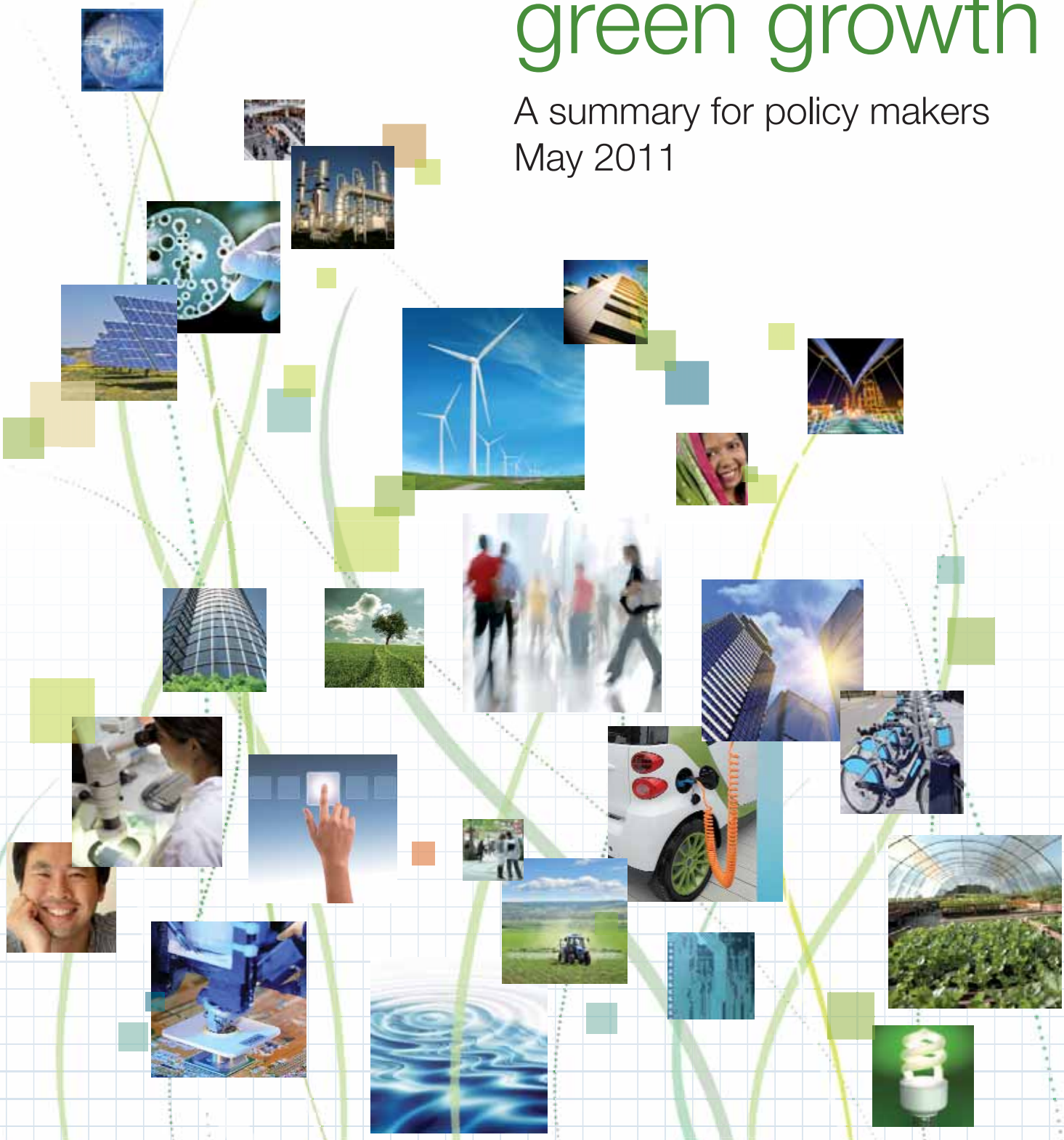
Towards green growth

A summary for policy makers

May 2011



In June 2009, Ministers from 34 countries signed a Green Growth Declaration, declaring that they will: “Strengthen their efforts to pursue green growth strategies as part of their responses to the crisis and beyond, acknowledging that green and growth can go hand-in-hand.” They endorsed a mandate for the OECD to develop a Green Growth Strategy, bringing together economic, environmental, social, technological, and development aspects into a comprehensive framework.

The Strategy responds to that mandate. It forms part of the OECD contributions to the Rio+20 Conference in June 2012.

Declaration on Green Growth, adopted at the OECD Meeting of the Council at Ministerial Level on 25 June 2009

This brochure was prepared for the OECD Meeting of the Council at Ministerial Level, 25-26 May 2011, Paris

Contents

New Songdo City (Korea): Located on a man-made island 40 miles from Seoul, the 1,500-acre city is intended to emit only one-third the greenhouse gases of a similar size city and become the commercial hub of Northeast Asia.
www.songdo.com

A message from the OECD Secretary-General

The OECD Green Growth Strategy: A lens for examining growth

The world economy is slowly, and unevenly, coming out of the worst crisis most of us have ever known. While dealing with immediate problems such as high unemployment, inflationary pressures or fiscal deficits, we have to look to the future and devise new ways of ensuring that the growth and progress we have come to take for granted are assured in the years to come.

A return to "business as usual" would indeed be unwise and ultimately unsustainable, involving risks that could impose human costs and constraints on economic growth and development. It could result in increased water scarcity, resource bottlenecks, air and water pollution, climate change and biodiversity loss which would be irreversible.

Strategies to achieve greener growth are needed. If we want to make sure that the progress in living standards we have seen these past fifty years does not grind to a halt, we have to find new ways of producing and consuming things, and even redefine what we mean by progress and how we measure it. We have to make sure to take our citizens with us on this journey, in particular to prepare the people with the right skills to reap the employment benefits from the structural change.

But we cannot just start from scratch. Changing current patterns of growth, consumer habits, technology, and infrastructure is a long-term project, and we will have to live with the consequences of past decisions for a long time. This "path dependency" is likely to intensify systemic environmental risks even if we were to get policy settings right relatively swiftly.

The modern economy was created thanks to innovation and thrives on it, and in turn the economy encourages new ways of doing things and the invention of new products. That will continue to be the case. Non-technological changes and innovation such as new business models, work patterns, city planning or transportation arrangements will also be instrumental in driving green growth. No government has all the technological, scientific, financial and other resources needed to implement green growth alone. The challenges are global, and recently we have seen encouraging international efforts to tackle environmental issues collectively, including the path-breaking Cancun agreements to address climate change.

At the OECD Ministerial Council Meeting in June 2009, Ministers acknowledged that green and growth can go hand-in-hand, and asked the OECD to develop a Green Growth Strategy. Since then, we have been working with a wide range of partners from across government and civil society to provide a framework for how countries can achieve economic growth and development while at the same time combating climate change and preventing costly environmental degradation and the inefficient use of natural resources.

The publications, *Towards Green Growth* and *Towards Green Growth – Monitoring Progress: OECD Indicators* summarise the work done so far. As a lens through which to examine growth, the analysis they present is an important first step to designing green growth strategies. At the same time, they provide an actionable policy framework for policy makers in advanced, emerging and developing economies.

The OECD will continue to support global efforts to promote green growth, especially in view of the Rio+20 Conference. The next steps will see green growth reflected in OECD country reviews and the output of future OECD work on indicators, toolkits and sectoral studies, to support countries' implementation efforts towards green growth.

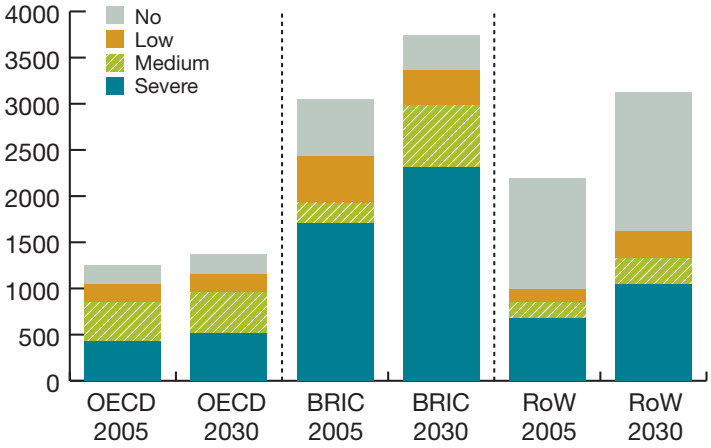
We have set ourselves ambitious targets, but I am confident that by working together we will reach them.

Angel Gurría
OECD Secretary-General

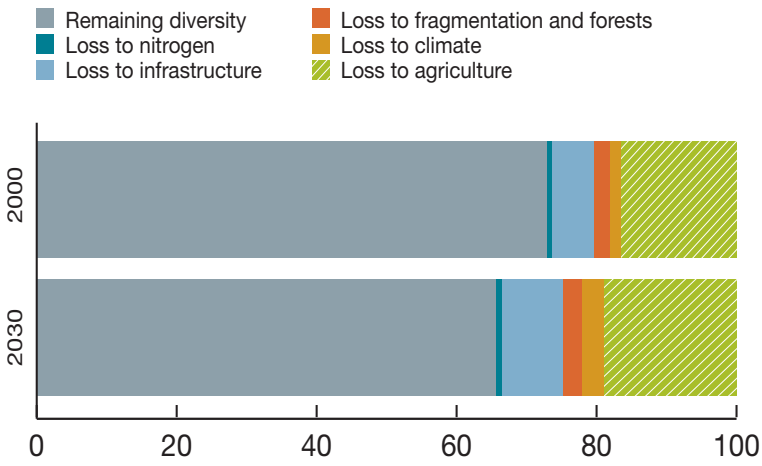
What is green growth and why do we need it?

Key environmental challenges

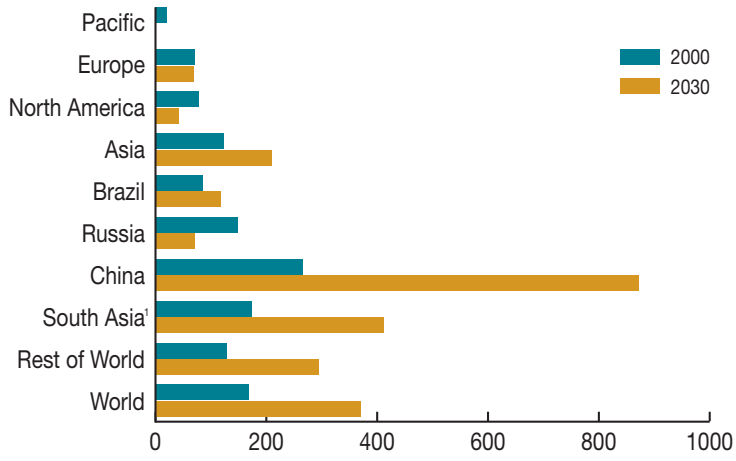
People living under severe water stress (millions)



World threats to biodiversity (percent)



Premature deaths from PM10 air pollution (per million inhab.)



1. Including India.

Source: OECD (2008), *OECD Environmental Outlook to 2030* and OECD (2009), *The Economics of Climate Change Mitigation: Policies and Options for Global Actions beyond 2012.*

Green growth means fostering economic growth and development, while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies. To do this, it must catalyse investment and innovation which will underpin sustained growth and give rise to new economic opportunities.

We need green growth because risks to development are rising as growth continues to erode natural capital. If left unchecked, this would mean increased water scarcity, worsening resource bottlenecks, greater pollution, climate change, and unrecoverable biodiversity loss.

These tensions may undermine future growth prospects for at least two reasons:

- It is becoming increasingly costly to substitute physical capital for natural capital. For instance, if water becomes scarcer or more polluted, you need more infrastructure to transport and purify it.
- Change does not necessarily follow a smooth, foreseeable trajectory. For example, some fish stocks suddenly collapsed after declining only slowly for years.

If we want to ensure that the progress made in living standards in these past fifty years does not grind to a halt, we have to find new ways of producing and consuming things, and even redefine what we mean by progress and how we measure it.

***33%** of the world's population could be affected by water scarcity by 2025*

***10%**, the amount of biodiversity lost by 2030 without action to stem the tide*

Sources of green growth

Green growth can open up new sources of growth through:

- ***Productivity***. Incentives for greater efficiency in the use of resources and natural assets, including enhancing productivity, reducing waste and energy consumption, and making resources available to their highest value use.

- ***Innovation***. Opportunities for innovation, spurred by policies and framework conditions that allow for new ways of creating value and addressing environmental problems.

- ***New markets***. Creation of new markets by stimulating demand for green technologies, goods, and services; creating new job opportunities.

- ***Confidence***. Boosting investor confidence through greater predictability and continuity around how governments deal with major environmental issues.

- ***Stability***. More balanced macroeconomic conditions, reduced resource price volatility and supporting fiscal consolidation through, for instance, reviewing the composition and efficiency of public spending, and increasing revenues through putting a price on pollution.

Green growth will also reduce the risks to growth from:

- ***Bottlenecks*** that arise when resource scarcity or reduced quality makes investment more costly, such as the need for capital-intensive infrastructure when water supplies become scarce or water quality decreases. In this regard, the loss of natural capital can exceed the gains generated by economic activity, undermining the ability to sustain future growth.

- ***Imbalances*** in natural systems that raise the risk of abrupt, highly damaging – and potentially irreversible – effects. Attempts to identify potential thresholds suggest that some – climate change, global nitrogen cycles and biodiversity loss – have already been exceeded.

***USD 112 trillion**, value of fuel saving between 2020 and 2050 from investment in low-carbon energy systems*

***EUR 153 billion**, the economic value in 2005 of insect pollinators (mainly bees) for the main crops that feed the world*

***USD 2.1 to 6.3 trillion**, potential commercial opportunities by 2050 related to environmental sustainability in natural resource sectors alone*

***1991**, the year Sweden introduced a carbon tax. The economy has continued to grow, expanding by 50% since then.*

Green growth and sustainable development

Sustainable development provides an important context for green growth. The OECD Green Growth Strategy leverages the substantial body of analysis and policy effort that has flowed from the 1992 Rio Earth Summit. It develops a clear and focused agenda for delivering on a number of Rio's key aspirations.

Green growth has not been conceived as a replacement for sustainable development, but rather should be considered a subset of it. It is narrower in scope, entailing an operational policy agenda that can help achieve concrete, measurable progress at the interface of the economy and the environment. It provides a strong focus on fostering the necessary conditions for innovation, investment and competition that can give rise to new sources of economic growth, consistent with resilient ecosystems.

Green growth strategies need to pay specific attention to many of the social issues and equity concerns that can arise as a direct result of greening the economy – both at the national and international level. To achieve this they should be implemented in parallel with initiatives centering on the broader social pillar of sustainable development.

The Strategy develops an actionable policy framework that is designed to be flexible enough to be tailored to differing national circumstances and stages of development. In partnership with initiatives by other international organisations, including UNEP, UNESCAP and the World Bank, the OECD's green growth work has been planned to contribute to the objectives of Rio+20.

Green growth in action

Korea, Ireland, China, Rwanda

The National Strategy for Green Growth and the Five-Year Plan (2009-2013) of **Korea** provide a comprehensive policy framework for green growth. The Strategy aims to:
(1) promote eco-friendly new growth engines,
(2) enhance peoples' quality of life, and
(3) contribute to international efforts to fight climate change. To facilitate its realisation, a Presidential Commission on Green Growth was established in 2009 and a Framework Act on Low Carbon Green Growth was enacted in 2010. The Five-Year Plan provides a blueprint for government actions for implementation of the Strategy, containing specific budget earmarks and detailed tasks for ministries and local governing entities. Under the plan, the government will spend about 2% of annual GDP on green growth programs and projects.

The National Development Plan of **Ireland** (2007-2013) sets out indicative financial allocations for investment priorities aimed at enhancing economic competitiveness and at providing a better quality of life. It brings together different sectoral investment policies into one overall framework, to promote co-ordination and alignment between policies, providing a financial framework within which government departments and agencies can plan and deliver the implementation of public investment. The environment chapter of the Plan covers transport, waste management, climate change, environmental research, and sustainable energy. In 2007, investment programmes with a direct impact on promoting environmental sustainability exceeded EUR 1.3 billion.

"The rewards of greening the world's economies are tangible and considerable, the means are at hand for both governments and the private sector, and the time to engage the challenge is now."

UNEP, *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication* www.unep.org/greeneconomy

The 'Green Development' section of **China's** 12th Five Year Plan (FYP, 2011-2015) is a manifestation of the country's aspiration to move towards a greener economy. The Plan is a strategic national roadmap, setting priorities regarding China's future socioeconomic development, and providing guidelines and targets for policy making at the sectoral and sub-national level. The 'Green Development' theme has identified six strategic pillars: climate change, resource saving and management, circular economy, environmental protection, ecosystem protection and recovery, water conservation and natural disaster prevention. These pillars entail several new binding targets (e.g. carbon emission per unit of GDP to be reduced by 17% by 2015, NOx and nitrogen air emissions to be reduced by 10% by 2015), in addition to targets continued from 11th FYP (e.g. energy intensity, SO_2 and COD pollution). Detailed policy guidelines have also been provided in the 12th FYP, for instance, energy-efficiency technology demonstration and diffusion programs have been emphasised as the engine of both energy saving and new growth opportunities.

The Economic Development and Poverty Reduction Strategy of **Rwanda** (2008-2012) represents the country's second medium-term strategy towards the attainment of the long-term Rwanda Vision 2020 Objectives. The Strategy sets out medium-term objectives and indicative financial allocations. Environment is identified as a key cross-cutting issue. In addition several sectors with strong environmental and natural resource content have been identified as critical for achieving Rwanda's development objectives, given their links to production (e.g. land) or to health (e.g. water supply and sanitation). The Environment, Land and Forestry sector has been allocated for the period 2008-12 a total of RWF 62 billion, representing 1.8% of total public expenditure. In turn, the Water and Sanitation sector has been allocated a total of RWF 146 billion, representing 4.2% of total expenditure.

A framework for green growth strategies

The overarching goal of a framework for green growth is to establish incentives or institutions that increase well-being by:

- improving resource management and boosting productivity;
- encouraging economic activity to take place where it is of best advantage to society over the long-term;
- leading to new ways of meeting the above two objectives, i.e. innovation.

Greening the growth path of an economy depends on policy and institutional settings, level of development, resource endowments and particular environmental pressure points. Advanced, emerging, and developing countries face different challenges and opportunities in greening growth, as will countries with differing economic and political circumstances. There are, on the other hand, common considerations that need to be addressed in all settings. And in every case, policy action requires looking across a very wide range of policies, not just traditionally "green" policies.

The framework of the OECD Green Growth Strategy provides a lens for looking at growth and identifying mutually reinforcing aspects of economic and environmental policy. It recognises the full value of natural capital as a factor of production along with other commodities and services. It focuses on cost-effective ways of attenuating environmental pressures to achieve a transition towards new patterns of growth that will avoid crossing critical local, regional and global environmental thresholds.

Such a strategy recognises that positive outcomes can only be produced up to a point with existing production technology and consumer behaviour. At some stage, depleting natural capital has negative consequences for overall growth. We do not know precisely where this frontier lies in all cases, but we do know that the ability to substitute reproducible capital (such as machines) for (depleted) natural capital is limited in the absence of innovation.

A green growth strategy also recognises that focusing on GDP as a measure of economic progress generally overlooks the contribution of natural assets to wealth, health and well-being. It will therefore target a range of measures of progress, encompassing the quality and composition of growth, and how this affects people's wealth and welfare.

Matching green growth policies and poverty reduction objectives will be important for adapting this framework to emerging and developing countries. There are important complementarities between green growth and poverty reduction, which can help to drive progress towards achieving the Millennium Development Goals (MDGs). These include:

- more efficient water, energy and transport infrastructure;
- alleviating poor health associated with environmental degradation; and
- introducing efficient technologies that can reduce costs and increase productivity, while easing environmental pressure.

Given the centrality of natural assets in low-income countries, green growth policies can reduce vulnerability to environmental risks and increase the livelihood security of the poor.

"Without taking care of the environment we are shaving digits off GDP and, therefore, limiting our very potential for the future."

Inger Andersen, Vice President, Sustainable Development, The World Bank
http://web.worldbank.org

***22**, the factor by which economic output has grown in the 20th century*

***30 years of extra life expectancy** in most parts of the world thanks to human progress in the past 150 years*

***1.7 million**, the number of avoidable deaths in the world each year from water pollution, primarily among children under 5 years old*

***6.4 million**, number of avoidable deaths from air pollution*

***USD 1.3 trillion**, the measurable public health benefits from the US Clean Air Act*

***50%**, an estimate of the reduction in climate mitigation costs when improvements in life expectancy are taken into account*

***25% of the wealth** in low income countries is vested in natural capital*

What are the essentials of green growth strategies?

Changing current patterns of growth, consumer habits, technology, and infrastructure is a long-term project and we will have to live with the consequences of past decisions for a long time. This "path dependency" is likely to intensify systemic environmental risks even if we were to get policy settings right relatively swiftly.

Green growth strategies therefore need to be flexible enough to take advantage of new technologies and unexpected opportunities and be able to abandon one approach if a better one becomes available.

Efficient resource use and management is a core goal of economic policy and many fiscal and regulatory interventions that are not normally associated with a "green" agenda will be involved in green growth.

Two broad sets of policies are essential elements in any green growth strategy:

- The first set consists of broad framework policies that mutually reinforce economic growth and the conservation of natural capital. These include core fiscal and regulatory settings such as tax and competition policy which, if well designed and executed, maximise the efficient allocation of resources. This is the familiar agenda of economic policy with the added realisation that it can be as good for the environment as for the economy. Innovation policies should be added to this set as well.

- The second set includes policies providing incentives to use natural resources efficiently and making pollution more expensive. These policies include a mix of price-based instruments, for instance environmentally-related taxes, and non-market instruments such as regulations, technology support policies and voluntary approaches.

While national circumstances will differ, putting a price on pollution or on the over-exploitation of scarce natural resources – through mechanisms such as taxes or tradable permit systems – should be a central element of the policy mix. Pricing mechanisms tend to minimise the costs of achieving a given objective and provide incentives for further efficiency gains and innovation.

1 generation *from now, global GHG emissions need to be in decline*

2 generations*, the typical lifetime of an electric power station*

Up to 10 generations*, expected lifetime for patterns of transport links and urban development*

5% of GDP*, the average fiscal consolidation required in OECD countries, no later than 2025*

3% of GDP*, the approximate revenue potential of carbon taxes in the OECD, by 2020*

Increased use of environmentally related taxes can play an important role in growth-oriented tax reform by helping to shift part of the tax burden away from more distortive corporate and personal income taxes and social contributions. Taxes on energy and CO_2 can also be a part of a wider fiscal consolidation package, offering an attractive alternative to higher taxes on labour or business income or cuts in public expenditure.

Not every situation lends itself to market instruments. In certain cases, well-designed regulation, active technology-support policies and voluntary approaches may be more appropriate or an important complement to market instruments. In addition, the responsiveness of businesses and consumers to price signals can, in many situations, be strengthened through information-based measures that highlight the consequences of environmental damage caused by specific activities and the availability of cleaner alternatives.

In all cases, economic policy decisions taken today need to incorporate a longer time horizon because patterns of growth and technological change tend to build on one another creating path dependency and technological and institutional lock-in. Environmental impacts are also cumulative and sometimes irreversible. Action taken now to insure against unfavourable, irreversible or even catastrophic outcomes can avoid significant economic costs in the future.

Policies to address green growth constraints

Green growth constraints	Policy options
Inadequate infrastructure	– Public-private partnerships – Public investment – Tariffs – Transfers
Low human and social capital and poor institutional quality	– Subsidy reform/removal – Growing and stablising government revenue
Incomplete property rights, subsidies	– Review and reform or remove
Regulatory uncertainty	– Set targets – Create independent governance systems
Information externalities and split incentives	– Labelling – Voluntary approaches – Subsidies – Technology and performance standards
Environmental externalities	– Tradable permits – Subsidies – Taxes
Low returns to R&D	– R&D subsidies and tax incentives – Focus on general purpose technologies
Network effects	– Strengthen competition in network industries – Subsidies or loan guarantees for new network projects
Barriers to competition	– Reform regulation – Reduce government monopoly

Green technology development is accelerating in some areas. Between 1999 and 2008, patented inventions increased annually by:
***24%**, for renewable energy*
***20%**, for electric and hybrid vehicles*
***11%**, for energy efficiency in building and lighting*

***25%**, share of green technologies in all venture capital investments in the United States in the first half of 2010*

***26%**, share of government energy R&D budgets devoted to energy efficiency and renewable energy, up from 13% in 1990*

Green innovation

Societies become dependent on institutions and technologies with which they are familiar. Social and economic inertia can be so strong that even a change that could produce a large benefit will not change behaviour. Innovation plays a key role in greening growth by breaking dependence on established ways of doing things and helping to decouple growth from natural capital depletion.

For green innovation, green growth strategies need to address the following challenges:

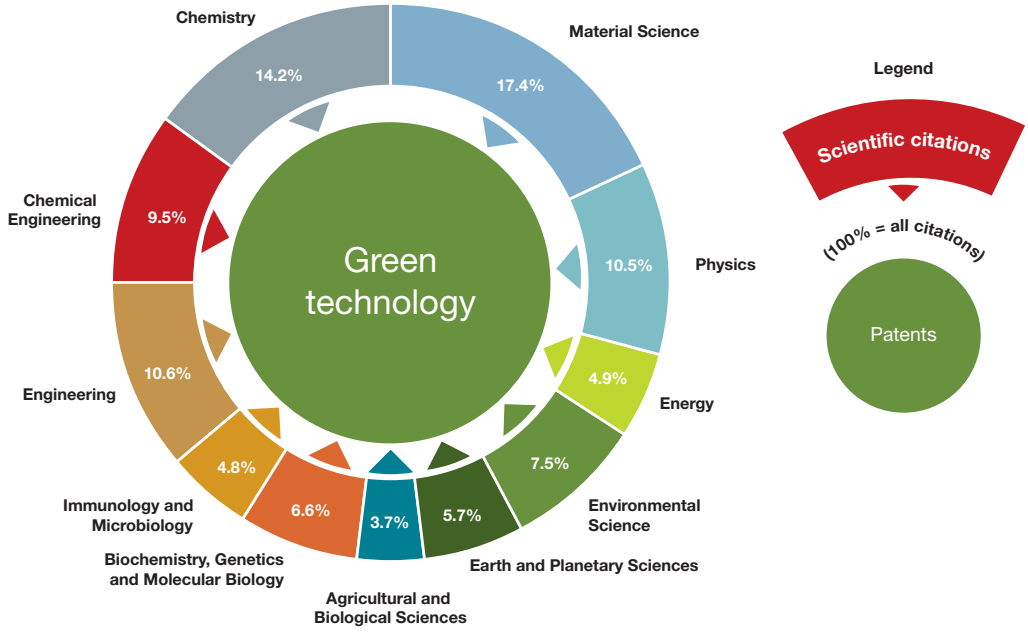
- Many environmental externalities are under-priced or not priced at all. For example, a carbon price can encourage innovation to tackle climate change, but current levels of carbon prices are too low to provide the necessary incentives.

- New technologies may find it hard to compete with existing technologies, establish a place in the market and scale up, in particular in markets such as energy and transport, where existing technologies dominate. Investment in relevant research and temporary support for the development and commercialisation of green technologies may be needed in certain cases. This support has to foster the emergence and uptake of efficient technologies while minimising the risks of technology lock-in, lack of competition or crowding out of private investment. Strengthening markets for green innovation is also important, for example through well-designed public procurement standards and regulation.

- Barriers to trade and investment can place a serious brake on the development and diffusion of green technologies. Reducing these barriers and providing effective protection and enforcement of intellectual property rights (IPRs) are essential to encourage the development and diffusion of technologies and the facilitation of foreign direct investment and licensing. Multilateral action will also be needed to facilitate access to green technologies for the least developed countries.

The innovation-science link in selected green technologies

Patent-science link via citations, 2000-07



Source: OECD (2010), *Measuring Innovation – A New Perspective*, based on Scopus Custom Data, Elsevier, July 2009; OECD, Patent Database, January 2010; and EPO, Worldwide Patent Statistical Database, September 2009.

Policies to foster green innovation

Policy challenge	Policy options
Insufficient demand for green innovation	– Demand-side policies, such as public procurement, standards and regulations, in specific markets and circumstances – Market-based instruments to price externalities and enhance incentives
Lack of innovation capability	– Broad-based policies to strengthen innovation
Technological roadblocks and lack of radical innovation	– Investment in relevant R&D, including thematic and mission-oriented research – International cooperation
Research and investment bias to incumbent technology	– R&D support, tax incentives – Adoption incentives/subsidies – Technology prizes
Lack of finance	– Co-investment funds – Market development
Regulatory barriers to new firms	– Regulatory reform – Competition policy – Front-runner approaches
Lack of capabilities in SMEs to adopt green innovation	– Access to finance – Skills development – Linking SMEs to knowledge networks – Improving information supply – Reducing regulatory burdens
Non-technological innovation	– City and transport planning – Regulatory reform
International technology transfer	– Development of capabilities – Trade and investment policies – IPR protection and enforcement – Voluntary patent pools and collaborative mechanisms

Green growth initiatives

UK: **green investment bank.** The Bank will be launched in 2012, with GBP 3 billion of public money to provide funding for low-carbon projects that would be too risky or whose returns are too long-term for the market to invest in.

GERMANY: **green pioneer.** The National Strategy for Sustainable Development (2002) defined targets for 21 different sectors. In 2010 nearly 17% of electricity supply was generated from renewable sources, surpassing the target value of 12.5%.

DENMARK: **tomorrow's agriculture**. Denmark's Agreement on Green Growth (2009) combines a high level of environmental, nature and climate protection with modern and competitive agriculture and food industries.

UNITED STATES: **long-term growth**. The American Recovery and Reinvestment Act (2009) aims to create and save jobs, jumpstart the economy, and build the foundation for long-term economic growth.

EUROPEAN UNION: **monitoring progress**. The EU's Europe 2020 Strategy for a smart, sustainable and inclusive economy monitors macro-economic factors, growth-enhancing reforms, and public finances.

RWANDA: **restoring ecosystems**. Rwanda's initiative to preserve the mountain gorilla's habitat has boosted tourism, which now accounts for the biggest share of national GDP.

BRAZIL: **sustainable cities**. Curitiba has the highest rate of public transport use in Brazil and one of the lowest rates of urban air pollution thanks to integrated urban planning.

Note: This map is for illustrative purposes and is without prejudice to the status of or sovereignty over any territory covered by this map.

CHINA: **renewable energy**. China aims to produce 16% of its primary energy from renewable sources by 2020.

KOREA: **national green growth plans**. Korea's National Strategy for Green Growth and the Five-Year Plan (2009-2013) provide a comprehensive policy framework for green growth. Under the plan, the government will spend about 2% of annual GDP on green growth programs and projects.

JAPAN: **green innovation**. Japan's National Strategic Projects Related to Green Innovation aim to achieve a JPY 50 trillion environment-related market and to create 1.4 million new environment-related jobs.

NEW ZEALAND: **advisory group on green growth.** Ministers of Finance, Economic Development, and Environment jointly established a high-level private sector advisory group to look at how to add value to the export industry, ensure smarter uses of technology and innovation and assist SMEs to become more energy efficient.

SOUTH AFRICA: **new growth plan.** In 2011, the Economic Development Ministry said that the Industrial Development Corporation has committed ZAF 25 billion to new investments in South Africa's "green economy" over the next five years.

INDONESIA: **reducing subsidies**. Indonesia plans to reduce overall energy subsidies by 10-15% a year until 2014.

AUSTRALIA: **efficient infrastructure**. Infrastructure Australia's priorities are expected to bring economic, social and environmental benefits with significantly lower costs than investment in new capacity.

***0.012%**, the current share of green bonds in the USD 91 trillion global bond market*

Infrastructure investment programmes

Greening growth will also require policies to establish network infrastructure suitable for next generation technologies, especially in energy, transport, water and communications. Green infrastructure investments can help avoid costly lock-in of inefficient patterns of growth. They can lift economic growth and bring social and health benefits. In developing economies, there will be opportunities for leap-frogging to new forms of infrastructure development.

Leveraging public and private financing – through e.g. public-private partnerships, a mixture of tariffs and taxes, facilitating investment by major institutional partners by reforming regulatory barriers and through sound long-term policy signals, and development assistance – will be necessary given the large-scale investments required in most countries. Many countries have announced large increases in such investments. For example, South Africa will invest USD 44 billion in transport, water and energy infrastructure between 2009 and 2011 – a 73% increase from 2007-08 levels.

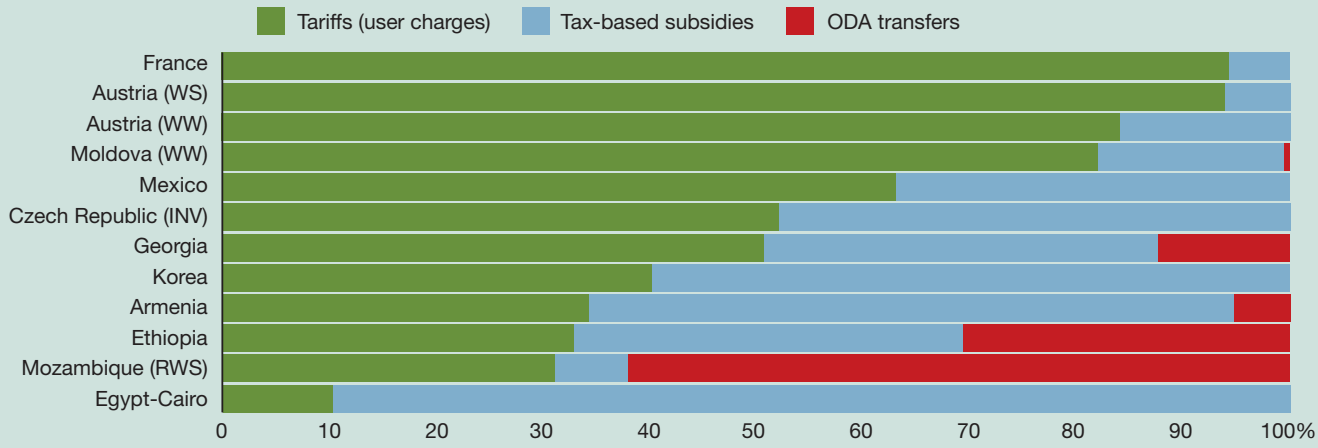
Investing in water infrastructure

Ageing water infrastructure is increasingly a problem in developed countries. Some estimates suggest that the United States will have to invest USD 23 billion annually for the next 20 years to maintain water infrastructure at current service levels, while meeting health and environmental standards. The United Kingdom and Japan will need to increase their water spending by 20 to 40% to cope with urgent rehabilitation and upgrading of their water infrastructure. According to the WHO, in developing countries, USD 18 billion will be needed annually to extend existing infrastructure to achieve the water-related MDGs, roughly doubling current spending. An additional USD 54 billion per year will be needed just to ensure continued services to the currently served population.

The application of sustainable cost recovery for water and sanitation services can provide government revenues to help finance infrastructure needs.

Investment in water infrastructure can reduce the strain on government health budgets by reducing external costs from adverse health impacts resulting from poor water and sanitation services. Benefit-to-cost ratios have been reported to be as high as 7 to 1 for basic water and sanitation services in developing countries.

Financing of water supply and sanitation – sources of revenue, 2005-07



WS = Water Supply – WW = Waste Water – INV = Investment only – RWS = Rural Water Supply

Source: OECD (2009), *Managing Water for All: An OECD Perspective on Pricing and Financing.*

How will green growth affect employment?

Greening growth will see new jobs created, including skilled jobs in emerging innovative green activities. But some jobs will be at risk, so there is a need to facilitate the re-allocation of workers from contracting to expanding sectors and firms such as those that replace polluting activities with cleaner alternatives or provide environmental services.

The job creation potential of investing in green activities

Investing in green activities will create many jobs, and a number of governments have already stressed the sizeable job creation potential of some of their green stimulus packages and broader green growth strategies. Beyond the short-run macro stabilisation packages, there is large potential for job creation associated with the expansion of renewable energies. Recent estimates suggest that up to 20 million jobs could be created worldwide by 2030 in renewable energy generation and distribution.

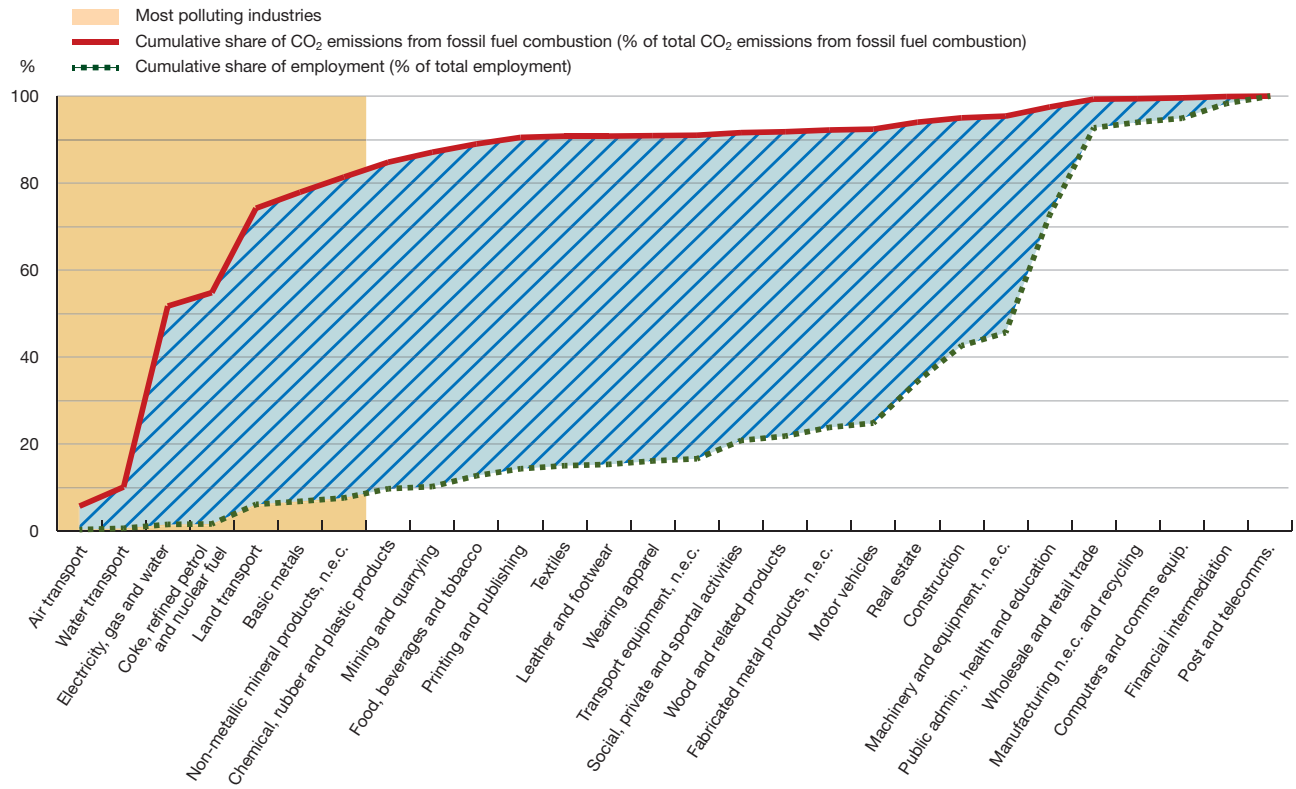
Renewable energies will develop to a considerable extent at the expense of more polluting energy sources with the associated job losses. However, these job losses are likely to be concentrated on a small portion of the total workforce. Indeed, while the most intensely-polluting industries account for a large share of total CO_2 emissions, they account for only a small share of total employment (see figure). In 2004, on average across OECD countries for which data are available, 82% of CO_2 emissions in the non-agricultural sector were generated by these industries, whereas they employed less than 8% of the total workforce.

*The **USD 90 billion** placed in clean energy investment in the US Recovery and Investment Act is estimated to save or create 720 000 job-years by the end of 2012.*

***KRW 50 trillion** being invested as part of Korea's 'Green New Deal' are expected to create 960 000 jobs from 2009 to 2012, including jobs in an environmentally-friendly transportation network, water management and river rehabilitation, clean energy, green information technologies, and waste-to-energy.*

Sectoral employment and CO_2 emission intensity

Unweighted average across 27 OECD countries, 2004 [1]



1. Sectors are ranked by increasing CO_2 emissions intensity, defined as the ratio of CO_2 emissions to valued added. At the level of disaggregation shown in the chart, seven sectors stand out as being the most polluting industries: three transport sectors, two energy producing sectors and two manufacturing sectors.
Source: EU-LFS, GTAP database, KLEMS database.

Overall, most studies agree that the restructuring of the energy sector towards a cleaner energy mix has the potential to generate sizeable *net* employment gains. This is because the renewable energy sector generates more jobs per megawatt of power installed, per unit of energy produced, and per dollar of investment, than the fossil fuel-based energy sector.

The overall long-term employment effect

However, a transition to green growth is much more than shifting sources of energy production; it involves systemic changes across the entire economy that can only be assessed with comprehensive general equilibrium models. In this context, a growing number of economic modelling teams have applied computable general equilibrium (CGE) models to analyse the economic impacts of environmental policies, including the impacts on labour markets. Because labour market policies and institutions vary widely across countries and interact in complex ways with policies in other markets, it remains a challenge to introduce a thorough representation of labour market in environmental CGE models. To provide further clarity on these questions, the OECD has also conducted illustrative simulation exercises looking at the implications of climate policies using its cross-country multi-sector general equilibrium OECD ENV-linkages model.

The simulations indicate that, for example, significant reductions of greenhouse gas emissions can be achieved with only limited effects on the pace of employment growth. Actually, labour market outcomes can improve if revenues from carbon pricing are used to promote labour demand. For example, under reasonable assumptions about the adjustment patterns in the labour market, OECD employment would increase by 7.5% over the period 2013-2030, against 6.5% in absence of mitigation actions, and this without any loss of purchasing power for workers. Moreover, these estimates do not take into account the positive impact on employment stemming from the potentially stronger growth generated by green innovation.

Labour market and skills policies

Labour market and training policies can play an important role within the overall policy framework for achieving green growth. Labour market policies need to ensure that workers and firms are able to adjust quickly to changes brought about by the greening of the economy, including by seizing new opportunities. By helping workers to move from jobs in contracting sectors to jobs in expanding sectors, they can also help to assure a just sharing of adjustment costs occasioned by the transition. New skills will be needed and this will require appropriate education and training policies. While many existing skills will remain appropriate, skill mismatches and gaps may emerge. Training and re-training programmes will have an important role to play in helping workers to participate fully in the emerging green economy.

The OECD Reassessed Jobs Strategy provides a useful framework for identifying policies that can reconcile the vigorous process of “creative destruction” required to achieve green growth with a high level of employment and shared prosperity. Three policy areas should be given priority to promote a smooth and just transition:

- A strong skills development system and active labour market programmes that facilitate a quick re-integration of jobseekers into employment are key supply-side policy elements for reinforcing the adaptive capacity of labour markets.

- On the demand side, moderate employment protection and strong product market competition are important supports for vigorous job creation as environmental policies and eco-innovation create new green competitive niches.

- Policies that increase the adaptive capacity of labour markets need to be combined with flanking measures, such as unemployment insurance and in-work benefits, which assure that dynamism is not achieved at the cost of excessive insecurity or inequality for workers and their families.

Addressing distributional concerns

There is a widespread perception that some people will be worse off because of green growth policies. While this is not the case, unless these concerns are addressed, some key policies may be called into question.

Affected groups need to be part of the policy making-process from the start. This process needs to be transparent and clearly explain the reasons for reform. Firms' concerns for changes in competitiveness in the transition should be addressed through multilateral policy coordination. Compensatory schemes can be justified, but they come with their own costs. Any negative impacts on poorer households need to be offset through well-targeted programmes, taking account of settings across the entire tax and transfer system.

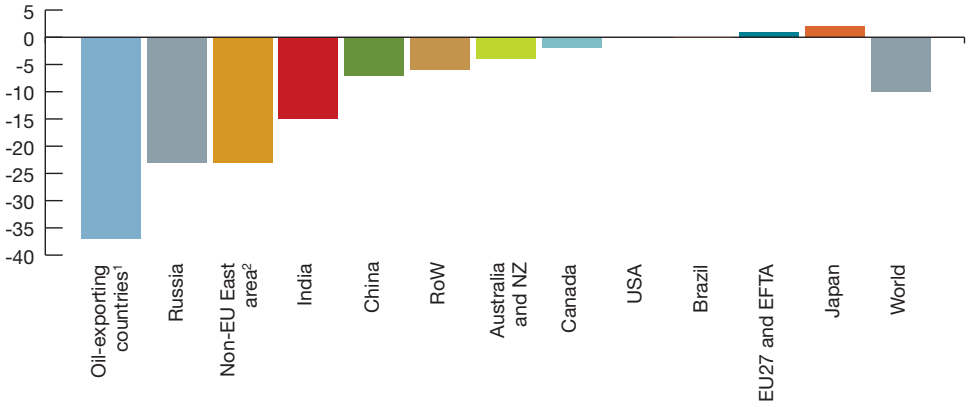
For example the phasing out of fuel subsidies will have positive impacts on the environment and the economy overall, but may have negative consequences for some nations or population groups in the short term. A typical political economy dilemma arises. The loss caused by higher fuel prices will be immediately obvious and significant for some people, but the economic and environmental gains will take longer to materialise and be more diffuse. Targeted compensatory measures will need to be introduced, particularly in emerging markets where some populations are most vulnerable to transitional costs associated with greening growth. As part of their commitment to reduce fossil fuel subsidies, India and Indonesia, for example, are taking important steps in this direction.

***10% reduction**, in global GHG emissions by 2050 from removing fossil fuel subsidies*

***2%-4%**, the potential real income gains from removing fossil fuel subsidies*

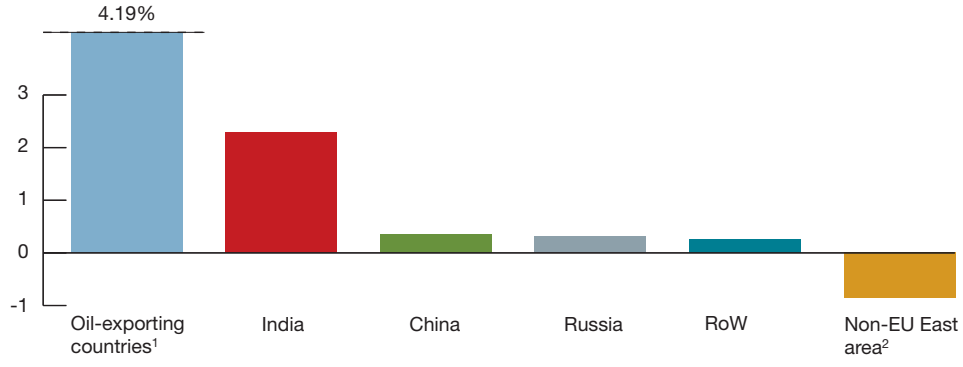
GHG emissions with fossil fuel subsidy removals

% deviation from baseline



Impact on real income of unilateral removal of fossil fuel subsidies

% deviation from baseline



Source: OECD ENV-Linkages model based on subsidies data from the International Energy Agency (IEA).

1. This region includes the Middle East, Algeria-Libya-Egypt, Indonesia and Venezuela.

2. This region includes Armenia, Azerbaijan, Belarus, Croatia, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

International co-operation for green growth

Creating a global architecture that is conducive to green growth will require enhanced international co-operation. **Strengthening arrangements for managing global public goods, especially biodiversity and climate**, hold the key to addressing co-ordination and incentive problems. The agreements reached in 2010 at the Cancun Climate Summit give reason to be optimistic that progress can be made, but further efforts are needed. Financial flows in particular need to become both an engine for growth and development as well as an incentive to maintain the quality of the global commons.

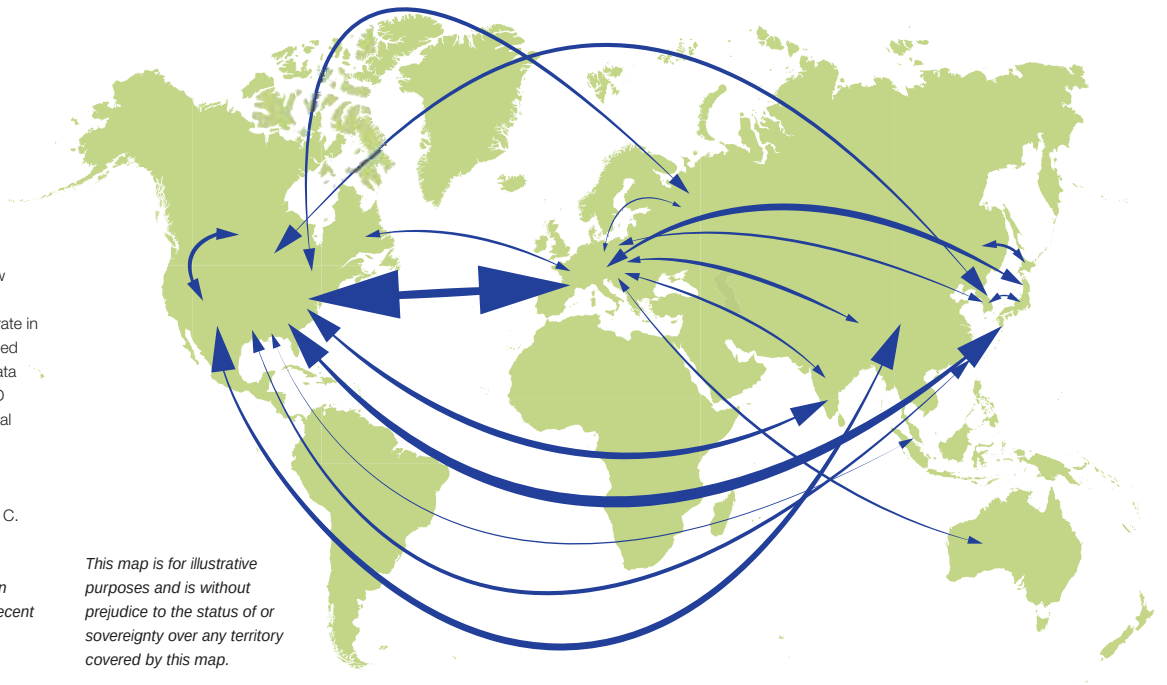
Official Development Assistance (ODA) can continue to play an important role in creating enabling conditions for green growth, by targeting areas where incentives for private investment are limited and investment is scarce, including essential infrastructure and human and institutional capacity building. ODA's contribution to green growth in developing countries can be further strengthened by ensuring that climate proofing and disaster risk reduction approaches are mainstreamed in public investments. Similarly, aid for poverty reduction needs to promote livelihoods that are secure and resilient to environmental degradation.

Increased co-operation in science and technology will need to be underpinned by more concerted approaches to accelerate technology development and diffusion, and build research capacity in developing countries. The use of targeted, time-bound financing mechanisms, such as loan guarantees and insurance mechanisms, other forms of risk sharing, and a commitment to stable, predictable economic and environmental policy, are important to promote timely diffusion of green technologies and processes.

Increased efforts to boost global trade and investment flows could help underpin sustained growth and diffusion of green technologies. There is also a need to ensure that the development prospects of low-income countries are not undermined through the potential spill-over effects of domestic trade and investment measures.

International technology cooperation as a means of developing capacity

The case of solar photovoltaic technology



Note: The map shows how frequently inventors from different countries co-operate in the development of patented technologies. Based on data extracted from EPO/OECD Worldwide Patent Statistical Database.

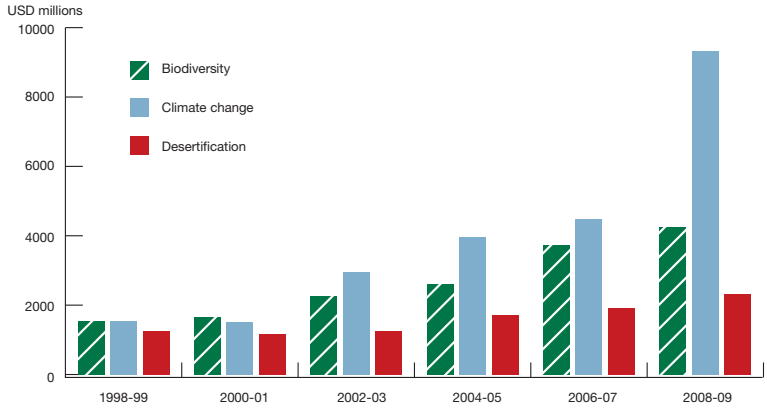
Source: Hascic, I., N. Johnstone, F. Watson and C. Kaminker (2010), *"Climate Policy and Technological Innovation and Transfer: An Overview of Trends and Recent Empirical Results"*, OECD, Paris.

This map is for illustrative purposes and is without prejudice to the status of or sovereignty over any territory covered by this map.

Some countries have expressed concern that trade and investment could be affected if the green growth policy agenda were captured by protectionist interests. While investment protectionism associated with green growth policies has not been found to be a major problem to date, continued vigilance should be encouraged. The OECD-hosted Freedom of Investment Roundtable will continue to monitor investment measures to ensure that they are not used as disguised protectionism. Governments are encouraged to continue to monitor their investment treaty practices with regard to environmental goals.

Aid targeting environmental challenges

Categorised according to the Rio Conventions, USD million [1]



1. Members of the OECD's Development Assistance Committee (DAC), two-year averages, commitments, constant 2008 prices.

Source: OECD-DAC: CRS Aid Activity database.

International initiatives and co-operation on green growth

With a view to the 2012 Rio+20 Conference, recent efforts to foster green growth have seen a growing number of international initiatives.

The United Nations Environment Programme (UNEP)-led Green Economy Initiative (GEI) launched in 2008 brings together over 20 UN agencies to promote investment in green(er) sectors. Since 2010, the GEI has been providing advisory services to a number of governments, with an active presence in fifteen countries. In February 2011, UNEP launched its report *Green Economy: Pathways to Sustainable Development and Poverty Eradication*, which asserts that a green economy is not only relevant to more developed economies but can be a catalyst for growth and poverty eradication in developing countries as well.

As part of the efforts to support countries on assessing progress towards green growth, the OECD and UNEP are working closely together, and also with other organisations, including the UN Statistics Division (UNSD), other UN agencies, the World Bank, EUROSTAT, and the European Environment Agency (EEA), to develop a common set of core indicators for the green economy.

International initiatives exploring the implications of green growth at the sectoral level include the FAO's project on Greening the Economy with Agriculture, covering sustainable development, food security and poverty alleviation through the mobilisation of the food and agriculture sector. A joint FAO-OECD international expert meeting will be held in September 2011.

The IEA and the OECD are developing a joint report on green growth in the energy sector which will be launched in June 2011.

In March 2011 the World Bank called on governments and development agencies to join a new global knowledge platform on green growth being developed jointly by the World Bank, OECD and UNEP. The platform brings together proponents of sustainable development to promote and implement green growth policies by exchanging knowledge, information and experience. The three organisations are also joining their efforts to provide co-ordinated contributions to Rio+20 (June 2012), which will mark a milestone for promoting a global green economic transformation.

Other emerging institutions, notably the Global Green Growth Institute (GGGI), are playing an increasingly important role in the creation of a global architecture conducive to driving greener growth. Promoting a strong partnership and knowledge-sharing between a diverse group of international and regional organisations as well as governments, the GGGI supports the creation and diffusion of green growth that integrates objectives for poverty reduction, opportunity creation, and social development with objectives for environmental sustainability, climate resilience, and energy security.

Monitoring progress towards green growth

Moving towards green growth requires appropriate information and comparable data to support policy analysis and to track progress, including at international level. The OECD framework for monitoring progress towards green growth explores four inter-related groups of indicators on:

- **Environmental and resource productivity**, to capture the need for efficient use of natural capital and aspects of production which are rarely quantified in economic models and accounting frameworks.
- **Economic and environmental assets**, to reflect the fact that a declining asset base presents risks to growth, and because sustained growth requires the asset base to be kept intact.
- **Environmental quality of life**, capturing the direct impacts of the environment on people's lives, through for example access to water or the damaging effects of air pollution.
- **Economic opportunities and policy responses**, which can be used to help discern the effectiveness of policy in delivering green growth and where the effects are most marked.

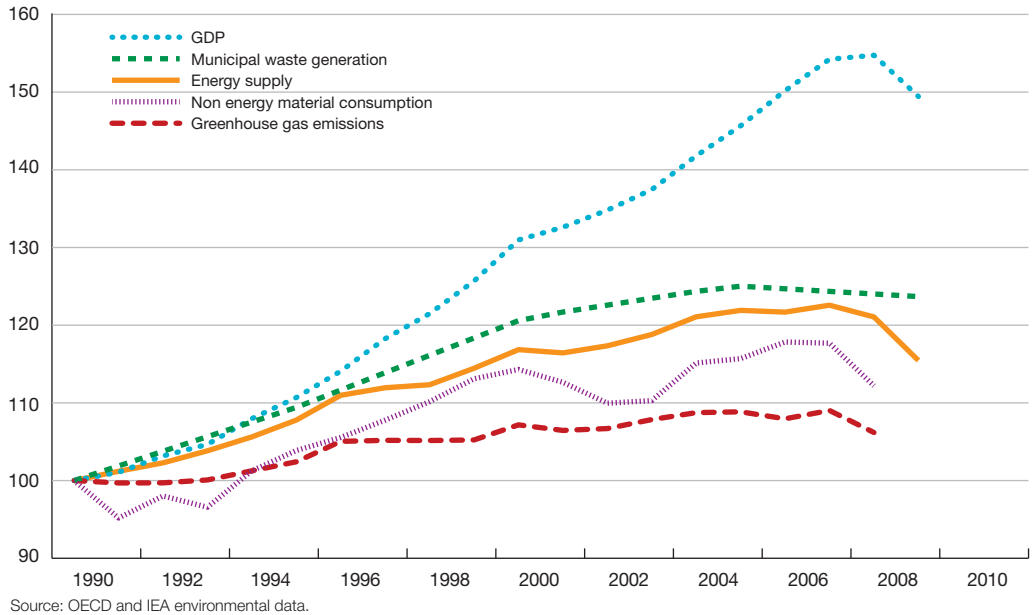
For each group, a list of indicators is proposed on the basis of existing OECD work and experience. The list constitutes work in progress and will be further elaborated as data become available and as concepts evolve. It is complemented by indicators describing the socio-economic context and the characteristics of growth.

Work to date suggests that while there are significant differences between countries, the growth rates of GDP and other measures of output tend to outstrip the growth rates of environmental inputs into the production system. In other words, environmental and resource productivity has been rising. However, improved environmental productivity is not necessarily accompanied by absolute decreases in environmental pressure or the sustainable use of some natural assets.

Indicators that measure the "green economy" need to be interpreted carefully. Judged simply by the size of industries involved in the production of environmental goods and services, today's "green economy" is relatively small. However, economic opportunities, entrepreneurship and innovation in conjunction with green growth can arise in all sectors, so an assessment based on green industries understates the economic importance of environmentally-related activities.

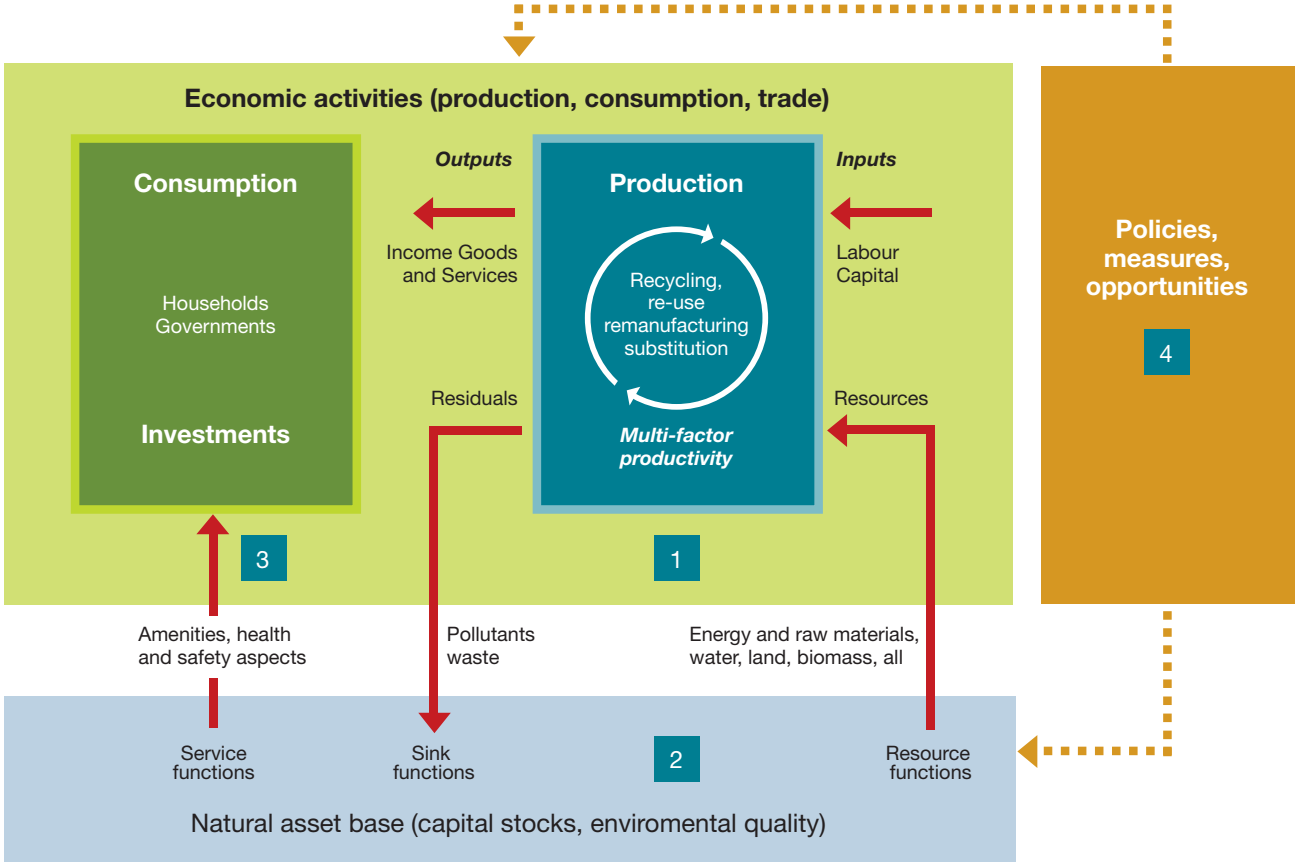
Decoupling trends, OECD

Index, 1990 = 100



Source: OECD and IEA environmental data.

Measurement framework



Overview of proposed indicator groups and topics covered

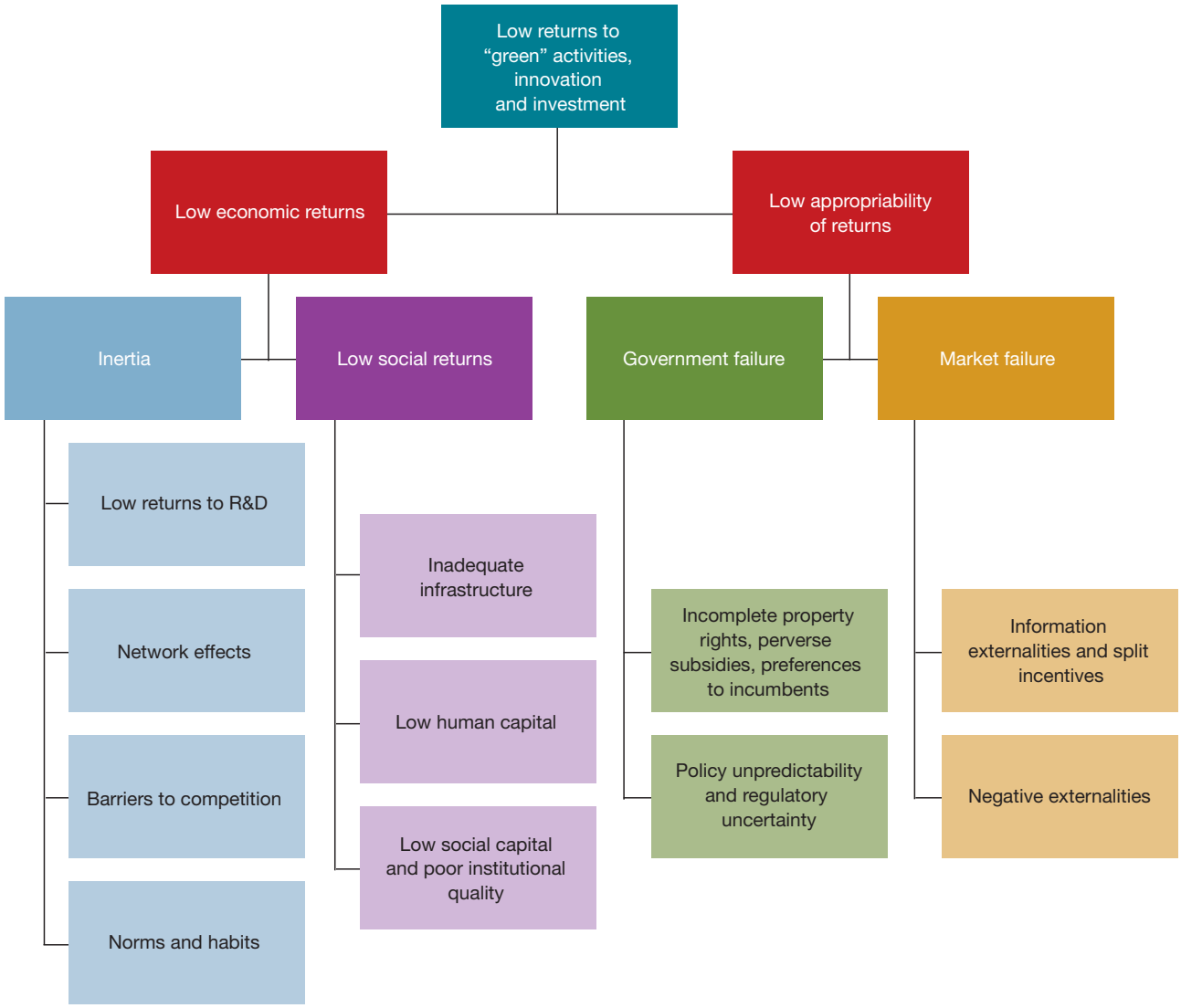
1	The environmental and resource productivity of the economy	• Carbon and energy productivity • Resource productivity: materials, nutrients, water • Multi-factor productivity
2	The natural asset base	• Renewable stocks: water, forest, fish resources • Non-renewable stocks: mineral resources • Biodiversity and ecosystems
3	The environmental dimension of quality of life	• Environmental health and risks • Environmental services and amenities
4	Economic opportunities and policy responses	• Technology and innovation • Environmental goods and services • International financial flows • Prices and transfers • Skills and training • Regulations and management approaches
	Socio-economic context and characteristics of growth	• Economic growth and structure • Productivity and trade • Labour markets, education and income • Socio-demographic patterns

Constructing green growth strategies

Green growth should be conceived as a strategic complement to existing environmental and economic policy reform priorities. If governments wish to green the growth paths of their economies, they need to treat the policy challenges as ones that go to the core of their economic strategies. This implies a leading role for finance, economy and environment agencies.

To facilitate the development of green growth strategies and policy prioritisation, the report *Towards Green Growth* includes a diagnostic framework for identifying key constraints to greening growth and possible policy responses. This exercise is further developed in an accompanying toolkit: *Tools for Delivering on Green Growth*.

Green growth diagnostic



Next steps of the OECD Green Growth Strategy

To succeed, green growth strategies need to be mainstreamed into government policies.

The OECD is uniquely placed to contribute to these efforts, thanks to its long experience in collecting data, designing tools to analyse it, and integrating expertise from a range of policy domains into a coherent approach.

The delivery of the Green Growth Strategy in May 2011 will mark the starting point of OECD's longer-term agenda to support national and international efforts to achieve greener growth.

Moving forward, the framework and policy insights of the report can be tailored to account for country-specific circumstances, and provide guidance for continued analysis in the form of country reviews. Such work can offer opportunities for an in-depth appraisal of the way in which policies are working together (or not) to drive greener growth. The development and refinement of the green growth toolkits that will accompany this Strategy can further support policy implementation at the national level.

Experience gained through both country reviews and general policy assessment will lead to the development of an analytical tool to identify country-specific policy priorities on the basis of a cross-country analysis and understanding of what is good practice. This would benefit from further work on green growth indicators and measurement issues. Indeed, an important measurement agenda arises from confronting indicators with available and internationally comparable data. The OECD will be advancing the measurement agenda in the years ahead so as to improve the possibilities for tracking the transition to green growth in OECD and other economies.

Further analytical work on the costs and benefits of various policy instruments also needs to be carried out. Moreover, work on issue-specific and sector-specific studies will provide more concrete insights into the implications of greening growth in a number of areas. Early priorities include food and agriculture, the energy sector, water, biodiversity and development co-operation, as well as policies governing cities and rural development.

Examples of OECD work on green growth

May 2011

- *Towards Green Growth* – Green Growth Strategy synthesis report
- *Towards Green Growth – Monitoring Progress: OECD Indicators*
- *Tools for Delivering on Green Growth*

2011-2012

- *A Green Growth Strategy for Food and Agriculture: Preliminary Report*
- Joint IEA/OECD Green Growth Study on Energy
- Green growth monitoring work:
  - *Green growth indicators*
  - *Green growth incorporated in Economic Surveys and Environmental Performance Reviews*
  - *Green growth reports for emerging economies*
  - *Monitoring green investment protectionism concerns*
- Report on green growth and developing countries
- Report on green innovation
- Innovation policy platform
- Green growth and biodiversity
- Green growth and water
- Green Cities Programme
- Renewable energy and rural development
- Project on green financing
- Environmental regulations and growth
- Green fiscal revenue
- Job potential of a shift towards a low-carbon economy
- Report on the local transition to a green economy

Key OECD publications

A Framework for Assessing Green Growth Policies, *OECD Economics Department Working Paper, No. 685* (2010)

Better Policies to Support Eco-innovation (2011)

Cities and Climate Change (2010)

Eco-Innovation in Industry: Enabling Green Growth (2010)

Economic Policy Reforms 2010: *Going for Growth* (2010)

Employment Impacts of Climate Change Mitigation Policies in OECD: A General-Equilibrium Perspective, *OECD Environment Working Papers, No. 32* (2011)

Energy Technology Perspectives 2010: *Scenarios and Strategies to 2050, IEA* (2010)

Environmental Outlook to 2030 (2008)

Globalisation, Transport and the Environment (2010)

Greener and Smarter: *ICTs, the Environment and Climate Change* (2010)

Greening Household Behaviour: *the Role of Public Policy* (2011)

Greening Jobs and Skills: *Labour Market Implications of Addressing Climate Change, OECD Local Economic and Employment Development (LEED) Working Paper Series* (2010)

Linkages between Agricultural Policies and Environmental Effects: *Using the OECD Stylised Agri-environmental Policy Impact Model* (2010)

OECD Green Growth Studies: *Energy* (2011, forthcoming)

OECD Green Growth Studies: *Food and Agriculture* (2011, forthcoming, preliminary report)

Paying for Biodiversity: *Enhancing the Cost-Effectiveness of Payments for Ecosystem Services* (2010)

Subsidy Reform and Sustainable Development: *Political Economy Aspects, OECD Sustainable Development Studies* (2007)

Taxation, Innovation and the Environment (2010)

The Economics of Adapting Fisheries to Climate Change (2011)

The Economics of Climate Change Mitigation: *Policies and Options for Global Action beyond 2012* (2009)

The OECD Innovation Strategy: *Getting a Head Start on Tomorrow*

Tools for Delivering on Green Growth (2011)

Towards Green Growth (2011)

Towards Green Growth – Monitoring Progress: *OECD Indicators* (2011)

Transition to a Low-Carbon Economy: *Public Goals and Corporate Practices* (2010)

World Energy Outlook 2010, IEA (2010)

“Biodiversity loss and ecosystem degradation are continuing to escalate, thereby putting business at risk, but if managed properly, can be transformed into new opportunities.”

Björn Stigson, President of the World Business Council for Sustainable Development
www.wbcsd.org

International Green Growth Dialogue (IGGD)

To increase international co-ordination, OECD member countries have launched an International Green Growth Dialogue (IGGD), with the participation of emerging and developing countries, international organisations, the private sector and NGOs. This will encourage discussion around green growth issues and provide a platform to exchange lessons learned and best practices.

Join the discussion on the secure website:
https://community.oecd.org/community/greengrowth

To register, please email your contact details to:
greengrowth@oecd.org. Registered users will receive a regular newsletter on green growth topics.

For more information:
www.oecd.org/greengrowth

Towards Green Growth: A Summary for Policy Makers

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