



ORGANISATION FOR ECONOMIC
CO-OPERATION AND DEVELOPMENT

OECD Forum Director and Head of Public Affairs
PUBLIC AFFAIRS AND COMMUNICATIONS DIRECTORATE
Public Affairs Division

15 February 2008

Dear Madam/Sir,

It is my great pleasure to inform you that OECD Forum 2008, "Climate Change, Growth, Stability: *the price of reform and the cost of inaction*", will be held at the OECD Conference Centre, Paris on 3rd and 4th June.

You can follow the preparations for OECD Forum 2008 and register your participation on our website: www.oecdforum.org.

I am delighted to be able to send you a summary of recent OECD work on Climate Change in the enclosed *Policy Brief* compilation.

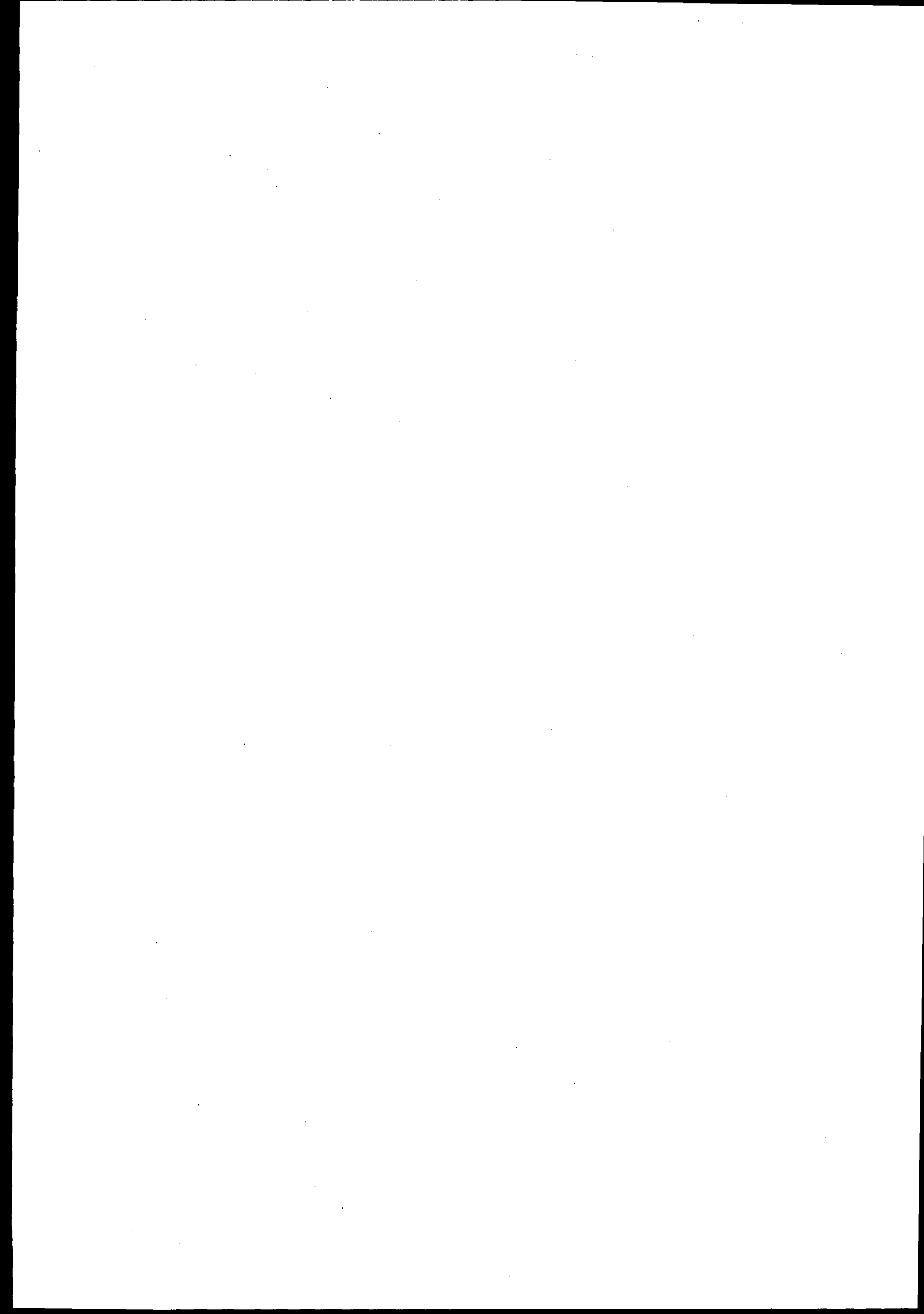
I look forward to welcoming you to Forum 2008.

With my best regards,

Yours sincerely,

A handwritten signature in black ink, appearing to be "John West". The signature is fluid and cursive, written over a light background.

John West





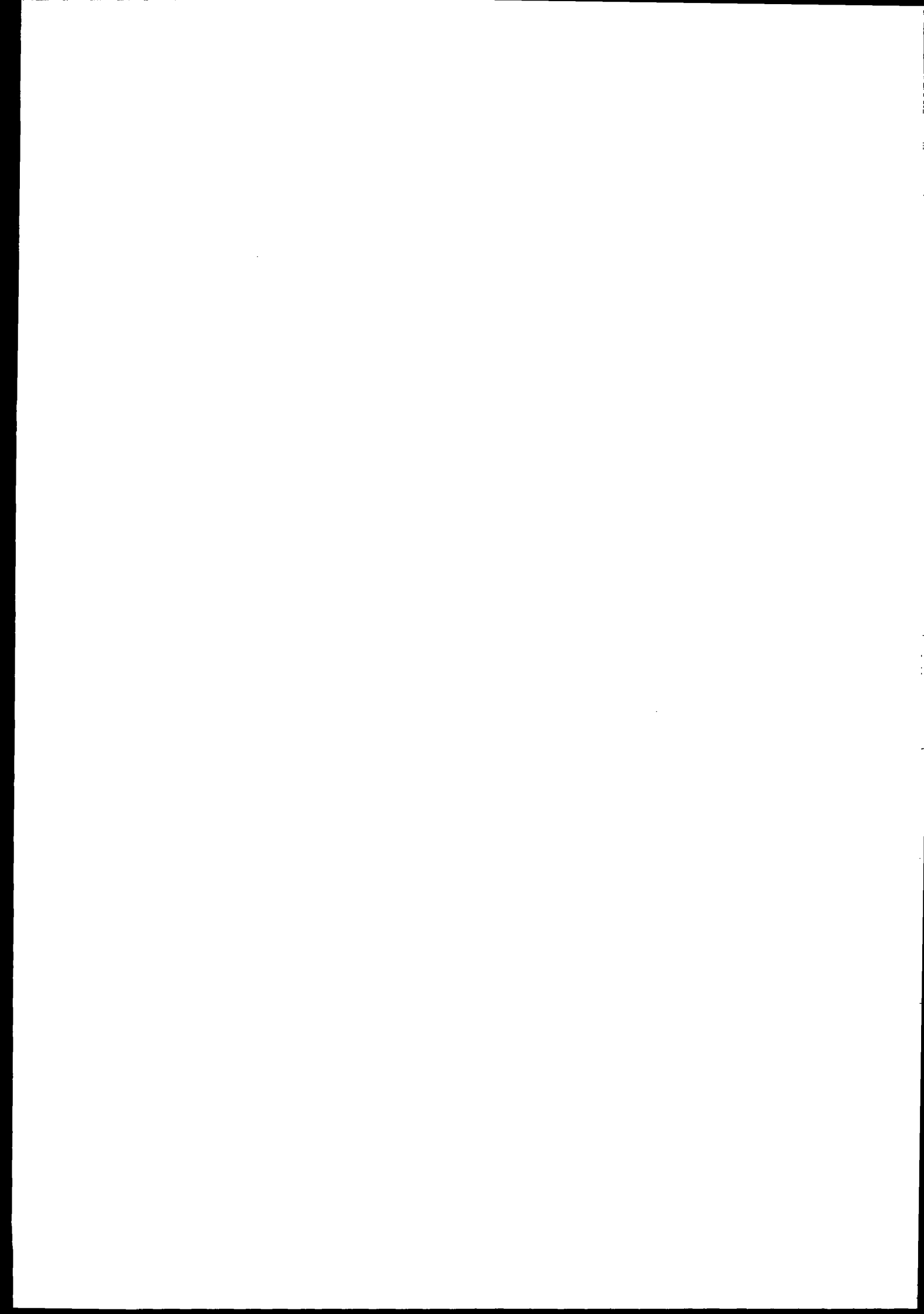
FORUM 2008

3-4 June 2008

OECD Conference Centre, Paris

OECD WORK ON CLIMATE CHANGE

- Climate change policies
- Putting climate change adaptation in the development mainstream
- Biofuels for transport
- Nuclear energy today
- The Political economy of environmentally related taxes
- Making environmental spending count



AUGUST 2007

Policy Brief

OECD



ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Climate Change Policies

How to price greenhouse gas emissions?

How to encourage innovative solutions?

Can climate, economic and social aims be complementary?

What about energy, transport, agriculture and forestry?

How to address climate change adaptation?

How to achieve global co-operation?

For further information

For further reading

Where to contact us?

Introduction

Climate change is already being observed through rising temperatures, melting glaciers, shifting rain patterns, increased storm intensity and rising sea levels. Greenhouse gas (GHG) emissions from human activities – mainly fossil fuel use, deforestation and agriculture – cause climate change. If GHG emissions are not reduced to significantly below current levels within the next few decades, there will be further warming and sea-level rise for centuries to come. This will result in adverse impacts on human health, natural ecosystems, and the economy.

The risk of serious climate change impacts suggests that urgent action is needed to significantly reduce GHG emissions in the coming decades. There is increasing evidence that the overall benefits of strong and early action to reduce GHG emissions outweigh the costs. But we need to reduce emissions at the lowest possible cost if we are to have a realistic chance of limiting further climate change.

OECD analysis shows that large reductions in GHG emissions are achievable at relatively low costs, if the right policies are put in place. This includes strong use of market-based instruments world wide to develop a global price for GHG emissions, accompanied by better integration of climate change objectives in relevant policy areas such as energy, transport, building, agriculture or forestry, and other measures to speed technological innovation and diffusion.

Since the early 1990s, most industrialised nations and many developing countries have implemented climate change-related policies. The OECD has contributed to the debate through its analytical work on the design and implementation of effective climate change policies, as well as its peer reviews of policy performance in individual countries. This Policy Brief summarises the main messages of OECD work to date, and provides suggestions for how governments can achieve their climate change commitments in the future. ■

Observer oecd

How to price greenhouse gas emissions?

Stabilising GHG concentrations in the atmosphere at a relatively stringent level can be achieved at costs of less than one-tenth of a percent of gross domestic product (GDP) growth per annum, or less than a 3% loss in GDP by 2030. These are the figures indicated in the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report and supported by recent OECD estimates. These relatively low-cost estimates of reducing GHG emissions assume widespread use of economically efficient market-based policy instruments, such as carbon taxes and emissions trading, and broad participation in mitigation efforts across the world. The likely costs of action increase significantly, however, if countries opt for less efficient policies, such as prioritising the use of regulatory or voluntary instruments, or exempting large energy-intensive industries from tax or trade schemes.

Several policy instruments can help put a price on GHG emissions: carbon or energy taxes, the removal of environmentally harmful subsidies, tradable permit schemes and the project-based flexibility mechanisms of the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC). While all OECD countries have applied one or more of these instruments to some extent, a priority is to extend their use and to link them so as to provide a strong and consistent price signal across all GHG-emitting activities. Developing a global carbon price not only reduces the total costs of reducing GHG emissions, but also helps to level the playing field between countries, thus addressing concerns about the potential effects on competitiveness of climate change policies.

All OECD countries levy energy taxes to some extent, while a few countries impose carbon taxes. Such taxes can be a particularly cost-effective approach to reducing GHG emissions. But OECD governments have often reduced their effectiveness by offering energy tax reductions or exemptions, typically for the most energy-intensive or polluting sectors where abatement costs are particularly low.

The use of emissions trading is expanding quickly, although it currently covers less than 20% of GHG emissions from the industrialised world (the "Annex I" countries in the Kyoto Protocol). Emission trading schemes are in use or under discussion in a number of countries or regions, including across the EU, in Norway, Switzerland, Japan, Australia and at the state level in the US. Increasingly, countries are looking at options for linking together the existing or proposed schemes.

Many OECD countries also participate in the two project-based market mechanisms that have been established under the Kyoto Protocol – the Clean Development Mechanism (CDM) and Joint Implementation (JI). These mechanisms allow firms in industrialised countries to earn emission credits by investing in emission reduction projects in other countries. Emission credits can usually be bought or sold in national or international carbon markets. Governments and companies have earmarked over USD 11 billion for CDM funding to 2012, and it is expected that CDM will result in a reduction in emissions equivalent to about 2 billion tons of CO₂ by 2012. JI is at an earlier stage of development, but its use is increasing.

There is also scope to reduce subsidies that may indirectly increase GHG emissions, such as those to energy or transport. Subsidies to energy producers in OECD countries are around USD 20-30 billion a year. The removal of environmentally harmful subsidies can be seen as a necessary first step towards an economically efficient and environmentally effective climate policy. However, taxation or emission trading will be necessary to effectively put a price on GHG emissions. ■

How to encourage innovative solutions?

Large reductions in GHG emissions are needed in the coming decades and throughout the century. This will require greater policy attention to accelerate the up-take of existing "green" technologies and practices, for example policies to encourage greater energy efficiency. Market-based instruments provide strong incentives for innovation, but market forces alone may not be enough; firms underinvest in research and development (R&D) if they fear they will not be able to earn a decent profit on resulting product development.

R&D programmes, regulations (e.g. building codes and regulations), and information instruments (e.g. eco-labelling of energy appliances) can complement market-based approaches. They can help to overcome some of the market and information failures that slow the development and diffusion of climate-friendly technologies. To ensure flexibility and encourage innovation, regulations should be based on achieving particular results, rather than specifying the methods or technologies to be used to achieve those outcomes. Care needs to be taken in choosing instruments in a policy mix, however, to ensure that they are complementary and avoid unnecessary overlap, and that they are cost-effective.

On the demand side, consumers or businesses may be slow to change their behaviour in response to price signals. This can be because of inadequate information on the performance of new technologies, or simply inertia. Many energy efficiency improvements, such as phasing-out incandescent lamps, are estimated to cost little or nothing to implement and to bring potentially large, near-term emission reduction benefits, but people need to be persuaded to take them up. It is estimated that current GHG emissions could be reduced by one-tenth using opportunities that cost less than they save. Well-designed regulations or information-based instruments, such as energy efficiency labels on household electrical appliances, can help to address some of the information or other barriers, as a complement to greater use of market-based incentives. ■

Box 1.
OECD ENVIRONMENTAL
PERFORMANCE REVIEWS

The OECD carries out periodical peer reviews of the environmental performance of each member country. These reviews assess a country's efforts to meet domestic objectives and international commitments and provide recommendations, including on climate change policies. All OECD countries are periodically reviewed in the OECD Environmental Performance Review process, as well as selected non-OECD countries, including Chile (2005) and China (2007).

Can climate, economic and social aims be complementary?

Climate change concerns should be integrated in all areas of public policy, particularly economic and social policies. This means addressing possible conflicts and defining trade-offs between policy objectives, as well as identifying and strengthening policies with potential "co-benefits". The co-benefits of GHG mitigation actions can include improved energy security, urban air quality and human health benefits.

Ambitious climate change policies can be perceived as being detrimental to sectoral competitiveness. Indeed, carbon or energy taxes may affect the competitiveness of energy-intensive sectors (such as aluminium, steel, or cement) if competitors in other countries are not similarly taxed. However, they are unlikely to negatively affect the economy as a whole. With the right policies, countries can even take advantage of being a "first mover" with regard to low-carbon technologies and practices.

Nevertheless, governments often face significant opposition from affected industries to the use of measures such as environmental taxes. While such impacts are often over-stated, moving towards a low-carbon economy will necessarily entail a shift in the structure of the economy. Several policy options exist to address competitiveness concerns – such as recycling tax revenues back to the affected sectors – without reducing the policy incentives to minimise GHG emissions. They should be used sparingly, however, and for a limited time, as they can raise the costs of achieving a given level of emissions abatement. Using taxation and trading together in a complementary manner can also provide a convenient and sometimes more politically acceptable approach to cover almost all GHG emissions. Some specific sectors – such as the aluminium industry – are discussing the adoption of sector-wide GHG emissions targets, which could also help to level the playing field for the sector across countries, and allow the trading of emission credits between installations. Other international, sector-based approaches to mitigating climate change include agreements for research and development on new technologies.

Reducing carbon emissions may also affect workers in energy-intensive industries. Phasing-in the policies according to a clear timetable, and helping workers to retrain or move to other forms of employment, are examples of measures that can help to smooth the transition to a low-carbon economy. Green tax reform can be used to combine environmental objectives with economic or social benefits, for example by using the revenues from carbon or energy taxes to reduce taxes on employment. ■

What about energy, transport, agriculture and forestry?

In the energy sector, integration of climate change and energy policy objectives is particularly important as today's investments will "lock in" the infrastructure, fuel and technologies to be used for decades to come. Similarly, the buildings and transport infrastructure put in place today will be in use for decades or centuries.

Therefore, greater attention must be paid to the energy efficiency requirements in building codes and long-term public transport planning. Major improvements in energy efficiency, as well as fuel switching to low- or

non-carbon-intensive energy sources such as renewables, carbon capture and storage, are the main technical options to reduce GHG emissions. Improving vehicle energy efficiency is also essential, and can be encouraged through pricing mechanisms such as increased taxes or charges and/or regulatory measures. In most countries, biofuels for transport are not economically competitive without substantial subsidies, and their environmental benefits are limited. Air and marine transport are largely exempted from fuel taxes, despite rapidly accelerating growth in the CO₂ emissions from these forms of transport.

Many policies with significant climate co-benefits are found in the agriculture and waste sectors. These include landfill gas recovery, animal manure management and agriculture fertiliser management. While in most cases these measures were introduced for other reasons, they have often led to significant GHG emission reductions. Policies to reduce environmentally harmful agricultural subsidies, or at least to redirect the subsidies to support environmentally friendly forms of agricultural production, can help to further reduce GHG emissions. Similarly, economic approaches in waste reduction or recovery schemes can bring multiple benefits, including lower GHG emissions.

In developing countries, large amounts of total GHG emissions come from deforestation and forest degradation. Moreover, studies suggest that reducing emissions from deforestation in developing countries is a cost-effective option relative to GHG mitigation in other sectors with multiple benefits. Policy options and positive incentives are needed to reduce emissions from deforestation, as well as to enhance the uptake of CO₂ by forests. ■

How to address climate change adaptation?

Climate change is already being observed in many parts of the world, and some further climate change is already locked-in due to past and current GHG emissions. Mainstreaming climate change adaptation into all relevant areas of public policy is a priority. It is a long-term process including awareness-raising, integration into sectoral planning and implementation of specific adaptation options. Integrating climate change risks requires more flexible, preventive and forward-looking approaches, and will involve legal, institutional and policy changes. For example, climate change adaptation could be facilitated through greater use of market-based instruments such as efficient water pricing and water markets, and risk-based insurance for properties, floods and droughts.

Box 2. THE ANNEX I EXPERT GROUP ON THE UNFCCC

The OECD and IEA support the work of the Annex I Expert Group (AIXG) on the United Nations Framework Convention Climate Change (UNFCCC). The AIXG is an *ad hoc* group of government experts from the industrialised countries that have taken on emission reduction commitments under the Kyoto Protocol. The AIXG provides a forum where Annex I countries can address key analytical issues related to the UNFCCC, and share experiences with climate change policies and approaches. Analytical work under the AIXG laid the groundwork for the inclusion of emission trading and other market instruments in the Kyoto Protocol, generating widespread support for the use of these mechanisms to keep global mitigation costs low.

In some cases, market forces are already driving adaptation. The winter tourism industry in the European Alps, for example, is moving ski resorts to higher altitudes, developing year-long activities to broaden their income base, and increasingly employing artificial snow-making in reaction to changing winter weather patterns.

Development co-operation is another policy area that is relevant for adaptation, in particular as developing countries are generally the most vulnerable to the impacts of climate change. OECD analysis indicates that a significant portion of official development assistance (ODA) is directed towards activities potentially affected by climate risks, such as water supply and sanitation, or energy and transport infrastructure, yet very little attention is paid to adaptation concerns within these investment decisions.

How to achieve global co-operation?

Strong and early international action is needed to stabilise GHG emissions at a level that would prevent dangerous interference with the climate systems by human activity. Countries are working together through the UNFCCC to develop a comprehensive framework for action post-2012. A number of countries – including the European Union, Canada and Japan – have underscored the need to at least halve global emissions by 2050.

Establishing a global price on carbon is essential for cost-effective reductions in GHG emissions. But how do we generate a common price for carbon? International co-operation is needed to establish the rules for carbon markets and the conditions to bring them into existence. This includes systems for monitoring emissions reductions, reporting and compliance. There is a need to extend and link existing international and national initiatives, such as emissions trading and carbon taxes. Other policies, including regulations and offset mechanisms, may be needed to extend GHG constraints to numerous small and diffuse emission sources, especially where market barriers limit the effectiveness of price signals.

The participation of all major emitters is needed to ensure sufficient global emissions reductions, while minimising the costs of action. The wider the coverage of abatement efforts across sectors and countries, the lower the economic costs of action. Global participation in mitigation efforts can also help to provide a level playing field, to address competitiveness concerns. Under the principle of common but differentiated responsibility, industrialised countries have the responsibility to provide leadership in addressing climate change internationally. But many opportunities for low or no-cost emissions reductions exist in non-OECD countries, for example through greater use of energy efficient building practices in new construction, or through ensuring that new coal-fired power stations are high-efficiency and designed in such a way that they can be easily retro-fitted for carbon capture and storage.

A key element of international negotiations on a post-2012 international framework will be to effectively engage all large emitting nations in the effort to significantly curb global emissions in the coming decades. But developing countries may not have the capacity to pay for large-scale GHG emissions

reductions themselves. Official development assistance plays an important role in supporting efforts by developing countries to climate-proof new investment for development, particularly in terms of leveraging private sector financing, as do the financing mechanisms under the UNFCCC. Development of a mechanism to provide financial incentives to support reduced emissions from deforestation and forest degradation will also be important, as this is a major source of emissions in many developing countries.

Further integration of cost-effective adaptation to climate change into all policy areas is a new challenge in all countries. Poorer countries and regions are also likely to need sustained financial and technical support to help increase their capacity to adapt to the level of climate change already locked-in due to past emissions. ■

**For further
information**

For more information about the OECD's work on climate change, please contact: env.contact@oecd.org, or visit www.oecd.org/env/cc/. Free reports of the OECD/IEA Annex I Expert Group on climate change are available on line at: www.oecd.org/env/cc/aixg/.

The OECD Policy Briefs are available on the OECD's Internet site:
www.oecd.org/publications/Policybriefs

OECD



ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

For further reading

OECD (2008), *OECD Environmental Outlook to 2030*, forthcoming.

OECD (2007), *Climate Change in the European Alps: Adapting Winter Tourism and Natural Hazard Management*, ISBN 978-92-64-03168-5, € 24, 128 pages.

OECD (2006), *The Political Economy of Environmentally Related Taxes*, ISBN 978-92-64-02552-3, € 40, 199 pages.

OECD (2005), *Bridge over Troubled Waters: Linking Climate Change and Development*, ISBN 978-92-64-01275-2, € 26, 154 pages.

OECD (2005), *Environmentally Harmful Subsidies, Challenges for Reform*, ISBN 978-92-64-01204-2, € 35, 160 pages.

OECD (2004), *The Benefits of Climate Change Policies: Analytical and Framework Issues*, ISBN 978-92-64-10831-8, € 90, 323 pages.

OECD (2004), *Greenhouse Gas Emissions Trading and Project-based Mechanisms*, ISBN 978-92-64-10576-8, € 54, 224 pages.

OECD (2004), *Tradable Permits: Policy Evaluation, Design and Reform*, ISBN 978-92-64-01502-9, € 48, 192 pages.

Baron, R. and J. Ellis (2006), *Sectoral Crediting Mechanisms for Greenhouse Gas Mitigation: Institutional and Operational Issues*, OECD/IEA.

Ellis, J. and S. Kamel (2007), "Overcoming Barriers to Clean Development Mechanism Projects", OECD/IEA/UNEP Risø Centre.

Ellis, J. and D. Tirpak (2006), "Linking GHG Emission Trading Systems and Markets", OECD/IEA.

Karousakis, K. (2007), "Incentives to Reduce GHG Emissions from Deforestation: Lessons Learned from Costa Rica and Mexico", OECD/IEA.

Levina, E., J.S. Jacob, L.E. Ramos and I. Ortiz (2007), "Policy Frameworks for Adaptation to Climate Change in Coastal Zones: The Case of the Gulf of Mexico", OECD/IEA.

Levina, E. (2006), "Domestic Policy Frameworks for Adaptation to Climate Change in the Water Sector, Parts I and II: Annex I and Non-Annex I Countries", OECD/IEA.

OECD publications can be purchased from our online bookshop:

www.oecd.org/bookshop

OECD publications and statistical databases are also available via our online library:

www.SourceOECD.org

Where to contact us?

OECD HEADQUARTERS

2, rue André-Pascal
75775 PARIS Cedex 16
Tel.: (33) 01 45 24 81 67
Fax: (33) 01 45 24 19 50
E-mail: sales@oecd.org
Internet: www.oecd.org

GERMANY

OECD Berlin Centre
Schumannstrasse 10
D-10117 BERLIN
Tel.: (49-30) 288 8353
Fax: (49-30) 288 83545
E-mail:
berlin.contact@oecd.org
Internet:
www.oecd.org/deutschland

JAPAN

OECD Tokyo Centre
Nippon Press Center Bldg
2-2-1 Uchisaiwaicho,
Chiyoda-ku
TOKYO 100-0011
Tel.: (81-3) 5532 0021
Fax: (81-3) 5532 0035
E-mail: center@oecdtokyo.org
Internet: www.oecdtokyo.org

MEXICO

OECD Mexico Centre
Av. Presidente Mazaryk 526
Colonia: Polanco
C.P. 11560 MEXICO, D.F.
Tel.: (00.52.55) 9138 6233
Fax: (00.52.55) 5280 0480
E-mail:
mexico.contact@oecd.org
Internet:
www.oecd.org/centrodemexico

UNITED STATES

OECD Washington Centre
2001 L Street N.W., Suite 650
WASHINGTON DC. 20036-4922
Tel.: (1-202) 785 6323
Fax: (1-202) 785 0350
E-mail:
washington.contact@oecd.org
Internet: www.oecdwash.org
Toll free: (1 800) 456 6323

The OECD Policy Briefs are prepared by the Public Affairs Division, Public Affairs and Communications Directorate. They are published under the responsibility of the Secretary-General.

MARCH 2006

Policy Brief

OECD



ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Putting Climate Change Adaptation in the Development Mainstream

How does climate change affect development?

How much aid goes to climate-sensitive activities?

Do development activities take climate change adaptation into account?

What are the main barriers to mainstreaming adaptation to climate change?

How can climate change adaptation be better integrated in development?

For further information

For further reading

Where to contact us?

Introduction

Climate change poses a serious challenge to social and economic development. Developing countries are particularly vulnerable because their economies are generally more dependent on climate-sensitive natural resources, and because they are less able to cope with the impacts of climate change.

How development occurs has implications, in turn, for climate change and for the vulnerability of societies to its impacts. Climate change adaptation needs to be brought into the mainstream of economic policies, development projects, and international aid efforts.

Considerable analytical work has been done on how development can be made climate-friendly in terms of helping reduce greenhouse gas emissions which cause climate change, although implementation remains a challenge. Much less attention has been paid to how development can be made more resilient to the impacts of climate change. In a narrow engineering sense, this could involve taking climate changes into account in the siting and design of bridges and other infrastructure. At a policy level, it could involve considering the implications of climate change on a variety of development activities including poverty reduction, sectoral development, and natural resource management.

Bridging the gap between the climate change adaptation and development communities, however, is not easy. The two communities have different priorities, often operate on different time and space scales, and do not necessarily "speak the same language". Specific information is therefore needed on the significance of climate change for development activities along with operational guidance on how best to adapt to its impacts, within the context of other pressing social priorities.

This *Policy Brief* looks at how far current development policies and programmes are taking climate change risks into account, as well as at ways to improve the "mainstreaming" of adaptation to climate change in development planning and assistance. ■

Observer^{oecd}

How does climate change affect development?

Climate is closely intertwined with development. For one thing, climate is a resource in itself, and it affects the productivity of other critical resources, such as crops and livestock, forests, fisheries and water resources. Natural fluctuations in climate such as those related to the El Niño phenomenon cause widespread disruptions in society's ability to harness resources and even to survive.

But human development choices also have a demonstrable impact on local and global climate patterns. Over-construction contributes to the formation of urban "heat islands"; deforestation and changes in land use can influence regional temperature and rainfall patterns; and increases in greenhouse gas concentrations as a result of industrial activity are responsible for global climate change.

In addition to natural climate variability, long-term climate trends and climate change are already having a discernible impact on development. A clear example is the close link between rising temperatures in the Himalayas and the incidence of glacier retreat and increased risk of potentially catastrophic glacial lake outburst flooding. A diverse range of development activities, from design of hydropower facilities to rural development and settlement policies, will need to adapt to such impacts.

Even where the impacts of climate change are not yet this obvious, scenarios of future impacts can, in many cases, justify ensuring that adaptation responses are built into planning. One reason is that it can be more cost-effective to implement adaptation measures early, particularly for long-lived infrastructure. Another reason is that current development activities may irreversibly affect future adaptation to the impacts of climate change. Examples include destruction of coastal mangroves and the building of human settlements in areas that are likely to be particularly exposed to climate change. In such instances, even near-term policies may need to consider the long-term implications of climate change.

The effects of climate change may be especially critical to the achievement of development objectives related to the most vulnerable groups and communities. The projected impact of climate change on access to natural resources, heat-related mortality and spread of vector-borne diseases such as malaria, for example, has direct implications for the achievement of several of the Millennium Development Goals. ■

How much aid goes to climate-sensitive activities?

An OECD analysis of Official Development Assistance (ODA) flows to six developing countries indicates that a significant portion of this aid is directed at activities potentially affected by climate risks, including climate change (Figure 1). Estimates range from 50-65% of total national official flows in Nepal, to 12-26% in Tanzania. In monetary terms, this represents half a billion US dollars of official aid flows in Bangladesh and Egypt, and about USD 200 million in Tanzania and Nepal. In Fiji, while the absolute amount may be low, it constitutes roughly one-third of all aid flows. Uruguay is the exception because it receives very little ODA: as it is an upper middle income developing country, most of its official flows are loans, primarily in activities not directly exposed to climate risk.

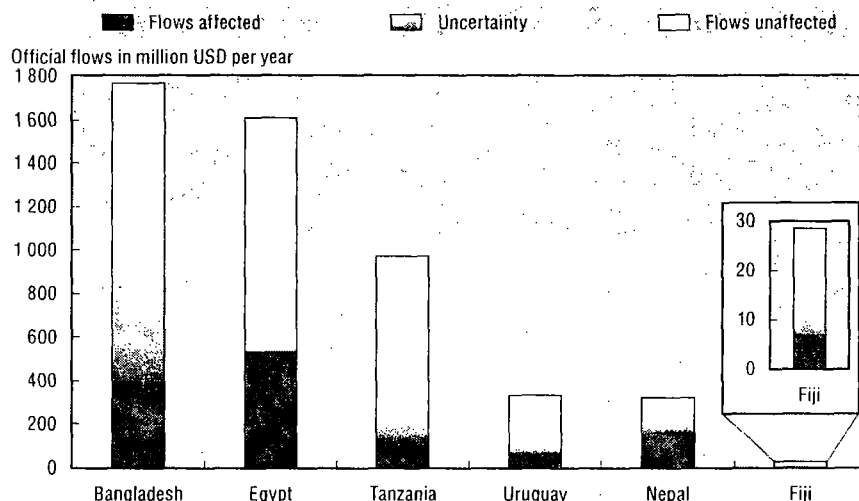
While there is a risk of oversimplification in any such classification, the analysis underscores the fact that taking climate risks (including climate change) into account is often important for development investments and projects. ■

Do development activities take climate change adaptation into account?

Some weather and climate considerations are routinely taken into account in a wide range of development activities, from crop selection to the design of highways and energy generation facilities. However, not all climate risks are being incorporated in decision making, even with regard to natural weather extremes. Moreover, practices that take into account historical climate are not necessarily suitable under climate change. Many planning decisions focus on shorter timescales and tend to neglect the longer-term perspective.

An analysis of national development plans, poverty reduction strategy papers, sectoral strategies and project documents in climate-sensitive sectors indicates that such documents generally pay little or no attention to climate change, and often pay only limited attention to current climate risk. Even when climate change is mentioned, specific operational guidance on how to take it into account is generally lacking. ■

Figure 1.
ANNUAL OFFICIAL FLOWS AND SHARE OF ACTIVITIES POTENTIALLY AFFECTED BY CLIMATE CHANGE



Source: *Bridge Over Troubled Waters: Linking Climate Change and Development* (Paris, OECD, 2005).

What are the main barriers to mainstreaming adaptation to climate change?

Lack of awareness of climate change within the development community and limitations on resources for implementation are the most frequently cited reasons for difficulties in mainstreaming adaptation to climate change within development activity. These explanations may hold true in many situations, but there is also a more complex web of reasons underlying them:

- *Barriers within governments and donor agencies:* Climate change expertise is typically the domain of environment departments in governments and donor agencies, and such departments have limited leverage over sectoral guidelines and projects. Sectoral managers and country representatives may also face “mainstreaming overload”, with issues such as gender, governance and environment also vying for integration in development activities. Moreover, as many development projects are funded over three to five years, they may not be the best vehicle for long-term climate risk reduction. Adaptation to climate change *ex ante* may also have more difficulty attracting resources than more visible *ex poste* activities such as emergency response and post-disaster recovery.
- *Insufficient relevance of available climate information to development-related decisions:* Development activities are sensitive to a broad range of climate variables, only some of which can be reliably projected by climate models. Temperature, for example, is typically easier to project than rainfall. Climate extremes, which are often critical for many development-related decisions, are much more difficult to project than mean trends. There is also a mismatch between the time and space scales of climate change projections and the information needs of development planners. For example, the primary sensitivity of development activities to climate is at a local scale (such as that of a watershed or a city), for which credible climate change projections are often lacking. ■

Box 1.

TRADE-OFFS BETWEEN CLIMATE CHANGE AND DEVELOPMENT

In certain cases, there are direct trade-offs between development priorities and the actions required to deal with climate change. Governments and donors confronting immediate challenges, such as poverty and inadequate infrastructure, have few incentives to divert resources to investments that are seen as not paying off until climate change impacts are full-blown.

Putting a real value on natural resources and deciding when not to develop coastal areas or hillsides may be seen as hampering development. At the project level, mainstreaming of adaptation may be perceived as complicating operating procedures or raising costs.

In addition, short-term economic benefits that often accrue to only a few in the community can crowd out longer-term considerations such as climate change. Shrimp farming, mangrove conversion and infrastructure development, for example, provide employment and boost incomes, but they may also reduce the future ability to adapt to the impact of climate change and increase the vulnerability of critical coastal systems.

How can climate change adaptation be better integrated in development?

Several opportunities exist for more effective integration of climate change adaptation within development activities. These include making climate change information more useful and easier to use, focusing more on implementing climate change and development strategies, and increasing co-ordination between development and climate change policies.

Making climate information more relevant and usable: Development practitioners need access to credible, context-specific climate information as a basis for decisions. This includes information on the cost and effectiveness of integrating adaptation measures within development planning. Perhaps even more fundamental is information on the likely impact of climate change and variability on particular development activities. While it would be naïve to call for a significant reduction in scientific uncertainty in climate model projections, more can be done to ensure that this uncertainty is made clear to development practitioners. Analysis of the costs and distributional aspects of adaptation could also assist sectoral decision makers in determining the degree to which they should integrate such responses within their core activities.

Developing and applying climate risk screening tools: In addition to improving the quality of climate information, tools and approaches are needed to assess the potential exposure of a broad range of development activities to climate risks and to prioritise responses. Also needed are more sophisticated screening tools at the project level, in order to identify the key variables of relevance to the project, how they are affected by climate change and what implications this has on the viability of the project. Field-testing such screening tools and using them in a wide range of project settings could greatly advance the integration of climate risks in development activities.

Using appropriate "entry points" for climate information: There is a need to identify the appropriate points at which to introduce climate change adaptation into development activities. Potential entry points include land use planning, disaster response strategies and infrastructure design. Environmental impact assessments could be another entry point for mainstreaming both climate change mitigation and adaptation. The implications of projects for greenhouse gas emissions could be included in checklists for such assessments. However, guidelines for environmental impact assessments would need to be broadened to include climate change impacts. Current guidelines consider only the impact of a project or activity on the environment, not the impact of the environment on the project. It is also important to incorporate climate change considerations in planning mechanisms and to ensure that the responsibility for co-ordination lies with appropriate implementation agencies. Furthermore, attention should be given not only to investment plans but also to legislation.

Shifting emphasis to implementation rather than developing new plans: In many instances, rather than requiring radically new responses, adaptation to climate change only reinforces the need to implement measures that already are, or should be, environmental or development priorities. Examples include water or energy conservation, forest protection and afforestation, flood control, building coastal embankments, dredging to improve river flow and protection of mangroves. Often, such measures have already been called for in national and sectoral planning documents but have not been successfully implemented. Reiterating these measures in elaborate climate change plans is unlikely to have much real effect unless barriers to effective implementation of the existing sectoral and development plans are confronted. Putting the spotlight on implementation, therefore, could put the focus on greater accountability in action on the ground.

Encouraging meaningful co-ordination and the sharing of good practices: Institutional mechanisms need to be developed to forge links between mainstreaming initiated under the international climate change regime and the risk management activities of national and sectoral planners. A corollary link could be between activities initiated to achieve development objectives, such as the Millennium Development Goals, and more bottom-up consideration of the impacts of climate change. Greater engagement of the private sector and local communities in mainstreaming efforts is also needed.

Another priority that has not received sufficient attention is transboundary and regional co-ordination. Most climate change action and adaptation plans are at the national level, although many of the impacts of climate change cut across national boundaries. Meaningful integration of a range of climate risks, from flood control to dry season flows to glacial lake hazards, would require greater co-ordination on data collection, monitoring and policies at the regional level. Finally, operational guidance on comprehensive climate risk management in development is needed to facilitate policy coherence, allow for joint building of experience and promote sharing of tools and experiences within and among governments and development co-operation agencies. ■

**For further
information**

For more information about the links between climate change and development, and the OECD's work in this area, please contact:

Shardul Agrawala, tel.: +33 1 45 24 16 65, e-mail: shardul.agrawala@oecd.org;

or Remy Paris, tel.: +33 1 45 24 17 46, e-mail: remy.paris@oecd.org.

Or visit: www.oecd.org/env/cc/bridge.

The OECD Policy Briefs are available on the OECD's Internet site:
www.oecd.org/publications/Policybriefs



ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

For further reading

- OECD (2005), **Bridge Over Troubled Waters: Linking Climate Change and Development**, OECD, Paris, ISBN 92-64-01275-3, 154 p., € 26.
- OECD (2004), **The Benefits of Climate Change Policies: Analytical and Framework Issues**, OECD, Paris, ISBN 92-6410831-9, 323 p., € 90.
- Inter Agency Report (2003), **Poverty and Climate Change: Reducing the Vulnerability of the Poor through Adaptation**, by AfDB, ADB, DFID (UK), BMZ (Germany), DGIS (The Netherlands), OECD, UNDP, UNEP, and the World Bank.

OECD publications can be purchased from our online bookshop:
www.oecdbookshop.org

OECD publications and statistical databases are also available via our online library:
www.SourceOECD.org

Where to contact us?

OECD HEADQUARTERS
2, rue André-Pascal
75775 PARIS Cedex 16
Tel.: (33) 01 45 24 81 67
Fax: (33) 01 45 24 19 50
E-mail: sales@oecd.org
Internet: www.oecd.org

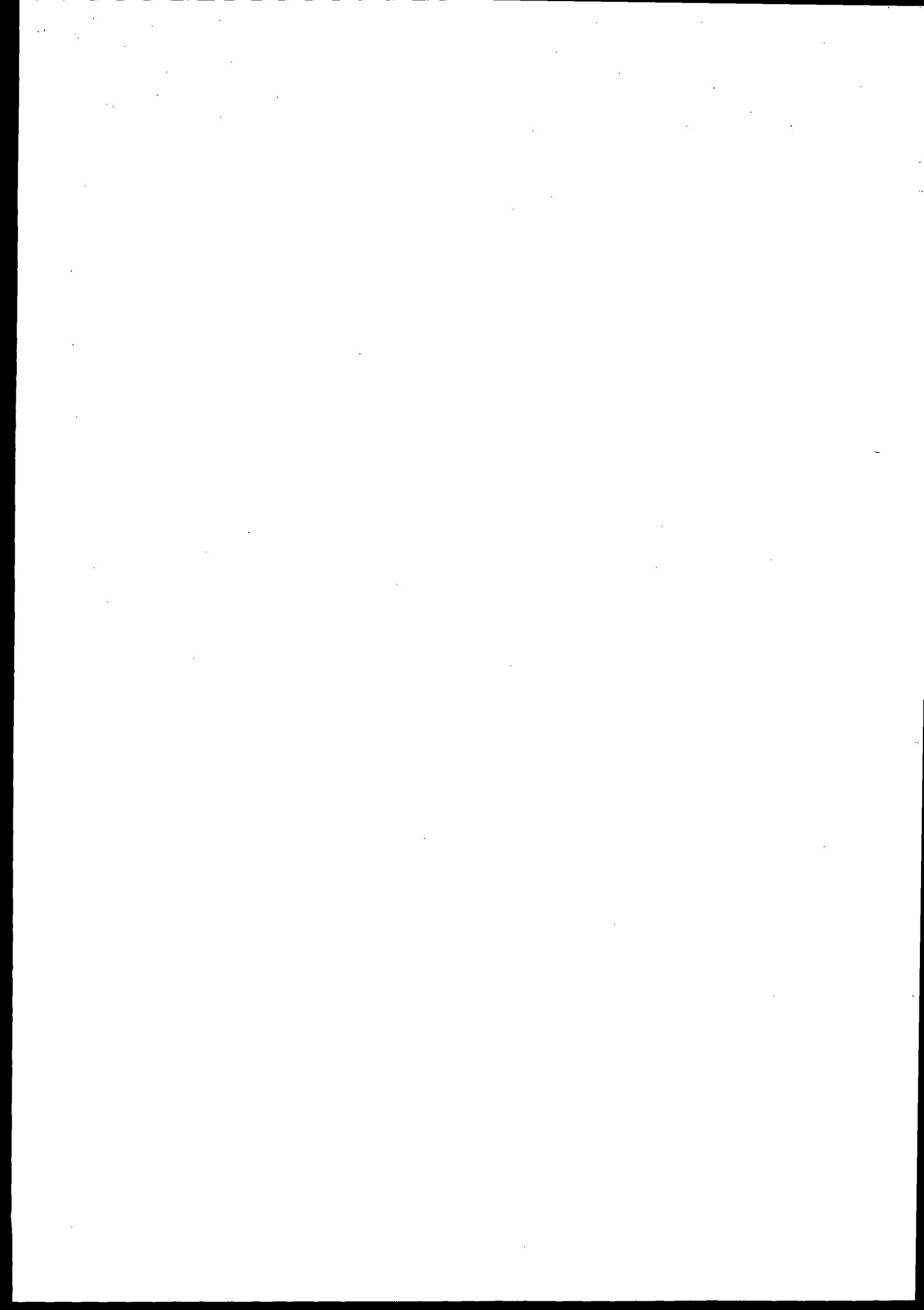
GERMANY
OECD Berlin Centre
Schumannstrasse 10
D-10117 BERLIN
Tel.: (49-30) 288 8353
Fax: (49-30) 288 83545
E-mail:
berlin.contact@oecd.org
Internet:
www.oecd.org/deutschland

JAPAN
OECD Tokyo Centre
Nippon Press Center Bldg
2-2-1 Uchisaiwaicho,
Chiyoda-ku
TOKYO 100-0011
Tel.: (81-3) 5532 0021
Fax: (81-3) 5532 0035
E-mail: center@oecdtokyo.org
Internet: www.oecdtokyo.org

MEXICO
OECD Mexico Centre
Av. Presidente Mazaryk 526
Colonia: Polanco
C.P. 11560 MEXICO, D.F.
Tel.: (00.52.55) 9138 6233
Fax: (00.52.55) 5780 0480
E-mail:
mexico.contact@oecd.org
Internet:
www.oedemexico.org.mx

UNITED STATES
OECD Washington Center
2001 L Street N.W., Suite 650
WASHINGTON DC. 20036-4922
Tel.: (1-202) 785 6323
Fax: (1-202) 785 0350
E-mail:
washington.contact@oecd.org
Internet: www.oecdwash.org
Toll free: (1-800) 456 6323

The OECD Policy Briefs are prepared by the Public Affairs Division, Public Affairs and Communications Directorate. They are published under the responsibility of the Secretary-General.





Biofuels for Transport: Policies and Possibilities

What are bioenergy and biofuels?

Why do governments want to promote biofuels for transport?

How are governments promoting biofuels?

Can biofuels live up to public expectations?

Where do we go from here – how can policies help?

For further information

For further reading

Where to contact us?

Introduction

Bioenergy and biofuels are of growing public and private interest at a time of rapidly rising world energy demand and high oil prices. Amid concerns over climate change, they are also increasingly under the spotlight as a “cleaner” alternative to fossil fuels.

But are biofuels for transport a viable alternative to power our cars, trucks and buses? Do they deliver the expected environmental benefits? And what role should public policy play in their development?

Biofuels are liquid fuels for road vehicles and include bioethanol made from crops such as cereals and sugar cane and biodiesel originating mainly from rapeseed-, palm- and soya oil. Higher demand for these crops to supply the biofuels industry is good news for farmers who produce them, but perhaps not for intermediate and final consumers who will face higher feed costs and increased food bills. There are also questions as to whether higher demand will cause new land to be given over to biofuel crops, with a negative impact on the environment. Research is looking for ways to produce fuels from other crop sources, but the required technology is still some years away.

So although using biofuels to partly replace fossil fuels is widely assumed to deliver a number of energy security, environmental, and economic benefits, these are actually smaller than expected and unlikely to be delivered by current policies. Additional research on the economics of biofuels and related agricultural markets, on the environmental costs and benefits of biofuel production using different feedstocks, and on a wider range of energy policy alternatives – including those that might accelerate the scientific and technological development of second generation biofuels – is needed.

This *Policy Brief*, jointly produced by the OECD and the IEA, looks at the current situation with biofuels in road transport, and how governments can balance all these elements when crafting policies for energy and biofuels. ■

What are bioenergy and biofuels?

Bioenergy refers to different forms of renewable energy produced from biomass. Biomass comprises any organic material of plant or animal origin, derived from agricultural and forestry production and resulting by-products, and from the renewable portion of industrial and urban wastes, used as feedstock for producing bioenergy and other non-food products. Bioenergy includes biofuels, biopower, bioheat, and (rural) off-grid energy (such as firewood). Biofuels are mostly in liquid form and are used to power combustion engines in road transport. Today two main types can be distinguished: bioethanol and biodiesel. With today's first generation technologies, bioethanol is mostly produced from sugar cane, cereals and sugar beet; biodiesel is derived from any source of fatty acids, such as soybean, rapeseed, palm oil and other vegetable oils but also from sources such as animal fats or used frying oils.

Technologies are being developed that make it possible to use cellulosic material, such as wood and plant stems and leaves, to produce so-called "second generation" bioethanol and to enable the use of any type of biomass to produce synthetic fuels. While at present such technologies are prohibitively expensive for transport use, there is considerable potential for their commercial application over the medium term. ■

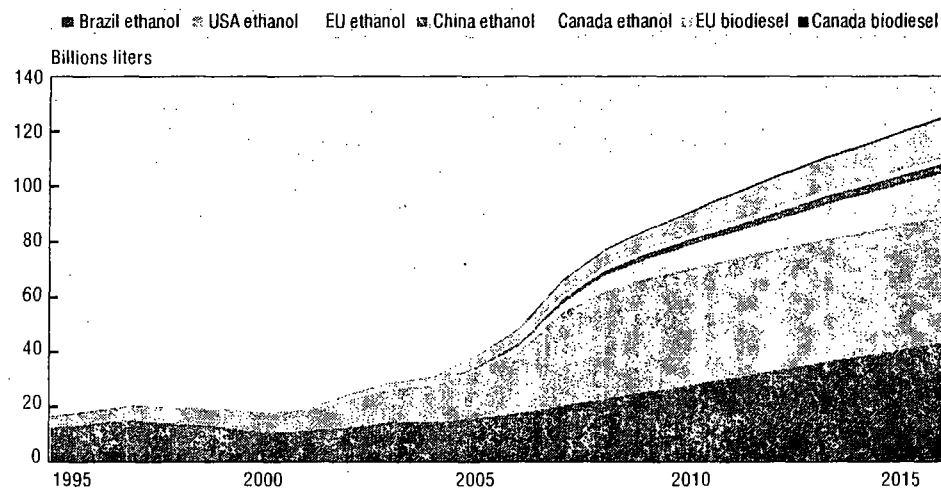
Why do governments want to promote biofuels for transport?

The production of biofuels is growing rapidly in many countries. In OECD countries, this growth is most evident in the United States, the European Union and Canada. Outside the OECD area, the main producer by far is Brazil, but production is also increasing – albeit from a very low base – in China, as well as in a number of other countries in South and East Asia (see Figure 1).

Public and private interest in the area of biofuels is also stronger than it has ever been, for a number of reasons.

First, continued rapid economic expansion in Asia has led to increased oil demand and, combined with limited expansion in oil refinery capacity worldwide, has driven up energy prices. At the same time, the notion is increasingly taking hold that fossil fuel supplies are finite and that other forms of energy need to be

Figure 1.
BIOFUEL PRODUCTION IN
SELECTED COUNTRIES –
PROJECTIONS TO 2016



Source: OECD-FAO Agricultural Outlook 2007-2016.

developed. Bioenergy is one of the alternatives and its development is seen as enhancing energy security in oil importing countries.

Second, with growing evidence of global climate change, it is becoming increasingly urgent to develop sources of energy that have lower greenhouse gas emissions than fossil sources. Bioenergy is seen by many as a "clean" form of energy: the amount of CO₂ released when it is burned is generally equivalent to the amount of CO₂ captured during the growth of the crop that produced it.

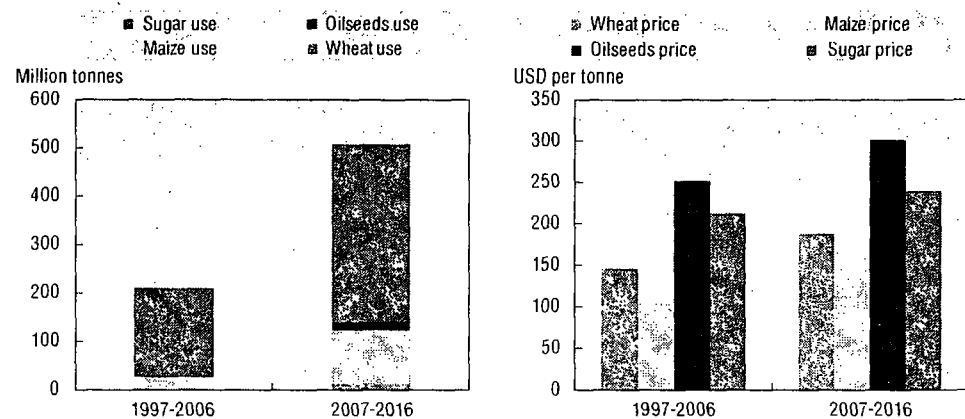
Third, with current technologies, biofuels are mostly produced from crops such as sugar, cereals, and oilseeds. Demand for these crops is thus likely to grow in line with the expected increase in demand for biofuels. Consequently, prices of these crops are expected to remain above their average values that prevailed during the past decade with positive impacts on overall farm income levels and possibly beneficial spin-offs for many rural communities (see Figure 2).

Fourth, bioenergy production is seen as a potential driver for economic growth in developing countries. In some countries, biofuel production could reduce dependence on imported fossil energy. Also, farmers in these countries could benefit from the expected higher crop prices, which could help raise rural incomes and aid poverty reduction. ■

How are governments promoting biofuels?

Depending on the country, the choice of crop and how it is grown, the technology used to turn it into energy and the type of biofuel produced, production costs vary considerably. Biofuel production in OECD countries is currently supported to the tune of USD 13 to 15 billion per year (OECD/ITF, 2007). At the moment, Brazil is the only major country producing biofuel from crops on an economically viable basis. Still, there is government support in Brazil: biofuels are exempted from the oil fuel excise tax and biofuel producers are exempted from a social tax on revenues. These subsidies totalled USD 1 billion in 2006. In addition, Brazil has had blending requirements for many years. Biofuel production could be economically viable in some less developed countries with a favourable climate and low-cost inputs, but there is no significant output from these countries at the moment.

Figure 2.
BIOFUEL PRODUCTION:
CROP USE AND PRICES



Source: OECD-FAO Agricultural Outlook 2007-2016.

Production costs for ethanol have ranged in recent years from USD 0.35-0.50 per litre of gasoline equivalent (GE) if produced from sugar cane, and from USD 0.45 to more than USD 1 per litre of GE for grain- or sugar beet-based fuels (the energy content of ethanol is about one third lower than that of gasoline). For biodiesel, the cheapest source is animal fats, with total production costs at around USD 0.40-0.55 per litre of diesel equivalent (DE), while biodiesel based on vegetable oil is produced for about USD 0.70-1.00 per litre of DE. The costs for "second generation" technologies, such as ethanol produced from ligno-cellulosic material from plants or synthetic biodiesel currently range between USD 0.80-1.10 per litre of GE and DE.

These costs for biofuels compare to gasoline and diesel prices – net of taxes – of between USD 0.35 and USD 0.60 per litre in recent years. Consequently, at crude oil prices of about USD 60 per barrel, public support is required in the order of USD 0.15-0.55 per litre of GE or DE in most OECD countries to make biofuel production based on agricultural crops profitable. With crude oil prices having recently reached levels around USD 90 per barrel, net gasoline and diesel prices have increased to above USD 0.70 per litre, but as crop prices have increased sharply at the same time, the basic economics of biofuel production have not changed significantly.

The most commonly used government policies to stimulate biofuel production are financial incentives, such as tax credits or concessions, and import quotas and tariffs; to enhance their use, quantitative blending requirements of ethanol and bio-diesel with fossil fuels are often introduced. These measures represent the bulk of the support, which is further provided through a variety of other measures that affect virtually all stages of the supply chain.

As summarised in Table 1, biofuels production is stimulated through specific and general support programmes. For instance, the costs of converting and distributing biofuels are reduced through capital grants, loan guarantees, subsidised loans, income tax concessions and excise and value-added tax exemptions. Also, import tariffs and other trade restrictions effectively limit competition from internationally competitive sources, thereby further stimulating domestic production of biofuels. Finally, biofuel use is stimulated through

Table 1.
BASIC CHARACTERISTICS
OF BIOFUEL POLICIES

Form of policy	Economic agent or activity affected directly by the policy			
	Biomass production	Biofuel production	Biofuel use	Biofuel trade
Quantitative requirements			• Blending obligation	• Import quota
Qualitative requirements	• Land set-aside obligations with permission to produce energy crops	• Fuel standards (e.g. oxygen content)		• Fuel standards
Financial incentive	• Energy crop payment • General agricultural support measures	• Investment aid / tax credits for production plants • Loan subsidies • Public research in conversion processes	• Fuel tax concessions • Sales tax concessions for biofuel compatible vehicles • Public research in engine development	• Import tariffs

requirements for petrol stations to sell certain amounts of renewable fuels, mandatory blending requirements, and subsidies on the purchase of biofuel-compatible equipment, such as flex-fuel vehicles. ■

Can biofuels live up to public expectations?

Much is expected of biofuels by many governments around the world. But at present, biofuels can only make a modest potential contribution to addressing public expectations, for a number of reasons.

First, the potential for biofuels to replace fossil energy is relatively small and the scope to improve energy security in this way is limited. The crops used in present-day biofuel production have a very low energy density compared with fossil energy sources. In other words, large amounts of agricultural land would be needed to replace a moderate amount of fossil energy. So biofuel production will be limited by the amount of land available. This partly explains the International Energy Agency's (IEA) estimate that by 2030 biofuels may account for only 4% to 7% of road transport fuels. According to the IEA, the amount of arable land needed for biofuels to meet just 4% of the world's transport demand in 2030 is equal to more than that of France and Spain (IEA, 2006). The energy security argument also has to be seen in a context of highly variable crop prices which could have important impacts on the profitability of biofuel production from one year to another.

Second, assessing the environmental impact of biofuel production in the northern hemisphere is not as simple as is often suggested. Life cycle analyses (LCAs) that take into account the entire production chain suggest that there is potential for fossil energy savings through the use of first-generation biofuels. However, these savings are relatively limited and vary between different situations in different locations. For ethanol based on cereals and sugar beet, fossil energy used for its production, including for crop production, transport and conversion would represent 60 to 80% of the energy contained in the final fuel. For biodiesel from animal fats and vegetable oils, the fossil energy needed still represents up to 50% of the final fuel energy. In contrast, the fossil energy used for producing ethanol based on sugar cane account for only 10% or less of the energy in the final product. While GHG emissions from feedstock production vary importantly with farm practice and soil type, savings in GHG emissions are lower for cereal and beet-based ethanol than for cane-based ethanol and biodiesel.

In addition to the limited scope for savings in energy and GHG emissions from most first-generation biofuels, there may also be increased environmental pressures. As growing demand from increased biofuel production raises prices for cereals, oilseeds and sugar, this may result in fragile land being brought back into production or currently forested land being cleared. This is already becoming an issue in certain countries in South-East Asia where the expansion of palm oil plantations largely comes at the expense of existing forest area and biodiversity. Also, increased demand for biofuels may lead to an increase in more intensive and single-cropping practices, reducing water levels and damaging soil quality, and bringing increased quantities of pesticides and fertilizers into the environment.

Against a background of uncertain environmental impacts and considering that the contributions of first-generation technologies to energy savings and GHG abatement are relatively modest in most cases, the costs for achieving any goals

governments might have to reduce CO₂ emissions through the increased use of biofuels are high. It is estimated that the costs per ton of CO₂ that is saved through the production and use of biofuels are in the order of USD 500 (about EUR 350), and even higher in many cases. This compares to prices for emission rights in the European Emission Trading Scheme (ETS) peaking at around EUR 30 per ton in March 2006, and currently hovering around EUR 24 per ton for 2008 futures (Cozijnsen, 2007).

Third, the results will be mixed for farmers. Crop farmers will certainly benefit from the higher prices coming from increased demand for biofuels. But with contemporary technologies and current public support policies these are mostly cereal and oilseed producers in OECD countries. Livestock producers, whether inside or outside the OECD area, who use the same cereals and oilseeds as animal feed do not benefit from this support. Hence, they will face higher costs and reduced incomes despite lower protein feed prices due to the additional supply of feed by-products from biofuel production. Also, the industrial demand for biofuels crops may be less price sensitive than traditional food and feed demand, which would add to price instability in world cereal markets.

Many OECD countries, while promoting biofuel production and use, also support fossil fuel use in agriculture – to the tune of some USD 8.6 billion, or about EUR 6 billion, a year. In addition to the high public cost, such measures are inconsistent with apparent environmental and energy diversification goals. Nevertheless, biofuels subsidies are much higher per litre (as high as 50% of the total cost of production) when compared to subsidies for fossil fuels which are in the order of less than 5% of the consumer price.

Fourth, food consumers will face higher prices resulting from increased raw commodity prices. In most OECD countries where costs of agricultural raw materials are only a small part in the final costs of food in the shops and where food represents only a small share of total expenditures, this issue should not be over-emphasised. But for poorer consumers in many developing countries, even a modest price increase could make the difference between being able to buy food or not.

Finally, the main ethanol and biodiesel producing countries in the OECD have implemented measures to limit imports of biofuels. At present, tariffs on ethanol imports are EUR 0.192 per litre in the European Union and 2.5% of the import value plus USD 0.143 cents per litre in the United States. Other countries also apply tariffs on ethanol imports as well as on biodiesel trade. Such border measures distort markets: they raise energy prices for consumers in OECD countries and limit the opportunities for development of potentially more competitive producers outside the OECD area. Given the larger potential for energy and GHG savings from biofuels produced in the southern hemisphere, such trade measures are also inconsistent with the objective of reducing fossil energy use and GHG emissions. ■

Where do we go from here – how can policies help?

It is clear that there is strong public interest in biofuels and that policies as well as markets will influence their development. The appropriate choice of policy measures will differ across countries – there is no “one size fits all” solution. Governments seldom have all the information they need to make fully informed policy decisions, and this is also true in the area of biofuels. Even so, and while

further research is being undertaken, a number of *preliminary* recommendations can be made that are based on accepted principles of good policy formulation (OECD, 2002).

- **Focus efforts on policies to encourage reduced energy demand and GHG emissions.** Measures such as more fuel efficient vehicles offer large potential benefits and would be more cost efficient than replacing fossil fuels with biofuels (OECD/ITF, 2007). Also, taxes on the carbon content of all fuels would be more cost effective than subsidies or targets for biofuel use as they would directly target CO₂ emissions.
- **Encourage investment in research and development to accelerate the introduction of "second generation" biofuels and biorefineries that are able to produce a range of products, including but not restricted to biofuels.** Such investments offer more promise than trade barriers and support for domestic production.
- **Explore a range of alternative sources of energy, including bioenergy,** that can be used to generate heat and power more efficiently and cheaply than through the conversion of feedstock to biofuels.
- **Provide for freer trade in both biofuels and their raw materials.** This would provide an important incentive to improve the economic efficiency of biofuel markets.
- **Where governments consider that support for production of biofuel from first generation feedstocks is warranted, any such support needs to be linked to performance and desired outcomes,** such as a specific reduction in greenhouse gas emissions.

These recommendations are preliminary and are of a general nature. Specific actions need to be considered in light of the diverse conditions and objectives in different countries. In addition, further insights on the range of issues outlined above could contribute to more fully informed policy decisions in the future. The OECD and the IEA are currently undertaking additional analyses and will provide a detailed economic assessment of biofuels and related policies in mid-2008. ■

For further information

For more information about the OECD's work on biofuels, please contact Loek Boonekamp, tel.: +33 1 45 24 95 14, e-mail: loek.boonekamp@oecd.org or Martin von Lampe, tel.: +33 1 45 24 96 94, e-mail: martin.vonlampe@oecd.org or visit www.oecd.org/tad.

For more information about the IEA's work on energy markets, please contact Teresa Malyshev, tel.: +33 1 40 57 67 12, e-mail: teresa.malyshev@iea.org or visit www.iea.org.

The OECD Policy Briefs are available on the OECD's Internet site:
www.oecd.org/publications/Policybriefs



ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

For further reading

OECD (2007), **OECD-FAO Agricultural Outlook 2007-2016**, ISBN 978-92-64-02509-7, € 60, 230 pages.

OECD/ITF Roundtable (2007), **Biofuels: linking support to performance**, summary and conclusions available at www.cemt.org/JTRC/EconomicResearch/RoundTables.

Martin von Lampe (2007), **Economics and Agricultural Market Impacts of Growing Biofuel Production**, Agrarwirtschaft, Heft 5/6.

OECD (2006), **Agricultural Market Impacts of the Future Growth in the Production of Biofuels**, available at www.oecd.org/dataoecd/58/62/36074135.pdf.

IEA (2006), **World Energy Outlook 2006**, IEA/OECD, ISBN 9789264109896, € 150, 600 pages.

OECD (2002), **Agricultural Policies in OECD Countries: A Positive Reform Agenda**, ISBN 978-92-64-19967-5, 40 pages.

Jos Cozijnsen, **Analysis of the EU CO₂ Market**, www.co2prices.eu, accessed 26 November 2007.

OECD publications can be purchased from our online bookshop:
www.oecd.org/bookshop

OECD publications and statistical databases are also available via our online library:
www.SourceOECD.org

Where to contact us?

OECD HEADQUARTERS

2, rue André-Pascal
75775 PARIS Cedex 16
Tel.: (33) 01 45 24 81 67
Fax: (33) 01 45 24 19 50
E-mail: sales@oecd.org
Internet: www.oecd.org

GERMANY

OECD Berlin Centre
Schumannstrasse 10
D-10117 BERLIN
Tel.: (49-30) 288 8353
Fax: (49-30) 288 83545
E-mail:
berlin.contact@oecd.org
Internet:
www.oecd.org/deutschland

JAPAN

OECD Tokyo Centre
Nippon Press Center Bldg
2-2-1 Uchisaiwaicho,
Chiyoda-ku
TOKYO 100-0011
Tel.: (81-3) 5532 0021
Fax: (81-3) 5532 0035
E-mail: center@oecd-tokyo.org
Internet: www.oecd-tokyo.org

MEXICO

OECD Mexico Centre
Av. Presidente Mazaryk 526
Colonia: Polanco
C.P. 11560 MEXICO, D.F.
Tel.: (00.52.55) 9138 6233
Fax: (00.52.55) 5280 0480
E-mail:
mexico.contact@oecd.org
Internet:
www.oecd.org/centrodemexico

UNITED STATES

OECD Washington Center
2001 L Street N.W., Suite 650
WASHINGTON DC. 20036-4922
Tel.: (1-202) 785 6323
Fax: (1-202) 785 0350
E-mail:
washington.contact@oecd.org
Internet: www.oecd-wash.org
Toll free: (1-800) 456 6323

The OECD Policy Briefs are prepared by the Public Affairs Division, Public Affairs and Communications Directorate. They are published under the responsibility of the Secretary-General.



Nuclear Energy Today

Introduction

Can nuclear energy help make development sustainable?

How safe is nuclear energy?

How best to deal with radioactive waste?

What is the future of nuclear energy?

For further information

For further reading

Introduction

Nuclear energy has been used to produce electricity for more than half a century. It currently provides about 17% of the world's supply and 23% in OECD countries.

The oil crisis of the early 1970s provoked a surge in nuclear power plant orders and construction, but as oil prices stabilised and even dropped, and enough electricity generating plants came into service to meet demand, orders tailed off. Accidents at Three Mile Island in the United States (1979) and at Chernobyl in Ukraine (1986) also raised serious questions in the public mind about nuclear safety.

Now nuclear energy is back in the spotlight as many countries reassess their energy policies in the light of concerns about future reliance on fossil fuels and ageing energy generation facilities. Oil, coal and gas currently provide more than two-thirds of the world's energy and electricity, but also produce the greenhouse gases largely responsible for global warming. At the same time, world energy demand is expected to rise sharply in the next 50 years, presenting all societies worldwide with a real challenge: how to provide the energy needed to fuel economic growth and improve social development while simultaneously addressing environmental protection issues. Recent oil price hikes, blackouts in North America and Europe and severe weather events have also focussed attention on issues such as long-term price stability, the security of energy supply and sustainable development.

The OECD Nuclear Energy Agency (NEA) has worked in these areas for more than 40 years, bringing together world specialists in every field to develop scientific and technical analyses that provide solid ground on which policymakers can establish nuclear and energy policies.

This Policy Brief looks at the current situation of nuclear energy, the prospects for the future and the policy challenges for governments. ■

The NEA is a semi-autonomous body within the OECD. It consists of 28 OECD member countries. The NEA's mission is to help its member countries to maintain and further develop, through international co-operation, the scientific, technological and legal bases required for a safe, environmentally friendly and economical use of nuclear energy for peaceful purposes. The NEA also provides authoritative assessments and forges common understandings on key issues, as input to government decisions on nuclear energy policy and to broader OECD policy analyses in areas such as energy and sustainable development. The NEA is an objective and non-promotional international instrument to advance co-operation in the safe and economic use of nuclear power among the most developed countries. ■

Can nuclear energy help make development sustainable?

Energy services are critical to economic development and prosperity. However, as energy use continues to grow, its effect on human health and the environment have to be controlled, alleviated or mitigated in order to achieve sustainable development goals. Current technologies for providing energy are increasingly viewed as unsustainable, either because supplies may be exhausted or because they produce greenhouse gases. Nuclear energy has certain clear advantages in that it produces heat and electricity without emitting carbon-dioxide into the atmosphere at the power plant level, and fuel supplies are not in danger of being exhausted.

Three "pillars" of sustainable development are commonly identified. These are: economic, environmental and social considerations.

On the *economic* front, the ability to provide reliable, low-cost electricity is an important aspect of sustainable development. Once a nuclear power plant is built, the electricity generated is often cheaper than many other generating methods. This is because the plants have a long life and ongoing operating and maintenance costs are low. However, the initial costs of building plants, conforming to regulations, decommissioning the plant at the end of its useful lifetime and ensuring long-term storage of waste is higher than for other technologies. Nevertheless, in most countries nuclear electricity generation is competitive with other technologies. New, more cost-effective designs, improved construction methods and multiple unit construction are all means to reduce the investment cost.

For plants powered by natural gas or coal, the initial investment is lower but fuel costs are higher and fluctuate unpredictably. Renewable sources of energy, such as wind and hydropower, are similar to nuclear energy in having high investment and low production costs per unit of power produced. However, renewable sources are currently available only on a small scale and typically provide intermittent, rather than baseload electricity supply.

Fossil fuel energy already bears some of the costs for reducing its emissions to air and water, but a considerable part of the waste goes into the atmosphere, imposing costs on the community that are not reflected in the price of its electricity. On the other hand, the costs of disposing of the high-level radioactive waste and decommissioning the facilities are already included in the price of the electricity charged to the consumer.

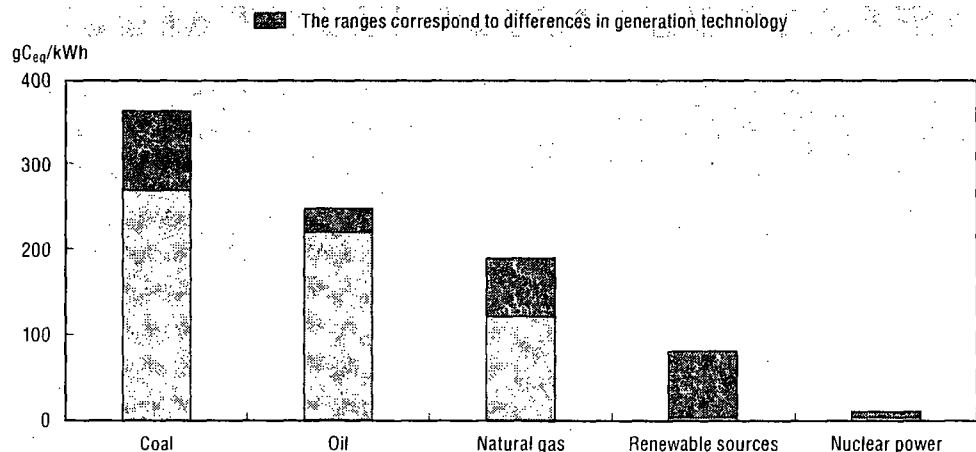
The economic competitiveness of nuclear power might be significantly increased if, for example, a "carbon tax" was imposed on greenhouse gas emissions by electricity producers.

The economic dimension in each country is also heavily influenced by the availability of natural resources. Countries in the Middle East and the Russian Federation hold 70% of the world's dwindling reserves of oil and gas. Conversely, OECD countries produce almost 55% of the world's uranium, and have 40% of the estimated uranium resources – resources which at current rates of use are estimated to be enough to provide energy for roughly 100 years, even without reprocessing and recycling usable fuel materials or accounting for discoveries of additional resources. Fuel costs for the nuclear reactors currently in service make up only 20% of the total cost of the electricity produced. Doubling the price of the uranium used to make the fuel would have only a minimal impact on the price of nuclear-produced electricity. Doubling the price of natural gas would see electricity prices from natural gas power plants rise by some 70%.

In *environmental* terms, nuclear power is one of the few energy sources that emit virtually no greenhouse gases. The Kyoto Protocol emission targets call for total annual emissions in OECD countries to be reduced by about 700 million tonnes of carbon dioxide by 2008-2012, relative to 1990 levels. Without nuclear energy, OECD power plant emissions of carbon dioxide would be about one-third higher than they are at present. This is an annual saving of some 1 200 million tonnes of carbon dioxide, or about 10% of total CO₂ emissions from energy use in the OECD. Energy sources that do not pollute because of combustion gases, such as nuclear energy and renewable energy sources, will be of vital importance as regards the reduction of emissions.

For nuclear power to make a very large contribution to reducing global warming, a large expansion in nuclear generating capacity would be necessary. Such an expansion using existing technology would bring a corresponding rise in nuclear waste generation. If nuclear energy is to become an effective and acceptable option, advanced reactor technologies

Figure 1:
GREENHOUSE GAS
EMISSIONS FROM
ELECTRICITY GENERATION
BY DIFFERENT SOURCES



Source: OECD/NEA (2001), NEA News 2001 – No. 19.1.

and recycling fuel strategies could be very helpful in alleviating this increase, beyond other advantages in economics, safety and non-proliferation.

On the social front, maintaining and improving the technical and intellectual infrastructure to support nuclear energy provides numerous spin-off benefits for society. Nuclear energy has historically played a very important role in the development of new materials, techniques and skills. These have been applied in other sectors such as medicine, manufacturing and public health and agriculture, with consequent economic benefit to all.

At the same time, all energy technologies have a tendency to create social concern, even conflict. Coal has its own profound history of conflict and social division, as, on an international scale, has oil. Some fear that increasing numbers of wind turbines will blight the landscape, in some cases cause noise pollution and pose an environmental hazard to birdlife. Hydropower presents particular environmental and social challenges. In the case of nuclear energy, this concern has focused on questions of safety, nuclear proliferation and waste disposal. ■

How safe is nuclear energy?

From an industrial safety viewpoint, in terms of injuries to its workforce, the nuclear industry has one of the best safety records. For example, in 2003 the worldwide industrial safety accident rate resulting in days off work at nuclear power plants was 0.28 accidents per 100 full-time workers. This can be compared with the US national average of 2.6 accidents per 100 full-time workers in 2003.

Nevertheless, an accident at a nuclear power plant has a greater potential to do harm than accidents in other types of industrial installation, since the fission process produces a major concentration of radioactivity. Very high levels of safety have therefore always been considered essential to its implementation.

Nuclear safety is provided by the ability of the installation's systems and its personnel to prevent accidents from occurring, and should one occur, to mitigate its consequences as much as possible. This can be achieved through a number of complementary and overlapping factors, referred to as "defence-in-depth". These defences encompass factors such as: care in selecting sites, robust design, high-quality construction; multiple levels of protection, fault prevention and an appropriate containment building; fostering a "safety culture" among all staff; and inspection by an independent regulatory authority.

Responsibility for nuclear safety is foremost national, with each country responsible for the safety of nuclear power plants within its borders. However, international co-operation, including organisations such as the NEA and the International Atomic Energy Agency (IAEA), have always made a fundamental contribution to developing relevant concepts and spreading good practice. For example, the Convention on Nuclear Safety under the auspices of the IAEA, to which all States operating nuclear power plants are signatories, defines internationally accepted principles and obligations relating to the basic elements of nuclear safety.

Despite the very high levels of safety maintained in all radiological activity, accidents involving the exposure of workers and of the public can occur, and can possibly (like Chernobyl) have international scope. The international community has therefore developed detailed programmes and approaches for nuclear emergency preparedness and nuclear accident management designed to minimise the consequences of any such event. All nuclear installations around the world maintain such plans and structures in conjunction with local and national authorities. Regular emergency exercises are conducted at both the national and international level.

Nuclear safety should not be confused with nuclear security. The physical protection of nuclear material and nuclear facilities – including against possible malicious acts – has always been taken seriously by OECD member countries and considerable work is being done to maximise security in this respect. Moreover, since 9/11 additional studies to ensure that nuclear installations are secure have been performed and enhanced security measures and safeguards have been adopted. Preventing the proliferation of nuclear weapons also remains a priority; notably through the IAEA's system of safeguards and verifications. ■

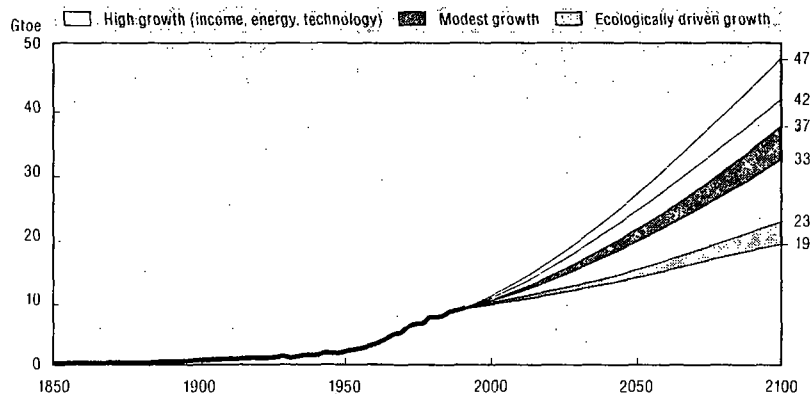
How best to deal with radioactive waste?

Several industrial and medical processes, such as particle accelerators, produce radioactive waste, but nuclear electricity production is the most important because of the quantity produced and its long radioactive life.

Generating electricity from a typical 1 000 MW(e) nuclear power station produces approximately 300 cubic metres of low and intermediate-level waste per year and some 30 tonnes of high level, solid, packed waste per year. Nuclear power generation facilities produce about 200 000 cubic metres of low-level waste and intermediate-level waste and 10 000 cubic metres of high-level waste, including spent fuel designated as waste each year worldwide. By comparison, the pre-enlargement members of the European Union alone produced on average about 10 million cubic metres of toxic industrial waste per year.

Disposal of low-level waste and most intermediate-level waste is so well-developed that some sites have already been filled and closed.

**Figure 2:
PROJECTED ENERGY
DEMAND TO 2100**



Source: OECD/NEA (2003), *Nuclear Energy Today*.

But solutions for long-lived high-level waste and spent nuclear fuel have proved more elusive.

Spent nuclear fuel requires long-term isolation from the human environment while its radioactivity decreases. The current preferred option for eventual disposal of high-level waste is emplacement in repositories deep underground. In general, the geological disposal concept involves treating the waste in order to achieve a suitable physical and chemical form, packaging it inside long-lived engineered barriers placed deep underground, and sealing these facilities. In these underground surroundings, conditions remain stable over the long periods needed to allow the radioactivity to decay to a sufficiently low level.

The scientific and technical community has confidence that removing highly radioactive waste from the human environment by disposal in such deep geological repositories is ethically and environmentally sound. However, with the exception of the USA and Finland, OECD countries have yet to make a decision on where to site their high-level waste repositories.

Because of the comparatively small volumes of both high- and low-level radioactive waste and the need for long-term isolation, centralised storage and disposal is desirable. This in turn necessitates transport to the chosen localities. These repositories are also the final destination for spent nuclear fuel after its initial storage and cooling. Radioactive materials – including those used in industrial and medical applications – also need to be delivered from their supplier to their eventual user. All such transport must be carried out in accordance with the relevant national and internationally agreed safety standards. Numerous shipments of all forms of radioactive materials and waste take place each year and incidents are extremely rare. Since 1971 there have been over 20 000 shipments of spent nuclear fuel and high-level waste worldwide using trains, trucks and ships travelling a total of over 30 million kilometres. None have been involved in an accident that has breached a container or released radioactivity into the environment. ■

What is the future of nuclear energy?

Increasing world energy demand requires decisions on whether or not to build new nuclear power plants. At the same time, nuclear reactor design is changing; while nuclear energy is now a mature technology, there is still scope for technical and economic progress. Concepts under investigation include liquid metal reactors, high-temperature reactors, reactors that use thorium as fuel, and improved recycling technologies to better utilise uranium and plutonium resources. These advanced technologies offer the promise of greatly improving the sustainability of nuclear energy. The ten countries and Euratom that have joined together to form the Generation IV International Forum plan to develop and demonstrate one or more new nuclear energy systems offering advantages in the areas of economics, safety and sustainability. The new design could be deployed commercially by 2020-2030. The NEA serves as Technical Secretariat to the Generation IV International Forum.

So far, nuclear energy has been used almost exclusively to produce electricity. But there are other potential uses. A great deal of research is currently taking

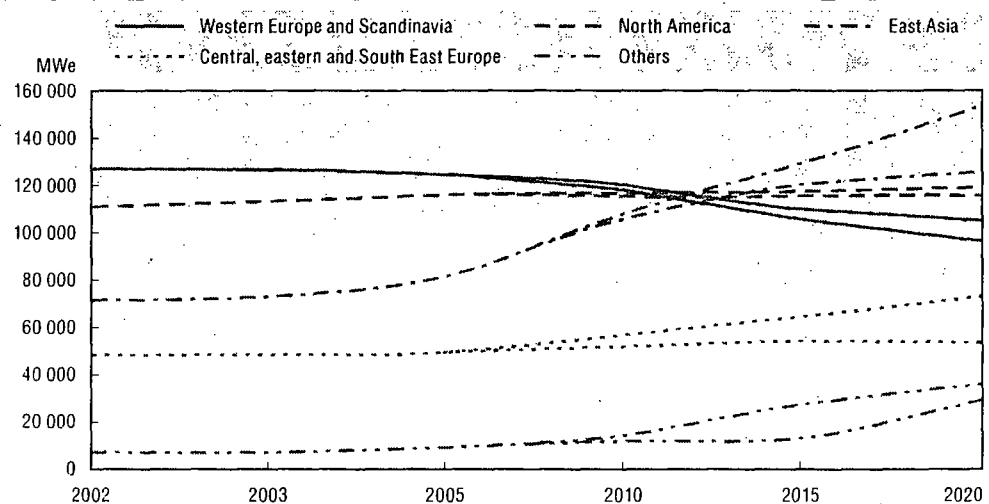
place on the possibility of hydrogen replacing carbon fuels used in motor vehicles. If this were successful, demand for hydrogen would expand dramatically. However, hydrogen production currently involves the use of natural gas, itself a carbon-emitter. More economic methods for producing hydrogen directly from water without using carbon fuels are required. Nuclear energy could therefore become an important "sustainable" source of hydrogen. Research and development into the use of nuclear energy to produce hydrogen is being conducted in a number of countries and through several international agencies, including the NEA. Other non-electricity applications of nuclear energy with potential for expansion include desalinating seawater and using the heat generated in nuclear reactors to produce hot water or steam for industrial or residential heating. Radioactive isotopes are very widely used, particularly in medicine, industry, agriculture, food processing and research. So far they have principally been produced as by-products of research activity, but a number of purpose-built isotope production reactors are now planned or under construction.

Nuclear energy is at a crossroads. Decision makers are faced with the difficulty of how to meet the continued growth in world energy demand while minimising the environmental impacts of energy production. They must do so while accounting for public attitudes, the cost and competitiveness of the various energy sources and public policy objectives such as security of supply and non-proliferation. How they resolve the tension between these sometimes conflicting factors will ultimately define the extent of nuclear energy's use worldwide. ■

For further information

For more information on this *Policy Brief*, please contact:
 Karen Daifuku, Head of External and Public Affairs, OECD Nuclear Energy Agency
 Tel.: +33 1 45 24 10 10,
 Fax: +33 1 45 24 11 10,
 email: daifuku@nea.fr.

Figure 3:
PROJECTED INSTALLED NUCLEAR CAPACITY TO 2020 (LOW AND HIGH PROJECTIONS)



Source: OECD/NEA (2004), *Uranium 2003: Resources, Production and Demand*.

The OECD Policy Briefs are available on the OECD's Internet site:
www.oecd.org/publications/policybriefs



ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

For further reading

Projected Costs of Generating Electricity: Update 2005, ISBN 92-64-00826-8, € 70, 230 p.

Government and Nuclear Energy (2004), ISBN 92-64-01538-8, € 21, 94 p.

Nuclear Energy Data (2004), ISBN 92-64-1632-5, € 21, 102 p.

Nuclear Energy Today (2003), ISBN 92-64-10328-7, € 21, 112 p.

OECD publications can be purchased from our online bookshop:
www.oecd.org/bookshop

OECD publications and statistical databases are also available via our online library:
www.SourceOECD.org

Where to contact us?

OECD HEADQUARTERS

2, rue André-Pascal
75775 PARIS Cedex 16
Tel.: (33) 01 45 24 81 67
Fax: (33) 01 45 24 19 50
E-mail: sales@oecd.org
Internet: www.oecd.org

GERMANY

OECD Berlin Centre
Schumannstrasse 10
D-10117 BERLIN
Tel.: (49-30) 288 8353
Fax: (49-30) 288 83545
E-mail:
berlin.contact@oecd.org
Internet:
www.oecd.org/deutschland

JAPAN

OECD Tokyo Centre
Nippon Press Center Bldg
2-2-1 Uchisaiwaicho,
Chiyoda-ku
TOKYO 100-0011
Tel.: (81-3) 5532 0021
Fax: (81-3) 5532 0035
E-mail: center@oecd-tokyo.org
Internet: www.oecd-tokyo.org

MEXICO

OECD Mexico Centre
Av. Presidente Mazaryk 526
Colonia: Polanco
C.P. 11560 MEXICO, D.F.
Tel.: (00.52.55) 9138 6233
Fax: (00.52.55) 5280 0480
E-mail:
mexico.contact@oecd.org
Internet:
www.rtn.net.mx/ocde

UNITED STATES

OECD Washington Center
2001 L Street N.W., Suite 650
WASHINGTON DC. 20036-4922
Tel.: (1-202) 785 6323
Fax: (1-202) 785 0350
E-mail:
washington.contact@oecd.org
Internet: www.oecd-wash.org
Toll free: (1-800) 456 6323

The OECD Policy Briefs are prepared by the Public Affairs Division, Public Affairs and Communications Directorate. They are published under the responsibility of the Secretary-General.

FEBRUARY 2007

Policy Brief

OECD



ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The Political Economy of Environmentally Related Taxes

How do governments use environmentally related taxes?

How to deal with the “losers”?

What effects on income distribution?

How high are the administrative costs?

Are environmentally related taxes politically acceptable?

How to combine them with other measures?

Where do we go from here?

For further information

For further reading

Where to contact us?

Introduction

Preserving the environment is high on the agenda for both governments and society. Governments in OECD countries are using a variety of instruments to change environmentally harmful behaviour, and taxes have proved a useful string to their bow. Using taxes to achieve an environmental objective, such as reducing emissions of a particular pollutant, is efficient from an economic point of view and offers flexibility to adapt for those affected. Direct regulation of polluting activities, for example by setting legal limits on the emission level of certain pollutants, forces immediate compliance regardless of the comparative cost for different businesses and individuals, and can be more difficult and costly for some than for others. Environmental taxes leave more flexibility for those affected, because they can essentially “buy time” to make changes which will mean they do not have to pay the tax in the future. Thus, a tax on polluting activities or products allows those who can cut emissions cheaply to do so first, while allowing those with higher pollution control costs to pay the tax while taking time to make technological adjustments. This means that the economy as a whole will meet the same environmental objective more cheaply than by using direct regulation. While using taxes to achieve environmental objectives is clearly efficient for the economy as a whole, however, in practice individual businesses or sectors may resist because they will be “losers” in the equation. Governments need to address such concerns about the negative impacts of environmental taxes on sectoral competitiveness and on income distribution if environmentally related taxes are to be a useful tool. This Policy Brief looks at the political economy of environmental taxes and how governments can use them in conjunction with other policy instruments to achieve their environmental objectives. ■

Observer^{oecd}

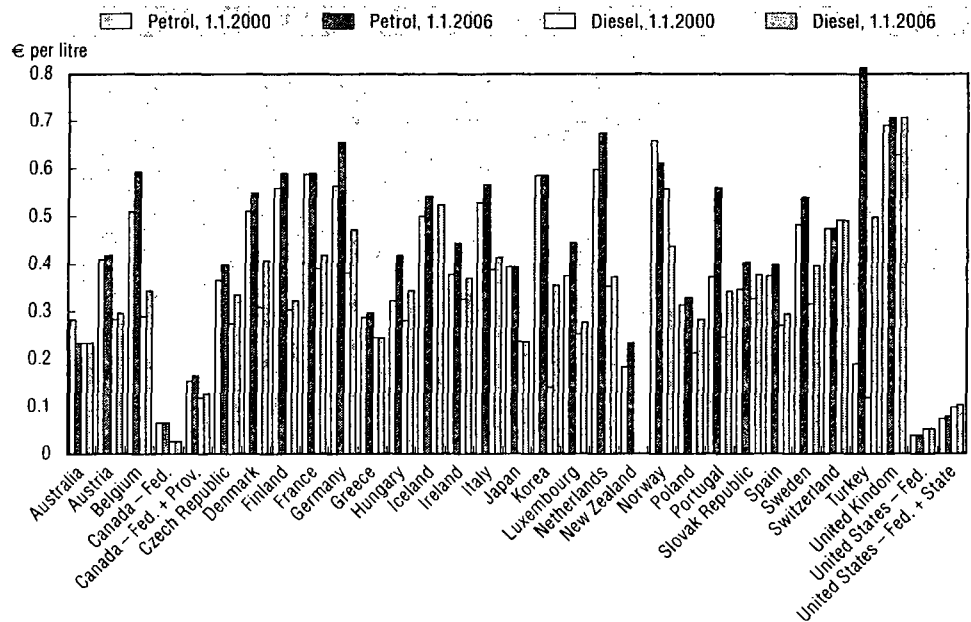
How do governments use environmentally related taxes?

Over the past decade, the number of environmentally related taxes in OECD countries has increased steadily. A database operated in co-operation between the OECD and the European Environment Agency (EEA), currently details about 375 environmentally related taxes in OECD countries (not counting other measures such as some 250 environmentally related fees and charges). The database includes the energy and transport sectors, and a number of taxes and charges linked to measured or estimated emissions. About 90% of the revenues from the environmentally related taxes stems from taxes on motor vehicle fuels and motor vehicles. Figure 1 illustrates that the tax rates applied to petrol and diesel vary significantly across OECD countries.

The environmentally related taxes raise revenues in the order of 2-2.5% of gross domestic product (GDP). The amount of revenue raised is, however, not a precise indicator of the environmental impacts of the tax and charges. Taxes and charges can trigger major behavioural changes that cut back on polluting activities, but raise small amounts of revenue because the tax-bases diminish.

Indeed, many existing environmentally related taxes are contributing to environmental improvements. Tax increases are reflected in price increases, and higher prices clearly reduce demand for environmentally damaging products. Fuel use has significantly fallen in recent years for example in response to higher crude prices and fuel taxes. In a number of countries, using the sulphur content of the fuel as one determinant of the level of fuel tax has led to a strong decrease in sulphur dioxide (SO₂) emissions. A tax on plastic bags in Ireland rapidly had the desired environmental effect of sharply reducing plastic bag usage – for one thing, shops stopped giving them away free to customers, and the increased price of the bags encouraged customers to return to re-usable shopping bags. ■

Figure 1.
TAX RATES ON UNLEADED PETROL AND DIESEL IN OECD MEMBER COUNTRIES
1.1.2000 and 1.1.2006



How to deal with the "losers"?

Environmentally related taxes may be efficient, but when implementing them governments have to take into account concerns about any negative impact they might have on the competitiveness of certain sectors, such as energy-intensive or export-oriented industries, and on individuals or households. To meet these concerns, OECD governments often grant exemptions to these taxes – currently there are more than 1 150 such exemptions and several hundred refund mechanisms and other tax provisions. These exemptions generally tend to reduce the environmental effectiveness of the taxes, as well as the economic efficiency with which environmental policy targets are met. How can governments remove, or at least limit, such exemptions while meeting the concerns that some industries and individuals suffer more than others?

Individual firms compete both at a *national* and at an *international* level, and an environmentally related tax can affect their competitiveness at both levels if their competitors are not subjected to a similar tax. For a given firm facing competitive pressures, it matters little whether the competition is from domestic or foreign producers. *Domestic* competitiveness impacts will, however, only to a very small extent have consequences for overall production at the national level. At international level, the issue is more complex. And while there are many good reasons why policy makers ought to focus mostly on impacts of environmental policies on the economy as a whole rather than at a sectoral level, *in practice* they tend to be more concerned with any potential "losers" from a policy change. Hence, the focus of discussion here is on *international competitiveness impacts at a sectoral level*.

If energy or carbon taxes to reduce greenhouse gas emissions are implemented in a limited number of countries, they are likely to have negative impacts on the international competitiveness of some industrial sectors in these countries. This has been demonstrated in case studies of hypothetical taxes being applied to CO₂ emissions in the steel and the cement sectors, both highly energy-intensive, in OECD member countries. But this does not automatically mean that governments need to offer widespread exemptions; if governments wish to limit the impacts of such measures on the competitiveness of affected industries, there are ways to do so without much reducing the environmental incentives.

A number of lessons can be drawn from these case studies:

- Individual firms within a given sector will *not* be affected in the same way by any use of environmentally related taxes because they use different input combinations and have different emission profiles.
- It is important to take into account possible adjustments in *related markets* when considering the impacts of a given policy on a particular sector. A part of any initial tax burden placed on a sector is likely to be passed on to input suppliers or to customers.
- If an OECD-wide tax were applied to combat climate change, *significant global reductions in carbon emissions could be achieved*, despite some element of "carbon leakage", such as emissions increase in other countries.

- The larger the group of countries that put similar policies in place, the more limited the impact on sectoral competitiveness would be. For example, the steel case study indicated that an OECD-wide carbon tax would reduce steel production in Japan by around 9%, while a unilateral tax in Japan would reduce steel production there by almost 18%. The differences in impacts were found to be especially important for the large, energy-intensive, basic oxygen furnace steel makers.
- It is possible to largely overcome the negative sectoral competitiveness impacts by recycling (part of) the tax revenues raised back to the most affected sectors. The way any recycling is done would have different impacts on different firms. However, such an approach would also tend to reduce the environmental effectiveness of the tax. ■

What effects on income distribution?

Most studies show that environmentally related taxes, especially energy taxes, can have a direct regressive impact on the income distribution of households. A less wealthy household spends a larger proportion of its income on heating, for example, than its better-off neighbours; so a tax that increased the price of household energy would hit the poorer family harder. There are several ways in which governments can mitigate or remove this effect, but some of these will reduce the environmental effectiveness of the measure more than others.

Mitigation practices, such as exemptions or lower tax rates for low-income households, reduce the environmental effectiveness of taxes. Governments should use direct compensation measures to address concerns for low-income households, e.g. through the social security or tax systems. This can maintain the price signal of the tax, while reducing its negative impact on low-income households.

Governments can offer relief through the personal income tax system, for example by increasing basic personal allowances or introducing tax credits. For individuals whose income is so low that they pay little or no tax, it can be preferable to provide cash transfers.

In some cases, distributional concerns have not been addressed at all, or have come up late in the policy design process, and therefore have been tackled in a more *ad hoc* fashion. This can lead to strong opposition and failure to implement effective environmental measures, and implies higher costs to society than necessary. ■

How high are the administrative costs?

It is possible to design economic instruments for environmental policy with relatively low administrative costs. For example, taxes on petroleum products are usually levied on a limited number of petroleum refineries and depots, and are hence relatively simple to administer and enforce. Several examples also indicate that the administrative costs of schemes involving a large number of tax payers can be kept at relatively modest levels. In the case of the Irish tax on plastic bags, for example, thousands of retailers serve as tax collectors, but the related administrative costs have been modest, since the bag tax was integrated with the existing Value Added Tax collection system (see Box 1).

However, many economic instruments involve a large number of special provisions that increase their administrative costs. Such mechanisms are often introduced for non-environmental reasons, such as addressing competitiveness or income distribution concerns. So, there can be a trade-off between the size of the administrative costs and the measures used to create a "fair" or "politically acceptable" scheme. ■

Are environmentally related taxes politically acceptable?

Whether the general public "accepts" an economic instrument, such as an environmentally related tax, depends to a great extent on public awareness of the environmental problem being tackled and whether this tax is seen as making a significant contribution to reducing that problem. Clearly it is advisable to "prepare the ground" by providing correct and targeted information to the public on the causes and impacts of environmental problems before introducing environmentally related taxes.

Political acceptance also depends on the perceived "fairness" of the instrument in question. A lot of the attention concerning "fairness" is related to expected sectoral competitiveness impacts and/or impacts on low-income households.

There are several things governments can do to deal with the competitiveness issue, while ensuring that they maintain incentives at the margin for the firms to abate their emissions.

Timing is crucial – a tax reform that seems impossible to implement at one time may become feasible when the circumstances are more favourable. A gradual phasing-in of taxes can also help, by softening the immediate

Box 1.

THE PLASTIC BAG LEVY IN IRELAND

A tax on plastic bags was introduced in Ireland in 2002, with a tax rate of EUR 0.15 per bag. The tax has contributed to a reduction in the use of plastic bags by more than 90%, leading to a considerable reduction of the litter problem.

From an administrative point of view, it was originally thought most efficient to levy the tax on producers and importers of plastic bags, thus limiting the number of collection points.

However, domestic producers of plastic bags argued that the proposed tax rate would represent some 1 500% of the net-of-tax price of the bags, which could make smuggling an issue. From an environmental perspective, it was also argued that levying the tax at the point of sale could provide a stronger signal to consumers to avoid using plastic bags.

Based partly on these arguments, the tax is in fact levied at some 5 000 points of sale. Each retailer is obliged to pass on the full amount of the levy to their customers – and local authorities ensure that they do so.

To limit the administrative costs of such an approach, the Irish Office of the Revenue Commissioners developed a solution where the collection of the tax was integrated into the VAT collection system. This entailed a one-off set-up cost of some EUR 1.2 million and annual administrative costs in the order of EUR 350 000. The retailers' extra administrative costs seem to be more than off-set by cost savings, in terms of forgone plastic bag purchases and through additional sales of bin liners.

cost impact and giving companies time to adjust – this can be an incentive to introduce “cleaner” processes to avoid the tax, thus achieving the environmental objective.

Applying the new taxes to broad-based tax bases, and introducing them as part of broader fiscal reform, can also make it easier to win political acceptance, and thus make the tax easier to implement.

In general, political acceptance could be strengthened by creating a common understanding of the problem at hand, its causes, its impacts, and the impacts of possible instruments that could be used to address the underlying environmental problem. One way to build such a common understanding is to involve relevant “stakeholders” in policy formulation, for example through broad formal consultations and/or working parties preparing new policy instruments. Green tax commissions, with participation from relevant ministries, industrial organisations, trade unions, environmental organisations, etc., can be a useful way to communicate between the stakeholders involved. ■

How to combine them with other measures?

Besides taxes, there are other policy instruments that governments can use to meet an environmental objective, such as regulations, emissions trading, voluntary approaches and information tools such as labelling. In practice, environmentally related taxes are not used in isolation – for example, in many cases one or more regulatory instruments will also be applied. The mere existence of such instrument mixes, however, does not constitute proof of their environmental effectiveness and economic efficiency.

A first requirement for applying an environmentally effective and economically efficient instrument mix is to have a *good understanding of the environmental issue to be addressed*. For example, a tax can be reasonably effective in reducing the total amount used of a given type of product, and the choice between different product varieties, but could be less suited to address how a given product is used, *when* it is used, *where* it is used, etc. Hence, additional instruments could be needed.

On the other hand, in some cases, it seems that more environmental targets than necessary have been defined. This could be the case in the waste management field, where specific recycling targets for items such as packaging have been established in many OECD countries, frequently without any clear evidence that the types of waste being targeted represent a larger threat to the environment than other types.

A second requirement for designing efficient and effective policies is to have a *good understanding of the links with other policy areas* – such as energy policies, housing policies, agricultural policies, transport policies, etc. The design of instruments applied in these areas can have direct environmental impacts on their own, but also major impact on the effectiveness of environmental policy instruments. Investment in public transport can by itself lead to less road traffic, and thus less air pollution, noise, etc. Such investments can also enhance the positive environmental impacts of any increases in taxes on

motor fuels, as they would make it easier for households and firms to respond to the price increase by changing from private to public transport means.

A third requirement is to have a *good understanding of the interactions between the different instruments* in the mix. Various instruments can interact with environmentally related taxes in a number of ways; for example:

- A labelling system can help increase the effectiveness of a tax by *providing better information* to the users on relevant characteristics of different products the tax applies to, e.g. the energy efficiency of appliances. This will increase the price-sensitivity of demand for the product.
- The combination of a tax and a voluntary approach can *increase the "political acceptability"* of the former – by limiting any negative impacts on sectoral competitiveness – but at the cost of reduced environmental effectiveness or increased economic burdens placed on other economic actors.
- Combining a tax and a tradable permits system can help *limit compliance cost uncertainty* – compared to the application of a trading system in isolation. On the other hand, such a combination could *increase the uncertainty related to environmental effectiveness* – unless additional provisions are put in place.
- A regulatory instrument applied alongside an environmentally related tax might *unnecessarily restrain the flexibility* for polluters to find cost-effective abatement options offered by a tax. ■

Where do we go from here?

Over the last decade, the use of environmentally related taxes in OECD countries has increased steadily. Several countries have implemented comprehensive "green tax reforms" or environmental policy "instruments mixes" where taxes play a key role. All OECD member countries apply several environmentally related taxes. Experience over the last decades has proven that environmentally related taxes can be effective and efficient instruments for environmental policy.

The environmental effectiveness and economic efficiency of the environmentally related taxes applied in OECD member countries could, however, be improved further if existing exemptions and other special provisions were scaled back, and if the tax rates were better aligned with the magnitude of the negative environmental impacts to be addressed. ■

For further information

For more information on OECD's work on environmentally related taxes, please contact
Nils Axel Braathen in OECD's Environment Directorate, tel.: +33 1 45 24 76 97, e-mail: nils-axel.braathen@oecd.org or
Chris Heady in OECD's Centre for Tax Policy & Administration, tel.: +33 1 45 24 93 22, e-mail: christopher.HEADY@oecd.org

The OECD Policy Briefs are available on the OECD's Internet site:
www.oecd.org/publications/Policybriefs



ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

For further reading

More information on the publication **The Political Economy of Environmentally Related Taxes** is available at www.oecd.org/env/taxes/politicaconomy. ISBN 92-64-02552-9, 199 pages, € 28.

Many background documents used in the preparation of the book are available at www.oecd.org/env/taxes.

A database on environmentally related taxes and other instruments used for environmental policy can be found at www.oecd.org/env/policies/database.

OECD publications can be purchased from our online bookshop:
www.oecd.org/bookshop

OECD publications and statistical databases are also available via our online library:
www.SourceOECD.org

Where to contact us?

OECD HEADQUARTERS

2, rue André-Pascal
75775 PARIS Cedex 16
Tel.: (33) 01 45 24 81 67
Fax: (33) 01 45 24 19 50
E-mail: sales@oecd.org
Internet: www.oecd.org

GERMANY

OECD Berlin Centre
Schumannstrasse 10
D-10117 BERLIN
Tel.: (49-30) 288 8353
Fax: (49-30) 288 83545
E-mail:
berlin.contact@oecd.org
Internet:
www.oecd.org/deutschland

JAPAN

OECD Tokyo Centre
Nippon Press Center Bldg
2-2-1 Uchisaiwaicho,
Chiyoda-ku
TOKYO 100-0011
Tel.: (81-3) 5532 0021
Fax: (81-3) 5532 0035
E-mail: center@oecdtokyo.org
Internet: www.oecdtokyo.org

MEXICO

OECD Mexico Centre
Av. Presidente Mazaryk 526
Colonia: Polanco
C.P. 11560 MEXICO, D.F.
Tel.: (00.52.55) 9138 6233
Fax: (00.52.55) 5280 0480
E-mail:
mexico.contact@oecd.org
Internet:
www.oecd.org/centrodemexico

UNITED STATES

OECD Washington Center
2001 L Street N.W., Suite 650
WASHINGTON DC. 20036-4922
Tel.: (1-202) 785 6323
Fax: (1-202) 785 0350
E-mail:
washington.contact@oecd.org
Internet: www.oecdwash.org
Toll free: (1-800) 456 6323

The OECD Policy Briefs are prepared by the Public Affairs Division, Public Affairs and Communications Directorate. They are published under the responsibility of the Secretary-General.



Making Environmental Spending Count

Why spend public money on the environment?

How to manage such spending?

What can be learned from OECD countries' experience?

What is transition countries' experience?

How to assess environmental public spending programmes?

How to implement good practice?

For more information

For further reading

Where to contact us?

Introduction

Clean air and water are vital for human life, and our societies devote large amounts of money to helping to curb pollution and preserve a healthy environment. Much of that money comes from private sources – businesses pay to dispose safely of environmentally harmful waste, or to mitigate the polluting effects of production processes.

But while technology standards, environmental permits, pollution charges and taxes all have a role to play, public spending is also important in environmental protection efforts.

Governments often pay subsidies to provide environmental public goods, such as the basic levels of sanitation required to safeguard health.

Public funds are also used to make it easier to borrow money on the financial markets for environmental projects, through measures such as risk sharing, credit enhancement, or subsidies to lower the costs of borrowing in communities that cannot afford the full costs of investments. So ensuring that public expenditure programmes are well-managed is an essential element of effective and efficient environmental policies.

This *Policy Brief* looks at how effectively governments use public funds to achieve environmental objectives, and what economies in transition can learn from the OECD experience in crafting and managing their own public expenditure programmes. ■

Why spend public money on the environment?

Environmental policy in OECD countries is generally guided by two key principles: that those responsible for pollution and those using natural resources should bear the full cost of their actions. As its name suggests, the Polluter-Pays-Principle (PPP), developed by the OECD in the 1970s, implies that polluters should pay to cover the full costs of any subsequent clean-up without subsidies. The User-Pays Principle states that revenue generated by users must cover all the costs related to the use of a natural resource such as water or the treatment of resultant pollution or waste.

Both the PPP and the User-Pays Principle aim at avoiding the use of public funds to deal with pollution. However, in some circumstances public spending may be necessary to limit pollution and environmental damage. The PPP specifies that public environmental expenditures may be justified if they are well-targeted (i.e. the environmental objectives to be achieved with the subsidy are clearly identified), limited in size and duration and do not introduce significant distortions to competition or trade; or when polluters cannot be identified.

Environmental public spending needs to be assessed from two angles: environmental policy and public finance. From an environmental policy perspective, the key challenge is to ensure that public expenditure achieves the intended result at least cost, and that it forms part of a coherent strategy for achieving environmental objectives. From a public finance perspective, expenditure should be managed in accordance with established standards of good governance – in other words, value for money. When choosing which environmental programmes to finance, governments should ensure that the expected social benefits from any spending programme exceed the expected social costs. If the benefits are difficult to measure, governments can instead test how cost-effectively an environmental programme achieves its objectives. ■

How to manage such spending?

A key question in managing public spending is whether revenue from specific taxes or charges should be earmarked to help pay for specific services. Such earmarking is a popular practice for environmental authorities. It offers predictable financing for environmental projects, and is politically popular as it clearly links revenue to a particular social benefit, which helps make new taxes more acceptable.

But earmarking funds also limits flexibility in public spending and may mean that resources are not allocated efficiently. It may also lead to environmental issues being marginalised in the mainstream budget process. Under certain conditions, however, earmarking is perceived as a price worth paying for predictable financing for priority environmental measures. In such cases, earmarking should not go beyond the timeframe necessary to achieve the stated objectives.

Once revenues have been collected, governments need a structure for disbursing them on environmental projects. Special environmental funds are a popular way of channelling public expenditure for the environment in both OECD and non-OECD countries, but the way they operate differs widely.

In OECD countries where such funds exist, they tend to focus on one environmental medium – such as water, air or waste treatment. This makes for more efficient management since it is easier to define environmental

objectives and to monitor results than if the funds were allocated for the environment in general. It also makes it easier to target human and financial resources and to adjust the programmes if necessary.

In Austria, for example, the government operates three funds supporting environmental investment: a Water Management Fund, an Environment Fund and a Contaminated Sites Remediation Fund. Between them they provide almost 300 million euros in investment support each year, leveraging investments of over 1.1 billion euros. The Funds are administered on behalf of the minister of environment by Kommunalkredit Public Consulting, the daughter of a bank specialised in public finance. Similarly, in France, six regional public water agencies are responsible for collecting and spending public investments in the water sector. They have a high degree of autonomy and on average, handle a total budget of more than two billion euros a year.

In the OECD's most recent European members (Czech Republic, Hungary, Poland, Slovak Republic), environmental funds have a wider remit, and most of them are used to manage revenue from the EU Cohesion and Structural Funds, as well as to provide co-financing for investments supported by these funds. The Funds in these countries are legal entities with well-established supervisory and executive management structures.

In Central and East Europe (CEE), as well as in Eastern Europe, Caucasus and Central Asia (EECCA) countries, broad environmental funds are the predominant instrument for managing public environmental expenditure programmes. Most of this money is spent on reducing pollution in the air and water sectors. But the revenue of these funds is small compared to OECD countries, and is often too low to allow significant spending on capital investment, especially in EECCA countries, so the money is often allocated for activities such as monitoring. The two major exceptions are the State Environmental Fund of Ukraine, and the National Environmental Fund of Moldova, which manage about 4 million euros and 15 million euros respectively.

Typically, the environmental funds in CEE and EECCA countries are domestic public institutions, capitalised by earmarked pollution charges, pollution fines and product charges. They provide financing for a wide range of environmental improvements for both the public and private sector, most often in the form of grants and soft loans. Most CEE and EECCA countries have also established environmental funds on national, regional and/or local levels. Funds vary in terms of their legal status and their relationship to the government. Most funds are not legal entities, but are part of the environment ministry. ■

What can be learned from OECD countries' experience?

The OECD has studied schemes providing subsidies for the water sector through targeted multiyear investment programmes in four member countries (Austria, Belgium, France and Germany) to see how their experience can help transition economies. This focused on analyzing the various institutional set-ups and approaches adopted, including the role that the private sector can play in managing such programmes.

Outsourcing the management of spending programmes and private sector participation are key features of the schemes reviewed in the four OECD countries. Initially, state authorities were responsible for managing public

subsidy schemes. Over time, the pressure on public administrations has been partially relieved by bringing in private sector agencies to take over managing the schemes for a fee.

However, outsourcing is only an option if the government has very strong control over the implementing agency's operations and develops clear rules, procedures and criteria for regularly evaluating the agency's performance. The case of Flanders highlights the need for good control measures. Until recently, the public-private partnership Aquafin, which is responsible for implementing a public investment programme for wastewater treatment at regional level, was having problems achieving the water quality targets specified in its government contract. A new incentive structure and more focused monitoring have been introduced to improve Aquafin's performance.

The OECD subsidy programmes that were studied have clearly set timeframes and are adjusted or closed when they have achieved their objectives or when other policy instruments become more relevant.

Beyond public financing schemes, user charges are the only sustainable long-term financing option for environmental investments. User charges in France and Germany have been raised to cost-recovery levels and now generate enough revenue to cover at least the operating and maintenance costs of water utilities, but also as far as possible investment in new water supply and sanitation infrastructure. Thus, in the OECD countries, public environmental expenditure programmes are part of a gradual transition from public subsidy schemes to financing through user charges. ■

Box 1.

THE POLISH ECOFUND

The Polish EcoFund is renowned for its well-designed expenditure programmes and rigorous management procedures based on the following criteria:

- a strict framework of clearly defined environmental priorities and project eligibility criteria;
- clear requirements for, and strictly professional relations with, applicants;
- clearly defined appraisal and selection criteria emphasising environmental benefits and cost-effectiveness; and
- careful monitoring of projects to ensure proper use of funds and achievement of environmental effects.

These procedures lead to objective, transparent and accountable decision-making. In addition, EcoFund's application procedures help create project preparation skills and promote the development of the environmental goods and services industry in Poland.

The Polish EcoFund Foundation was established to manage the revenue generated through debt-for-environment swaps (DFES). In 1991, Poland signed an agreement with the Paris Club of creditor countries to reschedule its external debt. As a result, half of the Polish debt was cancelled and part of the repayments on the rest is transferred to the EcoFund for environmental projects. Six creditor countries (United States, France, Switzerland, Italy, Norway and Sweden) have taken part in this scheme.

As a result, the EcoFund has had a stable and predictable source of revenue. Over the full debt repayment period to 2010 the Polish EcoFund expects to receive DFES revenues totalling USD 571 million. Although the sum is relatively small in the context of overall environmental financing in Poland, its impact is significant due to EcoFund's powerful leveraging effect on other financial sources. EcoFund's close attention to achieving high benefit/cost ratios offers reassurance that the DFES revenue has not resulted in the inefficiencies sometimes associated with earmarked programmes.

What is transition countries' experience?

The full application of PPP in transition economies has been constrained by a number of problems, such as weak or ineffective enforcement of environmental policy, severe financial constraints on enterprises and households, uncertainties in fiscal systems, poorly developed banking systems and capital markets, and inadequate information on the cost of environmental damage.

OECD has developed a framework to measure the level of environmental expenditure in member countries, ensuring the collection of reliable and internationally-comparable data. This framework covers the flow of capital and recurrent expenditure, subsidies and fees that are directly aimed at environmental protection, whether incurred by the public sector, the business sector, specialised producers of environmental services or private households.

Most transition and developing countries do not use these classifications, but it is nonetheless possible to measure and compare overall environmental expenditure between EECCA countries. In the bigger EECCA economies (the Russian Federation, Kazakhstan, Ukraine), environmental spending accounts for 1.2%-1.6% of GDP and has increased to levels which compare with some CEE countries. In poorer EECCA countries (Moldova, Georgia, the Kyrgyz Republic, Tajikistan), they represent on average between 0.2% and 0.8% of GDP. The public sector share of this expenditure is generally below 30% in EECCA, while it ranges between 12% and 80% in OECD countries.

Virtually all EECCA environmental funds (with the exception of Ukraine) have remained insignificant players in financing environmental expenditure. One of the fundamental problems facing EECCA in achieving more efficient allocation of public financial resources for the environment is a lack of well-developed expenditure programmes. As a result, environmental funds in EECCA suffer from excessive discretion, *ad hoc* political influences and blurred accountability. Responsibilities for appraising and selecting publicly-financed projects are usually unclear, leaving a lot of room for mismanagement and misuse of public resources. Eligibility criteria, procedures, priorities and targets are not specified or are defined in very vague terms.

A major trend in recent years in response to pressure to improve public spending and strengthen fiscal discipline has been to consolidate extra-budgetary environmental funds in both CEE and EECCA into national budgets. In Ukraine, for example, the State Environmental Fund is now part of the state budget process. A recent review of the performance of the Fund has indicated that the strict national budget rules have led the Fund to follow a prudent fiscal policy. ■

How to assess environmental public spending programmes?

The experiences above indicate that there is room to improve the performance of public environmental spending programmes. In particular, transition and developing countries could learn from OECD countries to design and manage these programmes so that they will contribute to the efficient and effective implementation of environmental policies.

The OECD has developed Good Practices for Public Environmental Expenditure Management (PEEM) to assess the performance of institutions managing public environmental expenditure programmes. The OECD has studied how far the national and regional environmental funds of a number

of transition economies comply with these Good Practices. The results have been used to prepare reform plans to improve the performance of the institutions involved.

The Good Practices cover three key areas: environmental effectiveness; budgetary good practice and management efficiency. *Environmental effectiveness* concerns the performance of public expenditure programmes as instruments of environmental policy. *Budgetary good practice* covers how to align the programme with the principles of sound public finance. *Management efficiency* considers how efficiently a financing institution uses financial and human resources.

The OECD has developed checklists of five major principles for each of these areas, plus criteria for putting them into practice. The checklists can be used to measure how far public environmental expenditure programmes comply with the Good Practices.

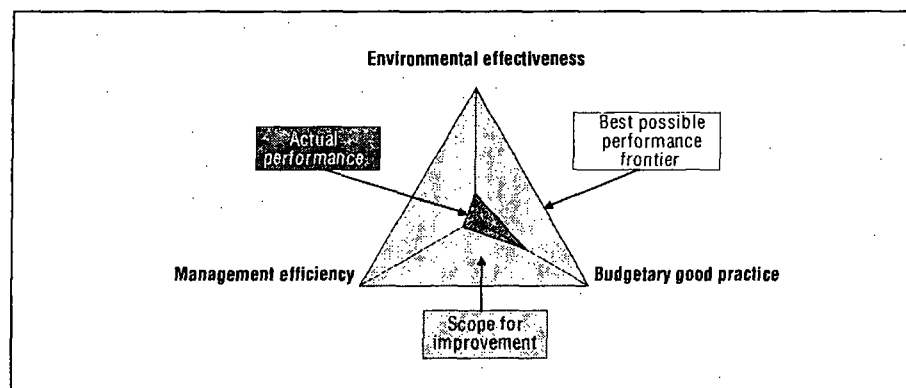
The results of such an assessment can be displayed using a performance triangle. Box 2 shows the performance of Ukraine's State Environmental Fund with regard to the Good Practices for PEEM. The larger (pale blue) triangle represents the best practice that the Fund can achieve, while the smaller (dark blue) triangle shows the actual performance of the Fund. The space between the two triangles shows the room for improvement.

Due to reforms implemented in Ukraine's public finance system, its environmental fund scores best in terms of budgetary good practice. But the Fund's compliance with the Good Practices is poor when it comes to environmental effectiveness and management efficiency. This low performance shows the need for a significant targeted institutional reform and strengthening of the Fund to bring it into compliance with internationally-recognised standards for such institutions. ■

How to implement good practice?

Implementing the Good Practices for PEEM must take into account the specific objectives to be achieved and the design of the programmes, which will be shaped by national administrative traditions, the level of economic development, as well as the maturity of markets and the public finance system. The choice of the institutional set-up should be tailored to the specific needs of a given programme.

Box 2.
PERFORMANCE ASSESSMENT OF THE STATE ENVIRONMENTAL FUND OF UKRAINE



One of the main conclusions from the work on PEEM in economies in transition is the need for practical management tools that managers of public expenditure programmes can use as a benchmark to improve effectiveness and efficiency. This has prompted the development of an OECD Handbook for *Appraisal of Environmental Projects Financed from Public Funds*.

The *Handbook* is aimed at the public financier who is responsible for selecting the most cost-effective projects proposed by project developers. It presents a step-by-step approach for programming and project cycle management and offers a menu of options and management tools to choose from, depending on the needs and maturity of the individual institution concerned. The *Handbook* focuses on investment projects, with most of the examples using wastewater collection and treatment projects to demonstrate the value of the different approaches proposed.

On the basis of the *Handbook*, a toolkit of training materials has been developed and pilot tested in EECCA. It includes a simple model for calculating the cost-effectiveness of environmental infrastructure investment projects.

Decision-makers can use the Good Practices to assess the performance of the agencies managing public environmental expenditure programmes. Managers in implementing agencies can use the Good Practices evaluation framework for self-assessment and for tracking progress in their development.

Managers of technical assistance programmes concerned with financing environmentally-related investments and consultants working on public finance issues may also find the tools useful.

Although the documents were initially developed to support reform in the CEE and EECCA countries, the major principles, tools and approaches are relevant for any developing and emerging economy wanting to improve public environmental expenditure management in line with international standards. OECD countries can also use these tools to further enhance their environmental public spending management practices. ■

For more information

For more information about OECD's work on public environmental expenditure management, please contact:
Nelly Petkova, tel.: + 33 (1) 45 24 17 66, e-mail: nelly.petkova@oecd.org or see www.oecd.org/env/finance.

Box 3.
KEY STEPS IN ESTABLISHING, MANAGING OR REFORMING PUBLIC ENVIRONMENTAL EXPENDITURE PROGRAMMES

- Define priority environmental objectives using evaluation methods, such as risk assessment and benefit-cost analysis as well as participatory political processes.
- Demonstrate whether public expenditures are necessary to achieve these objectives.
- Define sources of revenue, budget size, and the terms and conditions of the expenditure programme.
- Authorise an appropriate institution to manage the expenditure programme.
- Continue, modify or terminate the expenditure programme in light of periodic reviews of the programme's performance to assess whether its objectives have been achieved and its continuation is necessary.

The OECD Policy Briefs are available on the OECD's Internet site:
www.oecd.org/publications/Policybriefs



ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

For further reading

OECD (2006), **Mechanisms for Managing Public Environmental Expenditure in Selected OECD Countries**, available for free download at www.oecd.org/env/finance or www.oecd.org/dataoecd/21/48/37744488.pdf.

OECD (2006), **Performance Review of the State Environmental Protection Fund of Ukraine**, available for free download at www.oecd.org/env/finance or www.oecd.org/dataoecd/63/19/37724027.pdf.

OECD (2006), **Recommendation of the Council on Good Practices for Public Environmental Expenditure Management, 8 June 2006 (C(2006)84)**, available for free download at www.oecd.org/document/31/0,3343,en_2649_34335_34088223_1_1_1_1,00.html.

OECD (2007), **Handbook for Appraisal of Environmental Projects Financed from Public Funds**, available for free download at www.oecd.org/env/finance or www.oecd.org/dataoecd/10/63/38786197.pdf.

OECD (2007), **Pollution Abatement and Control Expenditure in OECD Countries**, available for free download at www.oecd.org/dataoecd/37/45/38230860.pdf.

OECD (2007), **Trends in Environmental Finance in Eastern Europe, Caucasus and Central Asia**, available for free download at www.oecd.org/env/finance or www.oecd.org/dataoecd/5/28/39011298.pdf.

OECD publications can be purchased from our online bookshop:
www.oecd.org/bookshop

OECD publications and statistical databases are also available via our online library:
www.SourceOECD.org

Where to contact us?

OECD HEADQUARTERS

2, rue André-Pascal
75775 PARIS Cedex 16
Tel.: (33) 01 45 24 81 67
Fax: (33) 01 45 24 19 50
E-mail: sales@oecd.org
Internet: www.oecd.org

GERMANY

OECD Berlin Centre
Schumannstrasse 10
D-10117 BERLIN
Tel.: (49-30) 288 8353
Fax: (49-30) 288 83545
E-mail: berlin.contact@oecd.org
Internet: www.oecd.org/deutschland

JAPAN

OECD Tokyo Centre
Nippon Press Center Bldg
2-2-1 Uchisaiwaicho,
Chiyoda-ku
TOKYO 100-0011
Tel.: (81-3) 5532 0021
Fax: (81-3) 5532 0035
E-mail: center@oecdtokyo.org
Internet: www.oecdtokyo.org

MEXICO

OECD Mexico Centre
Av. Presidente Mazaryk 526
Colonia: Polanco
C.P. 11560 MEXICO, D.F.
Tel.: (00.52.55) 9138 6233
Fax: (00.52.55) 5280 0480
E-mail: mexico.contact@oecd.org
Internet: www.oecd.org/centrodemexico

UNITED STATES

OECD Washington Center
2001 L Street N.W., Suite 650
WASHINGTON DC. 20036-4922
Tel.: (1-202) 785 6323
Fax: (1-202) 785 0350
E-mail: washington.contact@oecd.org
Internet: www.oecdwash.org
Toll free: (1-800) 456 6323

The OECD Policy Briefs are prepared by the Public Affairs Division, Public Affairs and Communications Directorate. They are published under the responsibility of the Secretary-General.

**Climate Change
Growth
Stability**

**OECD FORUM
2008
FORUM OCDE**

**Changement Climatique
Croissance
Stabilité**

**Register now:
Inscrivez-vous :**
www.oecdforum.org

3-4 June/juin 2008
OECD Conference Centre, Paris
www.oecdforum.org



