenge is to design regulatory frameworks and financial devices capable of lowering the risk-adjusted cost of low-carbon projects and providing a surrogate for a carbon price that would recognise the economic value of avoided CO₂ emissions. Political agreement on a “Social Cost of Carbon” is a good candidate for this surrogate which would send investors a long term signal regarding governments willingness to support climate action

In a global context where risky levels of private and public debts co-exist with vast amounts of savings, the design of such a climate-friendly financial architecture could jointly enhance investors’ confidence in low-carbon projects and channel large amounts of private savings. In addition, it could be a component of a broader reform of the international financial system. It could help to clarify the uncertain business environment that currently paralyses investors interested in long-term projects and eventually trigger a wave of “green growth” recovery.

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Acknowledgement

This Synthesis Report was developed with the aim of highlighting cross-cutting conclusions from panel discussions held during the 3rd Meeting of LCS-RNet, held in Paris, France on 13-14 October 2011.

Three years have passed since LCS-RNet was proposed at the G8 Environment Ministers' Meeting in Kobe. During these three years, thanks to the dedicated efforts of scientists, policy-makers and other stakeholders from many developed and developing countries, LCS research has made significant progress, and our meetings have increasingly identified and focused on key issues.

This year, scientists and policy-makers gathered in Paris fully aware of the difficult economic background against which the meeting was taking place, and they recognised the need to reach out to the various actors who will make low-carbon societies become a reality. This report summarises key findings of the discussions in Paris and anticipates the future development of the LCS agenda. I believe that the report will be useful and of interest to those who carry out LCS research as well as to policy-makers and other stakeholders. I would like to express my gratitude to all of the chairs and rapporteurs at the Paris meeting, as well as to those who have contributed to this report. I would also like to thank all of the participants at the meeting in Paris for their contributions. I hope that we can meet again at the 4th LCS-RNet Annual Meeting.

I would like to take the opportunity to introduce Japan's efforts to encourage low-carbon development in Asia. Japan has been operating a programme that promotes dialogue between policy-makers and researchers in certain Asian countries and networking among researchers. This is intended to promote sound low-carbon policies in Asia in a scientific manner. Indeed, the Asian network is looking to the LCS-RNet to provide a model for success. We sincerely hope that LCS-RNet will work together with the Asian network sometime in the near future.

Finally, my gratitude goes to governments and LCS-RNet government contact points for their support and advice. Thank you very much indeed.



Shuzo Nishioka
Secretary General
LCS-RNet Secretariat

Published by the Institute for Global Environmental Strategies (IGES) on behalf of the International Research Network for Low Carbon Societies (LCS-RNet)

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Referencing this report:

Transition towards Low Carbon Societies in a Changing World: Science and Policy for Low Carbon Society Development Pathways; Synthesis Report of LCS-RNet Third Annual Meeting 2011

Prepared by the LCS-RNet Secretariat (eds). Published: IGES, Japan

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Printed in Japan

