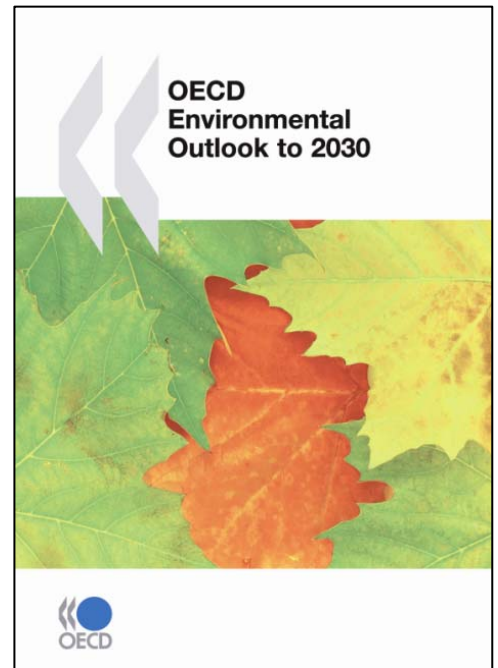


OECD Environmental Outlook to 2030

Summary in English






- How will economic and social developments drive environmental change to 2030? What policies are needed to address the main environmental challenges? How can OECD and non-OECD countries best work together to tackle these challenges?
- The *OECD Environmental Outlook to 2030* provides analyses of economic and environmental trends to 2030, and simulations of policy actions to address the key challenges. Without new policies, we risk irreversibly damaging the environment and the natural resource base needed to support economic growth and well-being. The costs of policy inaction are high.
- But the Outlook shows that tackling the key environmental problems we face today -- including climate change, biodiversity loss, water scarcity and the health impacts of pollution -- is both achievable and affordable. It highlights a mix of policies that can address these challenges in a cost-effective way. The focus of this Outlook is expanded from the 2001 edition to reflect developments in both OECD countries and Brazil, Russia, India, Indonesia, China, South Africa (BRIICS), and how they might better co-operate on global and local environmental problem-solving.

KEY MESSAGES

The *OECD Environmental Outlook to 2030* is based on projections of economic and environmental trends to 2030. The key environmental challenges for the future are presented according to a “traffic light” system (see Table 1). The *Outlook* also presents simulations of policy actions to address the key challenges, including their potential environmental, economic and social impacts.

Table 1. The OECD Environmental Outlook to 2030

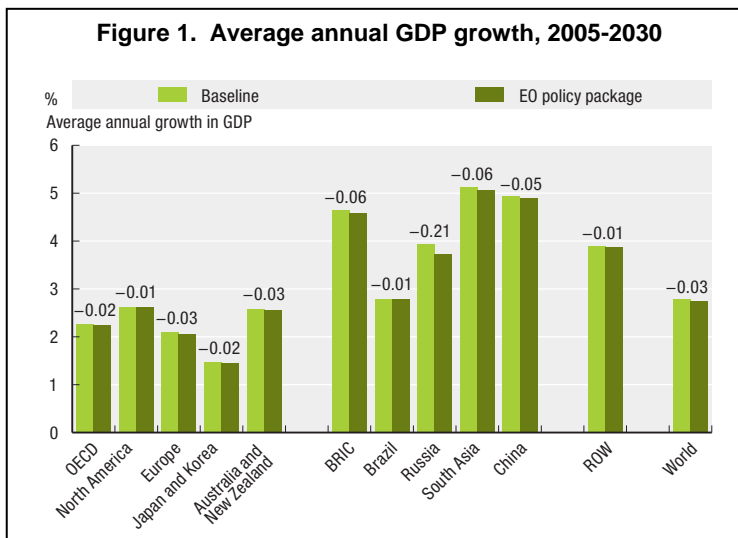
	 [Green Light]	 [Yellow Light]	 [Red Light]
Climate change		<ul style="list-style-type: none"> Declining GHG emissions per unit of GDP 	<ul style="list-style-type: none"> Global GHG emissions Increasing evidence of an already changing climate
Biodiversity & renewable natural resources	<ul style="list-style-type: none"> Forested area in OECD countries 	<ul style="list-style-type: none"> Forest management Protected areas 	<ul style="list-style-type: none"> Ecosystem quality Species loss Invasive alien species Tropical forests Illegal logging Ecosystem fragmentation
Water	<ul style="list-style-type: none"> Point-source water pollution in OECD countries (industry, municipalities) 	<ul style="list-style-type: none"> Surface water quality and wastewater treatment 	<ul style="list-style-type: none"> Water scarcity Groundwater quality Agricultural water use & pollution
Air quality	<ul style="list-style-type: none"> OECD country SO₂ & NO_x emissions 	<ul style="list-style-type: none"> PM & ground-level ozone Road transport emissions 	<ul style="list-style-type: none"> Urban air quality
Waste & hazardous chemicals	<ul style="list-style-type: none"> Waste management in OECD countries OECD country emissions of CFCs 	<ul style="list-style-type: none"> Municipal waste generation Developing country emissions of CFCs 	<ul style="list-style-type: none"> Hazardous waste management and transportation Waste management in developing countries Chemicals in the environment and in products

Source: KEY: **Green light** = environmental issues which are being well managed, or for which there have been significant improvements in management in recent years but for which countries should remain vigilant. **Yellow light** = environmental issues which remain a challenge but for which management is improving, or for which current state is uncertain, or which have been well managed in the past but are less so now. **Red light** = environmental issues which are not well managed, are in a bad or worsening state, and which require urgent attention. All trends are global, unless otherwise specified.

Action is affordable: policy scenarios and costs

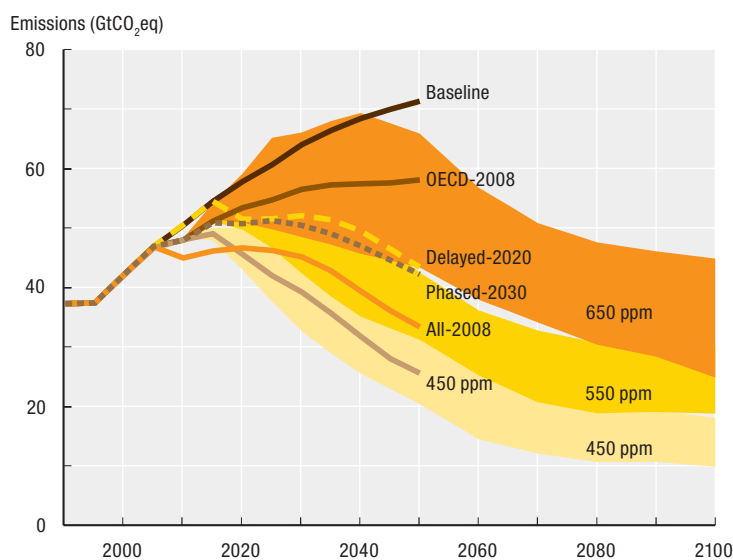
The *Outlook* highlights some of the “red light” issues that need to be addressed urgently. The policy scenarios in this *Outlook* indicate that the policies and technologies needed to address the challenges are available and affordable. Ambitious policy actions to protect the environment can increase the efficiency of the economy and reduce health costs. In the long term, the benefits of early action on many environmental challenges are likely to outweigh the costs.

As an example, a hypothetical global “OECD Environmental Outlook (EO) policy package” (EO policy package, see Chapter 20) was applied. It shows that, by combining specific policy actions, some of the key environmental challenges can be addressed at a cost of just over 1% of world GDP in 2030, or about 0.03 percentage points lower average annual GDP growth to 2030 (Figure 1). Thus world GDP would be about 97% higher in 2030 than today, rather than nearly 99% higher. Under such a scenario, emissions of nitrogen oxides and sulphur oxides would be about one-third less in 2030 while little change is projected under a no-new-policy baseline scenario, and by 2030 growth in greenhouse gas emissions would be contained to 13% rather than 37%.



More ambitious policy action than the EO policy package would be needed to stabilise greenhouse gas concentrations at the levels being considered in international discussions (Figure 2). Another simulation was run of policies needed to stabilise atmospheric concentration at 450ppm CO₂eq, one of the most ambitious targets being discussed. The simulation shows that to reach this target, actions by all countries are needed to achieve a

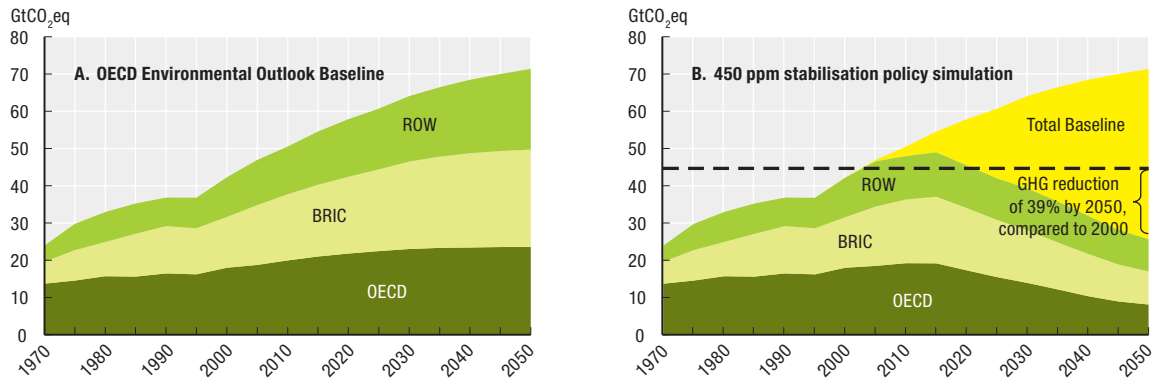
Figure 2. Global GHG emission pathways: Baseline and mitigation cases to 2050 compared to 2100 stabilisation pathways



Note: OECD 2008 = all OECD countries apply a GHG tax of USD 25 per tonne of CO₂-eq; Delayed 2020 = all countries apply the tax, starting only in 2020; Phased 2030 = OECD countries apply the tax in 2008, BRIC in 2020 and Rest of the World (ROW) in 2030; All 2008 = all countries apply the tax, starting in 2008; 450ppm = scenario to stabilize GHG concentrations in the atmosphere at 450 ppm CO₂-eq; For all USD 25 tax cases, the tax is escalating by about 2% per year after the initial year of introduction.

39% reduction in global greenhouse gas emissions by 2050 relative to 2000 levels (Figure 3). Such action would reduce GDP by 0.5% and 2.5% below Baseline estimates in 2030 and 2050 respectively, equivalent to a reduction in annual GDP growth of about 0.1 percentage points per annum on average. The more countries and sectors that participate in climate change mitigation action, the cheaper and more effective it will be to curb global greenhouse gas emissions. However, these costs are not distributed evenly across regions as seen in Figure 1. This suggests the need for burden-sharing mechanisms within an international collaborative framework to protect the global climate. While OECD countries should take the lead, further co-operation with a wider group of emerging economies, the “BRIICS” countries (Brazil, Russia, India, Indonesia, China and South Africa) in particular, can achieve common environmental goals at lower costs.

Figure 3. Total greenhouse gas emissions (by region), 1970 2050



Note: BRIC = Brazil, Russia, India, China. ROW = Rest of world.

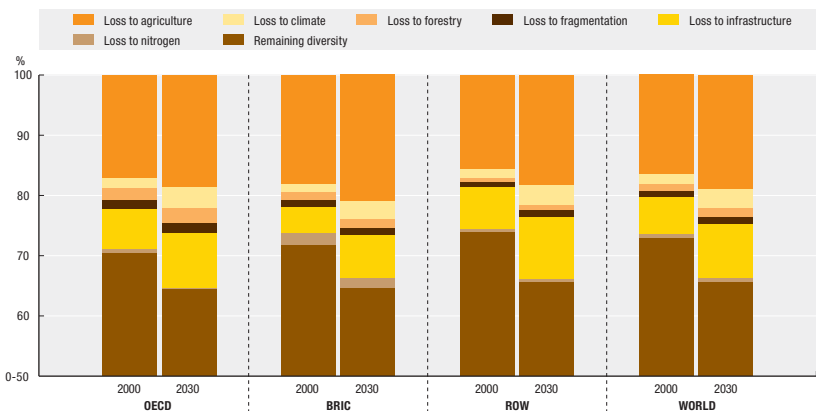
The consequences of environmental policy inaction

If no new policy actions are taken, within the next few decades we risk irreversibly altering the environmental basis for sustained economic prosperity. To avoid that, urgent actions are needed to address in particular the “red light” issues of climate change, biodiversity loss, water scarcity and health impacts of pollution and hazardous chemicals (Table 1).

Without further policies, by 2030, for example:

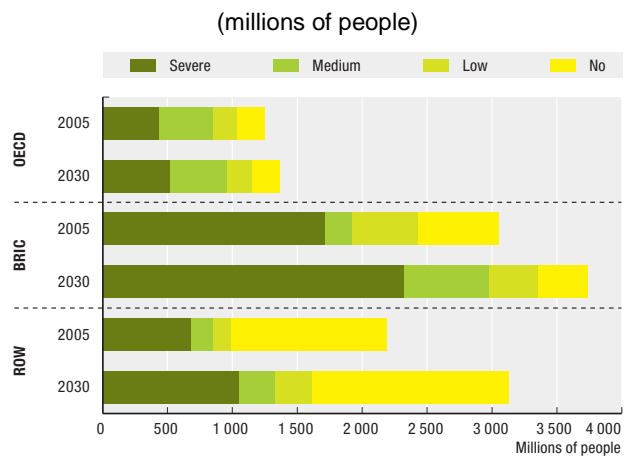
- Global emissions of greenhouse gases are projected to grow by a further 37%, and 52% to 2050 (Figure 3a). This could result in an increase in global temperature over pre-industrial levels in the range of 1.7-2.4° Celsius by 2050, leading to increased heat waves, droughts, storms and floods, resulting in severe damage to key infrastructure and crops.
- A considerable number of today’s known animal and plant species are likely to be extinct, largely due to expanding infrastructure and agriculture, as well as climate change (Figure 4). Food and biofuel production together will require a 10% increase in farmland worldwide with a further loss of wildlife habitat. Continued loss of biodiversity is likely to limit the Earth’s capacity to provide the valuable ecosystem services that support economic growth and human well-being.

Figure 4. Sources of losses in mean species abundance to 2030



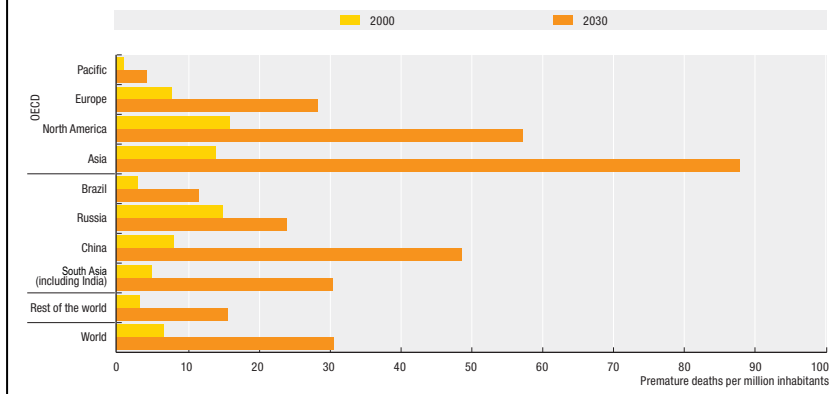
- Water scarcity will worsen due to unsustainable use and management of the resource as well as climate change; the number of people living in areas affected by severe water stress is expected to increase by another 1 billion to over 3.9 billion (Figure 5).
- Health impacts of air pollution will increase worldwide, with the number of premature deaths linked to ground-level ozone quadrupling (Figure 6) and those linked to particulate matter more than doubling. Chemical production volumes in non-OECD countries are rapidly increasing, and there is insufficient information to fully assess the risks of chemicals in the environment and in products.

Figure 5. People living in areas of water stress, by level of stress, 2005 and 2030



The greatest environmental impacts will be felt by developing countries, which are less equipped to manage and adapt. But the economic and social costs of policy inaction or delaying action in these areas are significant and are already affecting economies — including in OECD countries — directly (e.g. through public health service costs) as well as indirectly (e.g. through reduced labour productivity). The costs of policy inaction for biodiversity loss (e.g. fisheries) and climate change could be considerable.

Figure 6. Premature deaths from urban ozone exposure for 2000 and 2030



Key policy options

There is a window of opportunity now to introduce ambitious policy changes to tackle the key environmental problems and promote sustainable development. Investment choices being made today need to be steered towards a better environmental future, particularly choices that will “lock-in” energy modes, transport infrastructure and building stocks for decades to come. The following actions are essential:

- Use a mix of complementary policies to tackle the most challenging and complex environmental problems, with a strong emphasis on market-based instruments, such as taxes and tradable permits, in order to reduce the costs of action.
- Prioritise action in the key sectors driving environmental degradation: energy, transport, agriculture and fisheries. Environmental ministers cannot do this alone. Environmental concerns need to be integrated into all policy-making by relevant ministries including finance, economy and trade, and reflected in all production and consumption decisions.
- Ensure that globalisation can lead to more efficient use of resources and the development and dissemination of eco-innovation. Business and industries need to play a lead role, but governments must provide clear and consistent long-term policy frameworks to encourage eco-innovation and to safeguard environmental and social goals.

- Improve partnerships between OECD and non-OECD countries to address global environmental challenges. Brazil, Russia, India, Indonesia, China and South Africa (BRIICS) in particular are key partners given their growing influence in the world economy and increasing share of global environmental pressures. Further environmental co-operation between OECD and non-OECD countries can help spread knowledge and technological best practices.
- Strengthen international environmental governance to better tackle trans-boundary and global environmental challenges.
- Strengthen attention to the environment in development co-operation programmes, and promote more coherent policies.

What will the environment be like in 2030 if no further action is taken?

OECD countries have made significant progress in addressing many environmental challenges over the past few decades. Pollution from industrial sources has been reduced, forest coverage and the number and size of natural protected areas have increased (although the quality of protected areas is not always high, and there are still too few marine protected areas), ozone depleting substances have largely been phased-out and the use of natural resources, water and energy has to some extent been decoupled from continuing economic growth (*i.e.* become more efficient per unit of GDP). Policies that successfully led to these achievements should be maintained and scaled-up. However, in most cases, the increasing pressures on the environment from population and economic growth have out-paced the benefits of any efficiency gains.

Without more ambitious policies, increasing pressures on the environment could cause irreversible damage within the next few decades.

The remaining environmental challenges (see Table 1) are of an increasingly complex or global nature, and their impacts may only become apparent over long timeframes. Among the most urgent of these challenges for both OECD and non-OECD countries are climate change, biodiversity loss, the unsustainable management of water resources and the health impacts of pollution and hazardous chemicals. We are not managing our environment in a sustainable manner.

The picture of economic and environmental trends in the coming decades will differ from region to region. By 2030, the world economy is expected to nearly double and world population to grow from 6.5 billion today to over 8.2 billion people. Most of the growth in both income and population will be in the emerging economies of Brazil, Russia, India, Indonesia, China and South Africa (the BRIICS) and in other developing countries. Rising income and aspirations for better living standards will increase the pressure on the planet's natural resources. The economic prospects of many of the poorest countries are threatened by unsustainable use of natural resources, uncontrolled pollution in rapidly-growing cities and the impacts of climate change. Developing countries are the most vulnerable to climate change as they lack the necessary financial and institutional capacity to adapt.

The global importance of rapidly emerging economies is growing as they become major economic and trade partners, competitors, resource users and polluters on a level that compares to the largest of OECD countries. The primary energy consumption of Brazil, Russia, India and China together is expected to grow by 72% between 2005 and 2030, compared with 29% in the 30 OECD countries. Unless ambitious policy action is taken, greenhouse gas emissions from just these four

countries will grow by 46% to 2030, surpassing those of the 30 OECD countries combined. Already, 63% of the population in Brazil, Russia, India and China together are living under medium to severe water stress; this share will increase to 80% by 2030 unless new measures to better manage water resources are introduced.

Policy action is affordable, and the cost of inaction is high

Protecting the environment can go hand-in-hand with continued economic growth. The *Outlook* estimates that world GDP will grow by nearly 99% between 2005 and 2030 under a Baseline projection reflecting no new policies. Without policy changes, the environmental consequences of this growth will be significant. But good environmental policies can lead to “win-win” opportunities for the environment, human health and the economy. To demonstrate this, a hypothetical global “*OECD Environmental Outlook* policy package” (EO policy package) of a number of specific policy actions to address

several key environmental challenges simultaneously was put together. The EO policy package would imply a reduction of just over 1% in world GDP in 2030, such that world GDP would be about 97% higher in 2030 than today, instead of nearly 99% higher. On average, this would mean a loss of 0.03 percentage points in annual GDP growth globally to 2030.

A policy package to address some of these key environmental challenges could cost as little as a loss of 0.03 percentage points in annual average GDP growth globally to 2030.

Tackling a specific environmental problem can in some cases offer co-benefits in terms of reduction in other environmental pressures, and solutions to global problems can also help to address local environmental problems and *vice versa*. For example, measures to reduce vehicle emissions can both reduce greenhouse gas emissions and improve local air quality, while better insulation for homes and offices can cut energy bills for households and reduce pollution from energy production. For example, the climate policy simulation of a 450ppm CO₂eq stabilisation pathway also found that, in addition to reducing greenhouse gas emissions, the ambitious climate change policies would also lead to reductions in sulphur oxides of 20-30% and in nitrogen oxides of 30-40% by 2030. Similarly, regulations to limit agricultural water pollution from nitrogen fertilisers can also reduce atmospheric emission of nitrous oxide, a potent greenhouse gas.

Governments have the responsibility to create appropriate incentives for businesses and consumers to make choices that can help prevent future environmental problems. The investment choices being made today will determine future environmental outcomes. For example, the types of energy infrastructure put in place today will lock-in for decades to come emissions of greenhouse gases. Investments in transport infrastructure today will also affect future mobility options and their environmental impacts. The energy efficiency of our building stock for the coming decades or even centuries is determined by the construction and building efficiency regulations in place today. Fast growing economies offer enormous opportunities for investments in new energy efficiency technologies. For example, China is building new coal-power plants at a rapid pace, and its urban residential building stock is expected to more than double in the next 20 years.

The cost of inaction is high, while ambitious actions to protect the environment are affordable and can go hand-in-hand with economic growth.

A window of opportunity to act is now open where investments in building, energy and transport infrastructure will be made in the coming decades, especially in fast growing economies.

For many of these actions, there will be long delays before their benefits are realised; and in turn, many short-sighted policy decisions taken today may lead to long-term environmental challenges. This makes timing an important issue for the design and implementation of environmental policy over the coming decades. The costs of delaying action, however, could be critical, especially where policy decisions have long-term or irreversible environmental implications or where it is impossible to predict with precision the full extent and character of

damage. Biodiversity loss and species extinction are one such example. For climate change, deciding when to act involves balancing the economic costs of more rapid emission reductions now against the future climate risks of delay.

A window of opportunity to act is now open, but it will not be open for long. We need forward-looking policies today to avoid the high costs of inaction or delayed action over the longer-term.

What action should be taken?

Ensure efficient resource use and eco-innovation

Trade and investment liberalisation can encourage more efficient allocation of resources globally, if sound environmental policy and institutional frameworks are in place. In their absence, globalisation can amplify market and policy failures and intensify environmental pressures. Effective policies are required at local, national, regional and global levels.

Globalisation expands markets and promotes competition, and can motivate businesses to adapt and innovate. Some private sector leaders are already moving ahead, encouraged by stakeholders and consumer demands for “green” innovation and products. Eco-innovation and the wider use of eco-efficient techniques not only improve environmental performance, but can also raise economic productivity, making businesses and leading countries more competitive. The environmental goods and services sector is likely to expand significantly in the future. Businesses can reap the benefits of globalisation if they seize the “first mover” advantage of eco-innovation. Technological solutions have already addressed many environmental problems, and new ones are developing, such as carbon capture and storage and hybrid vehicles, which are likely to become increasingly cost-competitive within the next few decades. For example, if “second generation” biofuel technology (based on biomass waste) becomes widely available by 2030, the projected expansion of agricultural lands to supply biofuels production, the increased use of pesticides, fertilisers and water, and the impacts on biodiversity and ecosystems associated with this land use, could be avoided.

Globalisation provides opportunities to promote efficient use of resources and to spur the development and spread of eco-innovation.

Business has a central role in driving eco-innovation, but governments have an important responsibility to set the appropriate policy frameworks according to national circumstances:

- Long-term policy frameworks that allow environmental costs to be priced into economic activities (e.g. through green taxes and tradable permits or regulation) to make green technologies cost-competitive and provide business with the incentives to innovate.
- Well-targeted government support for basic R&D for eco-innovation where justified, including enhanced government-business partnerships.
- Strong policy and institutional frameworks to promote environmental and social objectives alongside efforts to liberalise trade and investment and to level the playing field to make environmental protection and globalisation mutually supportive.

Liberalisation of trade in environmental goods and services could help realise this objective. The number of regional trade agreements is still low but is increasing rapidly, and many now include commitments for environmental co-operation. Multilateral instruments such as the *OECD Recommendation on Environment and Export Credit* and the *OECD Guidelines for Multinational Enterprises* encourage environmentally and socially responsible corporate behaviour and accountability.

While globalisation has a range of potential impacts — both good and bad — on the environment, the state of the environment and natural resources also affects economic development and globalisation. Competition for scarce natural resources, harvesting of some renewable resources such as fish stocks and tropical timber, the impacts of changing climate on agricultural production, energy prices, the search for alternative energy sources, and others, may heavily influence trade and investment patterns in the coming years.

Enhance international environmental co-operation

Economic globalisation, as well as the global nature of many environmental problems, require OECD and non-OECD countries to work together to address the most pressing global environmental challenges and promote sustainable development.

- Developing countries have opportunities to learn from the experience of other countries and “leapfrog” to more energy-efficient, resource-efficient and greener development paths, taking advantage of new know-how and technologies. OECD and non-OECD countries need to work together to spread knowledge, best practices and technologies to mutually benefit from more sustainable production and consumption patterns worldwide.
- Some of the poorest countries in the world have been left behind by globalisation by failing to integrate into the world economy due to their lack of capacity to capture the benefits of globalisation and also due to trade barriers in OECD countries. Further efforts are needed to integrate environmental concerns into development co-operation programmes.
- The BRIICS, in particular, need to be part of international solutions to global environmental challenges, given their increasing role in the world economy and rapidly growing environmental impacts. Also, further environmental co-operation between OECD countries and BRIICS can achieve global environmental goals at lower costs for all.

OECD and non-OECD countries need to work together to achieve common environmental goals.

- For climate change, the more countries that participate in mitigation action, and the more sectors and greenhouse gases that are covered, the cheaper it will be to curb global emissions. The *Outlook* indicates that if OECD countries alone implement a carbon tax starting at USD 25/tonne of CO₂ in 2008, this would lead to a 43% reduction in OECD greenhouse gas emissions. However, global emissions would still be 38% higher in 2050 compared to the 2000 levels. If Brazil, China, India and Russia follow suit with the same policy in 2020, and the rest of the world in 2030, global greenhouse gas emissions in 2050 could be brought down to the 2000 levels (0% increase).
- Stronger international environmental governance is needed to ensure implementation of international agreements to tackle trans-boundary and global environmental challenges.

Prioritise actions in the key sectors affecting the environment: energy, transport, agriculture and fisheries

Most environmental problems can only be solved by coherent government-wide policy actions and co-operation with businesses and civil society. Relevant ministries need to work together to develop better co-ordinated policies so that environmental concerns are integrated into actions by key ministries such as finance, trade, industry, energy, transport, agriculture and health. For example, adaptation to climate change that is already locked-in by past emissions will increasingly need to be integrated into policies governing energy, transport and water infrastructure, land use planning, and development co-operation. Also, the development of biofuels needs to take account of their overall life-cycle impacts on the environment and on food prices. Coherent policy impact assessments need to cover all relevant policy areas, including energy, agriculture, environment, as well as research and technology development, in order to avoid a situation where governments subsidise energy production that can result in dubious environmental benefits and lead to higher agricultural commodity prices. Government authorities increasingly need to work together, including across different levels of government (central, regional, state, local), to successfully ensure the development and implementation of coherent environmental policies.

Many environmental challenges cannot be solved by environment ministries alone.

The *OECD Environmental Outlook* highlights the priority actions needed in key sectors to prevent the environmental damage projected to 2030:

- **Energy.** Fossil fuel use is the main source of carbon dioxide emissions, the principal greenhouse gas that causes climate change. The *Outlook* projects world energy-related carbon dioxide emissions to increase by 52% to 2030 under the no-new-policy Baseline scenario. Meanwhile, world energy sulphur and nitrogen emissions are projected to remain stable around or below recent levels. As investments in energy infrastructure lock-in technologies, fuel needs and related emissions for years to come, an appropriate policy framework is needed now to promote renewable energy and low-carbon alternative processes and fuels, including technologies for carbon capture and storage. Energy pricing that reflects the full cost of carbon is essential, but regulations and support for research and development of new technologies are also needed. Governments should avoid policies that lock-in specific technologies or fuel choices, in particular avoiding technology-specific targets (e.g. for biofuels), in order to leave all technology options open and to provide incentives for further innovation. Policies to promote cost-effective energy efficiency measures for buildings, transport and electricity production are needed urgently, particularly in fast growing economies, where infrastructure is being put in place today which will last for many decades.

- **Transport.** Air pollution and greenhouse gas emissions from transport are growing rapidly, from passenger vehicles, aviation and marine transport, contributing to climate change globally and causing health problems in many urban areas. The *Outlook* projects transport-related carbon dioxide emissions to increase by 58% to 2030, while sulphur and nitrogen emissions will fall by a quarter to a third from today's levels. Transport prices rarely reflect their full social and environmental costs, resulting in over-use and sub-optimal choices about the type of transport to use. Transport pricing should fully reflect the costs of environmental damage and health impacts, *e.g.* through taxes on fuels (including the removal of tax exemptions) and road pricing. Research and development of new transport technologies, including vehicles with better fuel economy, hybrid vehicles, etc., should be promoted, especially to help offset projected rapid increases in motorisation in non-OECD countries. The availability, frequency and safety of public transport should be strengthened to provide a viable alternative to private cars. It is mobility and access that need to be ensured, not “transport” *per se*.
- **Agriculture** is by far the largest user of water and is responsible for much of its pollution. The *Outlook* Baseline projects world primary food crop production to grow by 48% and animal products by 46% to 2030. OECD countries will account for large shares, particularly for animal products (37% in 2030 to feed 17% of the world's population). If no new policies are introduced, the conversion of natural land to agricultural use will continue to be a key driver of biodiversity loss. Under current policies, areas for biofuel crops are projected to increase by 242% between 2005 and 2030. Land-related greenhouse gas emissions are smaller than from energy sources, but still important. Production-linked subsidies have in many cases resulted in pollution of water resources and soil, and damaged ecosystems and landscape. Increasingly, production-linked payments are conditional on farmers adopting certain practices to reduce environmental harm. While such “cross-compliance” can help to reduce some of the negative environmental impacts of agricultural production, a more effective approach would be to remove environmentally harmful subsidies in the first place. Taxes on farm chemicals also help limit their use, while appropriate pricing of irrigation water would encourage more rational use of water and cost-recovery for irrigation infrastructure provision.
- **Capture fisheries** exert pressures on ecosystems and biodiversity through depletion of fish stocks, destruction of habitats and pollution. Those environmental pressures can undermine the productivity of affected fisheries and the livelihoods of fishing communities. Fisheries depend on a healthy marine environment. Fishing opportunities are influenced by climate change, natural fluctuations and environmental pressures from other human activities. While progress is already being made in some fisheries towards an ecosystem-based approach, the worrying outlook for capture fisheries highlighted in this report could be reversed by further measures to limit total catch levels, designate fishing seasons and zones, regulate fishing methods and eliminate subsidies for fishing capacity. Stronger international co-operation is needed in this area.

What are the obstacles to change?

While policy reforms are achievable and affordable, some obstacles are preventing the ambitious policy changes needed, including:

- *Fears of impacts on industrial competitiveness.* Possible negative impacts on industrial competitiveness of environmental policies are a key obstacle to decisive policy actions. Resistance by affected sectors often challenges the political feasibility of introducing

environmental measures such as emission standards, targets and green taxes. But concerns about the competitiveness impacts of environmental policies are often overstated. Better information is needed on the actual impacts on affected firms and sectors and this should be compared with the wider and longer term benefits of environmental improvements and potential economy-wide efficiency gains. Nevertheless, some sectors can be adversely affected by environmental measures, especially when such measures are implemented in a non-global manner.

- *Uncertainty about who should take action and who should bear the costs of action.* This is especially so for global environmental challenges like climate change and biodiversity loss, for which the costs and benefits of policy action are unevenly distributed amongst countries and generations. Historically, the majority of greenhouse gas emissions have come from developed countries, but climate change is expected to have the largest impacts on developing countries. Looking forward, CO₂ emissions from non-OECD countries are projected to double to 2030, accounting for almost 73% of the total increase to 2030. However, on a per-capita basis, OECD country emissions will still be three to four times higher than non-OECD countries in 2030. Burden-sharing will be a key issue in the post-2012 climate architecture.
- *Underpricing of natural resource use and pollution.* “Getting the prices right” is often a very efficient way of keeping the costs of environmental policies low and greening the economy. But in practice it is difficult to accurately estimate the full costs of environmental, health and productivity damages caused by economic activities. If the full costs are reflected in their prices, polluting activities will be costlier and there will be clear price incentives for increased resource and energy efficiency. However, in most countries the use of scarce natural resources remains under-priced or even subsidised, and the polluter pays principle is rarely implemented fully. Unsustainable subsidies are pervasive in the industry, agriculture, transport and energy sectors in most OECD countries. They are expensive for governments and tax payers to maintain, and can have harmful environmental and social effects.

Removing the key obstacles to change

The OECD work shows that clean and clever growth need not be expensive. Also, the right policies to protect the environment can lead to long-term net benefits for the economy. To realise this, the following approaches to policy development and implementation could be considered:

- *Phase in the policy to allow for options* such as transitional adjustments, recycling of tax revenues back to affected sectors, border tax adjustments in compliance with World Trade Organization regulations, and international co-operation to harmonise regulations and taxes. Improving public awareness of the overall costs and benefits of the proposed measures will also be important. Transitional measures can be part of the reform package to smooth the transition and soften any unwanted effects from structural changes on particular groups in society, such as increased energy bills for low-income families.
- *Work in partnership with stakeholders*, including business, academia, trade unions and civil society organisations, to find creative and low-cost solutions to many of the environmental challenges. Public support and buy-in, particularly by consumers and affected industries, are often needed to ensure successful implementation of ambitious policies.

- *Bring OECD and non-OECD countries together to identify environmentally effective and economically efficient solutions to common environmental challenges.* OECD countries need to take the lead to mitigate and help developing countries adapt to climate change and realise their mitigation potentials. To stop and reverse biodiversity loss, the need for action is primarily in developing countries where the richest natural resources are located, while the benefits of resource conservation extend globally. The long-term costs to society and the environment of not acting, or of further delaying ambitious action, are likely to outweigh the costs of early action.
- *Make widespread use of market-based approaches to enable efficiency gains and market advantage through innovation.* Market-based instruments — such as taxes, tradable permits and the reform or removal of environmentally harmful subsidies — are a powerful tool for sending price signals to businesses and households to make their production and consumption more sustainable.
- *Develop policy mixes, or combinations of instruments, tailored to specific national circumstances* to tackle many of the urgent remaining environmental problems. Mixes of policy instruments are needed because of the complex and often cross-sectoral nature of environmental issues. This typically means combining a robust regulatory framework with a variety of other instruments, such as strong pricing mechanisms, emissions trading or tradable permits, information-based incentives such as labelling, and infrastructure provision and building codes. In a well-designed mix, instruments can mutually support each other. For example, a labelling scheme can enhance the responsiveness of firms and households to an environmentally related tax, while the existence of the tax helps draw attention to the labelling scheme.

The *OECD Environmental Outlook* demonstrates that meeting the environmental challenges is both economically rational and technologically feasible. Seen from a long-term perspective, the costs of early action are far less than the costs of delaying; the earlier we act, the easier and less expensive the task will be. Policy-makers, businesses and consumers all need to play their part to implement the ambitious policy reforms which will deliver the most cost-effective environmental improvements. In that way, options are left open for future generations to make their own choices about how to enhance their well-being.

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