ECONOMIC POLICY COMMITTEE

Brussels, 30 January 2008
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Economic instruments to reach energy and climate change targets

MAIN RECOMMENDATIONS

Mitigating global climate change and adapting to its local impacts are vitally important economic issues that should be of key concern to Finance Ministers across the EU and beyond. Finance Ministers need to engage with this agenda to influence the choice and design of mitigation and adaptation policies, as these will substantially affect the overall costs of action. Current estimates suggest that the costs of global action - at up to 3 per cent of global GDP by 2030 - are far lower than the costs of inaction.

However, crucially, the estimates of the costs of action are normally based on two important assumptions; that both global solutions and cost-effective measures are implemented. While policies that adhere to a least-cost approach could deliver climate change objectives without serious disruption to the broader economy, the escalating cost of other options may jeopardise the ultimate goal of effective international action.

In order to ensure the efficiency and cost-effectiveness of EU climate change policies, the main findings of this report should be taken into account when the European Council considers the Commission's January package. A key challenge for Finance Ministers will be to ensure that the transition to a low-carbon economy is handled in a way that is consistent with EU competitiveness, supports sound and sustainable management of public finances and that contributes positively to broader growth objectives consistent with the Lisbon Strategy.

There are substantial direct economic and fiscal implications from the implementation of policies to tackle and adapt to climate change - the auctioning of allowances in the third phase of the EU Emissions Trading Scheme (EU-ETS) for example, is expected to generate significant new revenues while also introducing greater volatility in levels of revenue and displacing existing revenue streams. Understanding the wider macro-economic implications and managing distributional impacts will be essential in achieving overall energy and climate policy goals. Finance Ministers**,** with their expertise in the design of market-based policy instruments and understanding of the wider budgetary, fiscal and economic implications, therefore have a central role to play in the setting and design of climate change policies.

To this end, the EPC makes the following recommendations:

1. Managing the costs

- **Market-based instruments are most likely to deliver least cost policy options** for meeting energy and climate change targets. However the interaction of different policies needs to be carefully considered to avoid increased administrative burdens, reduced efficiency and excessive costs – both at national and European level. The approach agreed in March 2007 based on four interlinked targets on greenhouse gas reduction, energy efficiency, renewables and biofuels should not deflect the EU from its core mission to fight climate change nor prevent us from using the most cost-effective options to reduce emissions.

- The direct economic cost of the Commission's energy and climate change package is estimated to be 70bn euros in 2020. However, given the high degree of uncertainty around the costs of meeting energy and climate change targets it is particularly important that **extensive cost-benefit analysis and post-implementation evaluation** of instruments are carried out. All EU proposals should include **mandatory reporting requirements on progress toward meeting the 2020 targets** including information on the budgetary, economic (including impacts on consumer energy bills) and macro-economic impacts (actual and forward estimates) of compliance.

- As a great deal of the costs of meeting energy and climate change targets will be borne by consumers in the form of higher energy prices, **distributional impacts** will require careful analysis and management by Finance Ministries.

- **Any policies that have a potential impact on fiscal revenues or have significant budgetary implications should be considered by Finance Ministers.** For reasons of subsidiarity and sustainable public finances, revenues from auctioning should be used in line with sound budgetary principles and, specifically, not be subject to mandatory earmarking or hypothecation at EU level. It should be also borne in mind that the use of such revenues by Member States should not be inconsistent with EU efforts to tackle climate change and should avoid perverse environmental incentives.

- Experience of Member States shows that there are large differences in the costs per tonne of CO_2 abated associated with different measures across EU countries. Typically, measures to improve building energy efficiency and promote energy efficiency come at least cost, while increasing the share of renewables is relatively expensive, although the cost can be reduced in the longer term as the new technology develops. **Relative costs of measures should be taken into account in the design of energy and climate change policies**. Specific conditions of each country also need to be considered.

2. Choosing the right instruments

- **Taxes** are relatively efficient instruments for achieving energy savings and GHG reductions. Environmental taxes already account, on average, for 6.6% of EU Member States' revenue from overall taxation and play an important part in the sustainability of **public finances**, though if effective, will result in declining revenues.

- Policy instruments are often applied in combination. While in some cases the mix of instruments can be mutually reinforcing, in others they may limit each other's effect. In particular, additional measures will not deliver further GHG emissions reductions in sectors covered by the EU-ETS. **Interactions between instruments** should be taken into account when designing policies and overlaps that create inefficiencies should be avoided.

- Within the EU-ETS, auctioning appears to be the most efficient allocation method. It is recognised that competitiveness considerations need to be taken into account. Policy measures may be required – particularly in regard to Phase

III of the EU-ETS to **manage the risk of leakage to countries with lower environmental standards outside the EU**. Existing evidence suggests that risks will be concentrated in relatively few energy-intensive sectors of the economy, which vary across Member States.

- Overall policy **frameworks** (including the EU-ETS and its interaction with other instruments) **need to be designed to promote the long-term certainty and credible signals** required to support and generate the mainly private-sector investment in energy infrastructure and new technologies; the EPC emphasises the importance of ensuring that the policy proposals for 2020 and beyond provide the private sector with a clear view of the level of carbon constraint, including the conditions under which those constraints are liable to change in the future.

- Three elements will be key to **deliver the right incentives** in this regard: first, strengthening and streamlining the EU-ETS in order to maximize its efficiency and lessen market distortions; second, addressing greenhouse gas emissions remaining outside the scope of the EU-ETS; third, developing a co-ordinated approach between the two in order to have a coherent price on greenhouse gases.

- The experience of Finance Ministers with the regulation of international financial markets could usefully support the **ongoing development of the EU-ETS** particularly on such issues as the conditions under which different emission trading schemes may be effectively and efficiently linked, and market monitoring and provision of information. **Further work is required on monitoring or regulatory supervision that might benefit the scheme.**

- **Flexibility mechanisms** that provide policy-makers with a high degree of choice about how to comply should be an important part of any efficient and cost-effective climate change system that ensures Member States are not exposed to significantly adverse macroeconomic impacts. For example, flexibilities in the design and implementation of renewables targets, the use of Kyoto project-based credits and the possibility of renewable trading within and outside the Union should be considered, while taking into account interactions with existing effective national support schemes.
- A well-designed European system to achieve energy and climate change targets will recognise and facilitate co-ordinated **international action.** Alongside existing obligations to deliver climate change and energy targets within the EU, the EPC reiterates the key importance of building a global carbon market and using flexible international mechanisms such as the Clean Development Mechanism (CDM) to achieve cost-effective abatement. In this context Finance Ministers should play an increased role in finding solutions, creating new instruments and funnelling private sector investment to tackle the problem of climate change (including both mitigation and adaptation) and to provide positive incentives for cost-effective abatement in developing countries.

Detail

I. CONTEXT

The Energy Policy for Europe Action Plan agreed by the Spring 2007 European Council reflected growing awareness across all Member States of the need to reduce greenhouse gas emissions and to bring about a step change in how we generate and consume energy. The European Council made the following headline commitments:

- A 20% Greenhouse Gas Reductions target by 2020, which moves to 30% in the event of a post-Kyoto settlement[1];
- An EU-wide binding target of 20% of energy consumption coming from renewable sources by 2020; and a 10 % binding minimum target for the share of biofuels to be achieved by all Member States by 2020, subject to production being sustainable, second-generation biofuels becoming commercially available and the Fuel Quality Directive being amended accordingly to allow for adequate levels of blending.[2]
- Energy efficiency improvements to yield 20% savings in energy consumption by 2020 compared to the baseline;
- Recognition of the central role of emission trading in the EU's long-term strategy for reducing greenhouse gas emissions;
- A strategic energy technology plan to accelerate the competitiveness of sustainable energies and energy efficient, low carbon technologies;
- Further action on liberalising the internal energy market.

Tackling climate change is clearly an economic as well as an environmental issue. Not only are the macroeconomic impacts of unmitigated climate change potentially significant, but there are also substantial economic and fiscal implications from the implementation of policies to tackle and adapt to climate change.

Finance Ministers have a central role to play in the delivery of the climate change agenda by ensuring that energy and climate change targets are met in a cost-effective way, in terms of both budgetary and socio-economic costs. A key challenge will be to ensure that the transition to a low carbon economy is handled in a way that is consistent with EU competitiveness, supports sound and sustainable management of public finances and that contributes positively to broader growth objectives consistent with the Lisbon Strategy.

Specifically, Finance Ministers will need to consider and plan for the impacts of climate change measures on fiscal policies and public revenues and have a strong interest in ensuring that EU and national policies are credible, economically efficient and provide the necessary flexibility to deliver emissions reductions at least cost. The split approach agreed in March 2007 based on four coexisting and interlinked objectives on GHG, energy efficiency, renewables and biofuels should not deflect the

[1] 1. The Presidency Conclusions, European Council, 8/9 March 2007 state that the move to 30% is " *…provided that other developed countries commit themselves to comparable emission reductions and economically more advanced developing countries to contributing adequately according to their responsibilities and respective capabilities…."*

[2] The Presidency Conclusions, European Council, 8/9 March 2007

EU from its core mission to fight climate change nor prevent us from using the most cost-effective options to reduce emissions. It should also not undermine the credibility of the European Union when trying to convince emerging countries that climate objectives can be secured at a low cost.

Finance and Economics Ministries across the EU are already playing an active part in ensuring the cost-effectiveness of climate-related measures being considered or deployed by their governments. In June 2007 the Council invited the EPC to continue its work on the economic implications of energy and climate policies and report back to the Ecofin Council before the 2008 Spring European Council. To bring this work forward the EPC set up a working group on energy and climate change to examine the efficiency of instruments and their design in reaching specific energy and climate change objectives – with a view towards providing guidance for the design of EU and Member State measures for delivering agreed climate change targets.

The focus of the work has been on the effectiveness and economic and budgetary implications of the use of different instruments, in particular in the context of the possible future evolution of the EU-ETS. On the basis of an exchange of practical experiences in Member States, analysis of the merits of selected instruments and their relative efficiency in reaching different objectives has been undertaken. In addition, the design of specific instruments has been analysed on the basis of their relative cost-effectiveness, budgetary implications as well as their impact on competitiveness.

The work also covered interactions between market-based instruments and regulation and the relationship between energy or environmental taxes and carbon trading. In the context of emissions trading, issues related to importance of the EU-ETS as the foundation of the global carbon market were considered, in the context of the energy and climate change package of the Commission.

II. THE CASE FOR USING ECONOMIC INSTRUMENTS TO TACKLE ENERGY AND CLIMATE CHANGE TARGETS

The EU has stated a long-term goal to limit the global average temperature increase to no more than 2 degrees C above pre-industrial levels, which is associated with limiting atmospheric concentrations to well below 550 ppm CO_2e, and cutting global emissions by at least 50 per cent below 1990 levels by 2050. Estimates suggest that stabilisation at a level of 445 to 535 ppm CO_2e would cumulatively cost up to 3 per cent of global GDP growth by 2030. [3] This cost is significant, but it is far lower than the costs of inaction. Crucially, estimates of the costs associated with acting to tackle climate change are based on the assumption of global and cost-effective solutions being adopted, which take advantage of the lowest cost opportunities for action available around the world to reduce emissions. If not, the costs would be much higher.

For policies to be successful at reducing emissions, they must provide or reinforce the right incentives to consumers/businesses to change their behaviour. In particular, policies should ensure that the socio-economic costs of GHG emissions are taken into account (i.e. prices must include the full external costs). External costs could be internalised in different ways – through a tax, charges or fees, regulation, or a trading scheme. The most efficient and low-cost approach would be through a mechanism to internalise these costs on a global basis, reflecting the fact that the damage to the

[3] "IPCC Fourth Assessment Report: Mitigation of Climate Change", IPCC, Bangkok, 2007.

climate from emissions is the same regardless of where on the planet they are released.

The argument in favour of market-based instruments, such as taxes or tradable allowances, to generate a strong carbon price signal are well-known and need only be summarised here:

- They use market forces and all the information at the disposal of economic agents to improve the allocation of scarce resources;

- They can provide firms with flexibility to meet regulatory requirements;

- By allowing greater flexibility they ensure better efficiency through lower compliance costs;

- In the longer-term they encourage innovation and technological development.

These effects all benefit competitiveness, compared with other forms of regulation. In addition, when the market-based instrument raises revenues, it offers the scope to improve fiscal balances or cut other distortionary taxes and thus help to boost competitiveness (the "double dividend").[4] Market-based instruments will be more effective in well-functioning, competitive markets that are responsive to price signals. In practice, they are often used as part of a policy mix with other policy measures. For example, labelling of the fuel consumption of cars enhances the incentives for energy saving given by excise duties, purchase and/or registration taxes.

In some cases the mix of instruments can be mutually reinforcing but in other cases the mix can affect environmental effectiveness and/or economic efficiency. OECD work demonstrates that the scope for positive interactions between instruments seems greater if the instruments in question provide decision-makers with a high degree of choice about how they would comply.[5] However, if two instruments address the same environmental externality, and the same target group (e.g. instruments designed to improve the energy efficiency of sectors already contained within emissions trading schemes), there will be no additional environmental impact of adding instruments together, and only limited economic efficiency Overlap between different types of instruments (for example taxes and product standards), can both hamper the proper working of the instruments involved and cause unnecessary administrative costs.

In addition the introduction of non-environmental objectives that require an instrument to be modified, e.g. exemptions or rate reductions for certain industrial sectors to a CO_2 or energy related tax, can reduce its environmental effectiveness and can also lead to significant increases in administrative costs.

Limited information on the side of producers or consumers, high transaction costs or consumer inertia are some of the reasons why market mechanisms may not be as efficient or effective in practice. There is for example evidence that several energy

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[4] "The use of economic instruments, including taxation, to reach specific objectives in energy policy", note for the Economic Policy Committee, ECFIN/REP/51786 – EN. See also the Commission's recent Green Paper on market-based instruments for environment and related policy purposes (COM(2007)140 final) of 28.3. 2007.

[5] Instrument Mixes for Environmental Policy, OECD, Paris, 2007

saving measures are very cost-effective[6], yet they are not adopted because of such market failures. Second, uncertainty about the cost of pollution may mean that market-based instruments do not deliver precisely the socially-optimal amount of pollution abatement, but this same uncertainty equally affects direct regulation.

III. EXPERIENCE IN MEMBER STATES

This section of the report draws upon Member States' replies to a questionnaire on the main policy targets related to meeting greenhouse gas or carbon emissions reduction goals and on the range of policies in place to support the achievement of these targets. The results indicate a wide range of measures implemented in Member States with widely different costs per tonne of CO_2 abated. The full range of measures is reflected in the overview table in Annex A. This shows the most common instruments to be CO_2 and energy taxes, vehicle taxation and support subsidies for public transport users, incentives to promote energy efficiency and support for the production of energy from renewable sources. The efficiency and effectiveness of these measures in meeting energy and climate change objectives is of particular relevance to the delivery of a proportion of the 2020 emissions reduction target through sources not currently covered by the EU-ETS.

III.1 Targets

By ratifying the Kyoto protocol, the EU committed itself to reduce its collective GHG emissions by 8 percent below 1990 levels in the period 2008-2012.

All Member States report the adoption of targets related to meeting their energy and climate objectives. The list of targets varies but typically includes targets for greenhouse gas emissions reductions, for increasing the share of renewables in energy use (including separate targets for electricity and biofuels), for combined heat and power generation, and for energy efficiency, sometimes broken down into separate energy efficiency targets for individual sectors.

These targets sometimes go further than what would be required to meet EU commitments under the Kyoto Protocol and the targets set by the 2007 Spring European Council. This covers both the level of ambition of the targets and their timeframe.

- In the area of greenhouse gas emission reductions, some Member States have already set targets for 2020/2025 (Czech Republic, Germany, UK), or even 2050 (France, UK), although it is not always clear whether these are firmly set down in legislation, with well-defined policy instruments to deliver them, or if they have more of a "guidance" character;

- A number of Member States have set indicative national targets for the share of renewable energies in overall energy use in 2020/2025 or before (Austria, Denmark, Germany, Ireland, Lithuania, Hungary, Portugal, Spain) and/or for the share of biofuels beyond 2010 (Germany, Ireland, Lithuania, Latvia, Hungary, Poland, Portugal);

- Others have set targets for energy saving beyond the direct requirements of EU legislation (Germany, Netherlands,).

[6] Enkvist, Per-Anders et al. (2007). "A cost curve for greenhouse gas reduction," *McKinsey Quarterly*, No. 1, 2007.; also Stern, N. et al. (2006). "The Economics of Climate Change: Stern Review", HM Treasury, London, p. 249.

III.2 Instruments

While various energy and climate change policy measures are used (and tested) in the Member States, questionnaire results did not show a one-to-one relationship between targets and instruments. In some cases, this reflects the nature of Community legislation: while there is an overall target for greenhouse gas emission reductions, the EU emissions trading scheme (EU-ETS) only addresses emissions from larger stationary sources (around 50% of total). This effectively requires Member States to introduce additional instruments to deliver emission reductions from other sectors. It also reflects the intended multiple purpose of some targets, notably for renewable energies, where broad objectives such as security of energy supply, innovation, or rural development may also justify the targets.

Instruments implemented by Member States act on both the demand and supply sides. Few instruments, apart from the CO_2 and energy taxes, and to a certain degree the ETS, cover several sectors and multiple users. The energy and CO_2- tax rates applied are also quite differentiated between users. As a result a uniform price signal across the economy to internalise the costs of greenhouse gas emissions is not provided at present. The sections below provide a brief overview of the different instruments applied in the Member States.

CO_2 and energy taxes

CO_2 and energy taxes are used to increase the price of energy use and thereby to decrease demand. In the future, these measures may be deployed more broadly at both the EU and the national level to deliver the proportion of the 2020 emissions reductions target required from sources not currently covered by the EU-ETS. The Community energy tax framework (Directive 2003/96 EC) forms the basis for energy taxation in the European Union. This framework directive still leaves room for a rather differentiated application. A few countries have also introduced CO_2-taxes (Denmark, Finland, Slovenia, and Sweden) or climate levies (UK), which are also considered as part of the Community energy tax framework. The energy and climate change package discussion should therefore take into account the European Commission's Green Paper on market-based instruments for environment and related policy purpose, published in March 2007.[7]

Experience of Member States has shown that CO_2/energy taxes can have a significant impact on fossil fuel consumption/greenhouse gas emissions (e.g Sweden, Germany). This can be achieved without a significantly adverse impact on the wider economy. By increasing the price of use of fossil fuels, taxes can also provide a strong stimulus for investment in alternative renewable energy sources. Member States also reported however, that sectoral competitiveness concerns often limited the application of such taxes – in Germany for example, such concerns required exemptions from ecological taxes for coal and much industrial energy use. Sweden has similarly maintained very low energy tax rates on electricity and heating oil for its industry.

[7] "Green Paper on market-based instruments for environment and related policy purposes", COM(2007)140 final, of 28.3. 2007.

Examples of environmental tax reforms:

- *The UK reduced the employers' national insurance contribution when the climate change levy was introduced.*

- *Experience in Sweden has shown that increased environmental tax levels have had a major impact on fossil fuel consumption and it is estimated that CO2 emissions would have been 15-20% higher if taxes had remained at 1990 level. In residential and services sectors the emissions in 2005 were one third of the emissions in 1990. In 2006 total revenue from energy and CO2 taxes in Sweden was 6.9 bn € or equal to 2.3% of GDP (Ministry of Finance Sweden, 2007, 'Economic instruments – Swedish experience', presentation to EPC working group, Brussels, 10 October).*

- *Germany conducted an environmental tax reform, in which over a number of years (starting in 1999) taxes on energy were increased, while social security and pension contributions were reduced compared to a "business as usual" scenario without environmental tax reform. According to the results of an evaluation study, the policy cut CO_2-emission by 2-3% and increased employment, while it had only minor negative effects on GDP growth (DIW 2007, 'Ecological Tax Reform (ETR) in Germany', presentation to EPC working group, Brussels, 10 October.)*

In order to mitigate the possible impact on competitiveness from the introduction of a CO_2/energy tax, whilst at the same time still ensuring a reduction in demand for energy, some Member States report the use of negotiated agreements with industry. These act as a complement to the energy tax scheme. Negotiated agreements are required in order to apply reduced tax levels or to grant tax exemptions.

While exemptions to CO_2/ energy taxes are used by several Member States to lever energy efficiency agreements with heavy emitters, there is a risk that they will compromise the environmental effectiveness of such schemes. A recent evaluation of the German Ecological Tax Reform programme concluded that while it had a positive environmental impact it was at an insufficient level for climate change goals and did not provide strong incentives for structural change and sustainable growth in the longer-term. The same study also noted that negative distributional impacts (via rising energy prices) could be compensated via transfers or tax allowances.

Negotiated Agreements

- *The UK applies Climate Change Agreements with energy intensive industries in order to protect their competitiveness, while requiring them to undertake energy efficiency measures. An 80% discount on the climate levy is granted if the industry enters into an agreement, and the measure is estimated to deliver savings of 2.8 MtC (~6.2 $MtCO_2$) per year by 2010.*

- *In Sweden the energy intensive industry can take part in agreements on energy efficiency improvements in exchange for a lower tax burden. Belgium, Finland, Slovenia and Luxembourg also use voluntary agreements with industry to provide incentives (e.g. tax exemptions) for the energy efficiency improvements. In Belgium, negotiated agreements entitle industry to an energy tax reduction (which becomes a total exemption in the case of energy intensive firms); in the Flemish Region, negotiated agreements follow the benchmarking approach.*

- *The Netherlands apply a system called Benchmarking covenant Energy-efficiency, which is an agreement between the Dutch government and the Dutch energy intensive industry. The industry has agreed to improve their energy efficiency so as to be among the world leaders by 2012, while the Dutch government ensures that no other national energy efficiency policy measures energy taxes or permits are applied to them. The program covers about 40% of the national energy consumption. An evaluation in 2006 showed that the average energy efficiency of the Dutch industry is higher than that of the world leaders, but the lead of the Dutch industry is declining. In 2002, yearly efficiency gains corresponding to 5-6 Mt CO_2 were expected for 2012. These expected gains were revised downwards in 2005 to 3-4 Mt CO_2.*

Revenues from energy/CO_2 taxes can be used to improve fiscal balances or to reduce taxes on activities that the government wishes to encourage, for example some Member States have used introduction of a "green tax" to switch away from other taxes, for example to promote labour market participation by reducing employment related taxes. Increasing the share of total revenue from green taxes could have implications for public finances, given that, if the measure succeeds in reducing consumption as intended, tax revenues would then also decline.

Biofuels

The European Council set a 10 % binding minimum target for the share of biofuels by 2020 to be introduced in a cost-efficient way and subject to production being sustainable, second-generation biofuels becoming commercially available and the Fuel Quality Directive being amended accordingly to allow for adequate levels of blending.[8] Some Member States use exemptions or reductions on excise duties in order to increase both supply and demand and meet the EU target, others have implemented regulation e.g. in the form of obligations on fuel suppliers to include an increasing share of biofuel in the road transport fuel they put on the market. In some cases, Member States have combined a market-based and regulatory approach. Evidence shows a shift from tax exemptions or "de-taxation" to blending obligations once the volumes and the revenues foregone start to become sizeable.

Tax incentives and blending obligations have proven to be effective in stimulating increased demand/supply for biofuels. In the case of a tax exemption, the additional costs of biofuels compared with petrol or diesel fall entirely or mainly on the general budget. This can be costly in revenue terms, as has been shown by the shift by Member States to a regulatory approach following the success of subsidy schemes. However, an obligation on the oil companies will mean that others (e.g. road users as fuel consumers) end up bearing the costs. This should be considered carefully in developing policy in this area. The high costs of biofuels per tCO_2 mean that the cost-effectiveness of some policy measures will need to be determined by weighing costs against the effects on security of supply, rural development and land use as well as taking into account possible impacts on prices. The development of EU level biofuel policy, through both the EU Renewables Directive and the Fuel Quality Directive should ensure those criteria are met. Policies should also recognize the fact that different biofuels will lead to a wide range of overall lifecycle GHG reductions and should incentivize the production of more sustainable biofuels.

Vehicle taxation, public transport etc.

Transport is one of the key sectors in the delivery of EU GHG emissions reductions outside the EU-ETS. While aviation is expected to be included in the EU-ETS from 2012, surface transportation remains outside the scheme. The European Commission is considering that shipping might be included at a later date. Environmental vehicle taxation based on CO_2 emissions is currently used by 10 Member States (Denmark, Spain, Ireland, Cyprus, Luxembourg, Austria, Portugal, Finland, Sweden and UK) and a further 3 (Belgium, Italy and the Netherlands) have subsidies or rebates to stimulate the purchase of low emissions vehicles.

Other Member States are increasingly moving towards differentiating registration and circulation taxes according to CO_2 emissions. In addition, some Member States offer incentives to replace older, more polluting cars with newer, cleaner models. Several Members States also provide substantial subsidies/tax incentives for cars which run on alternative fuel.

[8] The Presidency Conclusions, European Council, 8/9 March 2007

Vehicle Taxation

i) Registration and circulation taxes differentiatied according to CO_2 emissions

- Cyprus has differentiated its registration and circulation taxes since 2003, and the measure was strengthened in 2007. A percentage reduction depending on the emission level is granted on the tax calculated according to the engine size. Italy has introduced a similar system in 2007 taking account of both the power and the environmental features of the engine.

- Portugal has overhauled its vehicle taxation system along the same lines, increasing the environmental component of circulation taxes from 10 to 30%, as from July 2007, with a further increase to 60% to be applied, from January 2008 onwards. Luxembourg, on the other hand, has as of January 2007 shifted to a purely CO_2-based system, and the tax rates have been increased, as the motor vehicle tax revenues are expected to double in 2007. From 2008, tax rates in Finland and Ireland for both circulation and registration taxes are based on CO_2 emissions.

- A reform of vehicle taxes has been approved in Spain. The aim is to base tax rates on CO_2-emissions. Furthermore, circulation taxes in Sweden and UK already take account of CO_2-emission levels. Germany is currently in a process of reforming its annual circulation tax, with a view of differentiating the tax rates depending on the CO2-emissions.

- Belgium is granting tax rebates when purchasing new cars that emit low levels of CO_2, the budgetary impact of which was estimated to be €7.9m in 2007.

ii) Subsidies for purchase of cars running on different types of alternative fuels

- Several Member States also provide subsidies for purchases of cars running on different types of alternative fuels. Cyprus and Ireland are for example subsidising hybrids, flexible fuel and electric cars. Italy is in addition to electrical cars subsidising methane and LPG vehicles, while France grants tax exemptions to hybrid and LPG vehicles. Netherlands offers high tax rebates on fuel-efficient cars, up to 5000€ for hybrid cars. Malta has a number of measures, namely the removal of registration tax on battery operated vehicles/motorcycles and reduced registration tax on hybrid vehicles.

iii) Incentives to replace older, more polluting cars with newer, cleaner models

- Italy is providing a subsidy to scrap old more polluting cars when replaced with new cleaner cars. The existing subsidies to replace older cars with new less polluting vehicles in Spain have, on the other hand, been phased out as part of the reform of vehicle taxation, due to the declining efficiency of this measure.

Whilst tax incentives send a price signal to encourage consumers to purchase less polluting models, at current levels, rates are probably not high enough to incentivise additional behaviour and therefore only have marginal effect. Given that company cars often account for a large share of the new cars, there is a need to ensure that company car tax schemes take into account environmental, and in particular climate change, policy.

Several Member States recall the role of public authorities in encouraging public transport through measures such as subsidies to transport companies, tax breaks for public transport users, and measures such as bus lanes and limits on on-street parking. However, many of these measures, along with congestion charges recently introduced in some cities, are typically within the remit of local authorities and so Member States in general did not report on them in detail in their replies to the questionnaire.

Tax rebates, regulations and other measures to improve energy efficiency

Tax rebates and other forms of subsidy are widely used to promote energy efficiency and applied by almost all Member States. Energy efficiency measures are often targeting the household sector or buildings in general, and fund purchase of more energy-efficient domestic appliances and improved insulation. In some countries, the rebates or subsidies are highly targeted, and differentiated, according to the nature of the equipment being purchased or investment undertaken. In others, the incentive seems to take the form of allowing a fixed percentage of the cost to be offset against taxes. Other Member States have introduced "White Certificate" schemes.

White certificates

- Italy and France have introduced “white certificates” to promote energy savings. Under these schemes, designated energy suppliers have to make quantified savings in the amount of energy they deliver compared to a baseline. The authorities deliver a “white certificate” to the supplier for each confirmed unit of energy saving. Individual suppliers may comply with their target either by implementing energy saving measures themselves or by buying “white certificates” from other suppliers who have exceeded their target. In Italy the target is set at energy savings of 2.9 Mt of oil equivalent per year. Eligible projects cover a wide range of actions including fuel switching, introducing high efficiency appliances, and information campaigns on energy saving. So far most of the measures undertaken relate to electricity use in the residential sector and public lighting. The French system has a target of energy savings amounting to 54 TWh by 2009 in relation to a baseline.

Experience from Member States suggests that improving household energy efficiency is a low-cost way to cut emissions and meet the EU energy saving target. However, multiple market failures surrounding the inefficient use of energy mean that economic instruments alone can be insufficient to change behaviour. In addition, subsidies to encourage energy efficiency improvements may give rise to significant levels of “free riding” on the part of households who use the subsidy to carry out improvements they would have made without it. Finally, incentives should be reviewed over time to avoid overlap with new legal and regulatory requirements (such as for energy efficient construction), as subsidies targeted at the same sector will not generate additional GHG emission savings.

Apart from the household sector, several Member States also use fiscal incentives to improve energy efficiency by encouraging combined heat and power generation in industry.

Renewable energy: green certificates and/or feed-in-tariffs

In general additional measures will need to be adopted by Member States in order to meet the EU's binding target of 20% from renewable resources. There are important links between increasing the supply of renewable energy and energy market liberalisation proposals regarding variable provision of fair and equitable grid access for renewable energy producers[9] and other issues such as security of supply. To increase the production of electricity from renewable energy sources, feed-in tariffs and "green certificates" are the most widely used measures. Other support mechanisms include research and development support, direct subsidies and investment support.

The vast majority of EU member states (19) use feed-in tariffs to increase the share of renewable energies in the electricity sector. Feed-in tariffs proposed by Member States generally appear to share the following characteristics:

- they are fixed and limited in time (a particular installation is eligible to receive a pre-determined feed-in tariff for a pre-determined number of years – generally from 10 to 20); therefore giving long-term stability and investment security;
- they are differentiated by type of technology, and by when the site started operation (older wind turbines receive a higher payment than newer wind turbines, photovoltaics receive a higher payment than wind turbines);
- they are funded by a levy on the electricity price, which is paid for by consumers.[10]

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[9] 'The share of renewable energy in the EU', Com(2004) 366 Final of 26.5.2004.
[10] The Netherlands is a partial exception to the last characteristic. Its feed-in tariff has led to a rapid growth in the volume of electricity generated from renewables, so that the additional costs have been partly met from the budget .Access to the tariff is closed for new entrants, as the current stock is enough to meet its target for electricity generated by renewables.

Some Member States are currently moving from a system of fixed feed-in tariffs to one in which producers of electricity from renewable energy sources simply receive a premium on top of the market electricity price. The introduction of premiums exposes producers to market forces, as rather than receiving a fixed revenue per unit, the revenue received by producers will depend on the development of electricity prices. By being paid a premium in addition to the market price, the producer is rewarded for not creating a negative externality through the production of electricity from non-renewable sources (thereby transforming the feed-in tariff into something of an “externality adder”).

Feed-in tariffs for renewables

- Germany introduced a feed-in tariff system in 1991 and then amended it in 2000. It has lead to a substantial increase of the share of renewables from 2.8 % in 1991 to 12 % in 2006 in the electricity sector. The CO_2-emission savings only based on the EEG are estimated to be around 45 $MtCO_2$. It has increased the electricity costs for a normal household by around 3.5%. An amendment to increase the efficiency of the scheme is currently under consideration in order to limit overcompensation in some cases as well as strengthening incentives in others.

'Premium' schemes

- In Denmark a straight premium of DKK 0.10/kWh (~€0.013) is paid to a newly installed wind turbine for the first 20 years of production. Previously a tariff was set for an initial period (10 years and later a specific load), and thereafter a premium was provided on top of the electricity price in the period up until 20 years of operation. A ceiling was applied for the total of the premium and the electricity price.

- Spain currently applies a system that provides the RES-electricity producers with a choice between a fixed tariff or a premium, which has allowed a substantial increase in the share of renewables in the electricity sector. The producer chooses the regime for one year at a time. A new regulation in 2007 has introduced a cap and floor for the premium, which implies that for electricity prices above €87/MWh the premium is zero. The cost of the renewable support as a percent of the total electricity tariff in Spain is expected to rise from 6% in 2006 to 9% in 2010.

<u>"Green certificate" systems</u> are the renewable energy equivalent of the “white certificates” for energy saving outlined earlier in this report. They have been introduced in a number of countries (e.g. Italy, Belgium, Romania, Sweden, the UK and, recently, Hungary) even if feed-in tariffs are more common. In a green certificate system the quantity of renewable energy to be brought into the market is determined by the authorities, but the price for the certificate remains uncertain.

Green certificate schemes

- The Italian system started in 2002 with a quota of 2% renewable electricity. The quota was then increased by 0.35% per year in the period 2004-2006, and deadlines have been set for when the quota should be fixed for the subsequent periods. In Italy the Electric System Manager (GSM) now provides both a floor and a ceiling to the system by its prescribed market operations.

- Sweden introduced a certification system in 2003 with a target to increase renewable energy production by 17 TWh by 2016 compared to 2002.

- The UK Renewable Obligation system has been successful in bringing in the cheapest forms of renewable electricity production to the market, i.e. landfill gas and onshore wind. It also fits well with a competitive electricity market, as the renewable electricity is traded on the wider electricity market, while the renewable component is marketed on the certificate market.

- Belgium has three different regional certification systems and a federal one. Minimum prices are set for different technologies in the federal, the Walloon and the Flemish systems, while penalties provide a price ceiling in the systems in Wallonia and Brussels.

- Estonia actually applies both feed-in tariffs and certificates of origin as of May 2007. This is in preparation for a wider market on renewable electricity, and is a result of the large interest to invest in wind power in Estonia. A fixed feed-in tariff is available up until 200 GWh wind power is installed in a calendar year, a premium tariff is then offered up until total installed wind capacity reaches 400 GWh. Certificates of origin are then granted to installations exceeding the 400 GWh without any limit.

As regards the choice of support, feed-in tariffs provide predictability, stability, profitability to investors, and so have lower short-run costs, but appear to offer poor incentives to reduce costs over time. Feed-in tariffs offer each technology a premium to come onto the market. Green certificates, on the other hand, put producers under greater competitive pressure but at least in the short-term carry a risk premium because producers lack certainty about future income flows. In addition they could lead to high prices if the obligation is set at a very high level so that new technologies set the price on the margin. To counter this, some Member States have established floor and/or ceiling prices for their green certificates (e.g. Belgium, Romania), thereby giving greater certainty to investors, and protecting electricity users from excessive costs.

So far feed-in systems have in general proved themselves to be more effective and more cost efficient compared to certificate systems in the short run. But important advantages of green certificates are that they would more clearly be compatible with the creation of a trading scheme for energy from renewable sources and increase the chances of competition between energy sources, thereby leading to lower costs in the medium to longer term. Feed-in tariff schemes may, however require some modification to make them consistent with a cross-border trading scheme.

The introduction of variable elements into feed-in tariffs, and of price guarantees into green certificate schemes, may suggest that the two approaches are tending to converge as regards the effective incentive they offer to producers. However, depending on market and price structures, both feed-in tariffs and green certificate schemes may substantially increase electricity prices giving rise to important competitiveness, general macroeconomic and distributional impacts[11].

Trade in renewables

To date, support for renewable energies has mainly been restricted to domestic producers. The large expansion in the scale of renewable energy consumption called for by the 2020 target set by the European Council represents a relatively expensive way of meeting GHG reduction targets. There is therefore a need for flexible mechanisms that provide policy-makers with a high degree of choice on how they want to comply such as trading, different compliance regimes etc, to help reduce costs of meeting 2020 target. A cost-effective approach could usefully include an option for Member States to 'make or pay'.

A trading scheme could be set up to operate at either company or Member State level. Any trading system would need to ensure sufficient level of demand; would involve an agreed list of approved sources; would need to be designed in such a way as to provide adequate certainty to investors; would have to minimize administrative costs and would need to take account of existing national support schemes.

Conditions under which the scheme would also allow purchase of physical and virtual renewable energy from non-EU sources should be considered. One important issue is the need for appropriate certification mechanisms. The extension of energy trade opportunities to third countries would favour the deployment of renewable technologies where potential is higher.

IV. EMISSIONS TRADING

Emissions trading is a relatively recent development within the EU. The EU ETS only came into force on January 1st 2005. Nevertheless, despite this limited experience, the Spring meeting of the European Council recognised the central role of emissions trading in the EU's long-term strategy for reducing greenhouse gas emissions. Strengthening the EU-ETS and linking it with other emerging emissions trading schemes worldwide to create a global carbon market provides a key opportunity to develop an efficient and low-cost international approach. European industry is already factoring the scheme into their planning: a recent survey has indicated that half of all companies in Europe's energy intensive industries regard the EU ETS as one of the primary factors affecting their long-term investment decisions[12].

The EU-ETS is the world's largest trading scheme, covering around 11,500 fixed sources representing around 45% (2.2 Gt) of the EU-25 total CO_2 emissions (source: IEA). In 2006, allowances representing some 817 million tonnes were traded; the total value of trades was €14.6 billion (source: Point Carbon). For the first Kyoto commitment period 2008-2012, some 2 billion emission allowances will be allocated each year. At November 2007 prices for 2008-12 allowances, each year's allowances have a value of about €45 billion. The EU-ETS functions as a key driver of international carbon trading and has the clear potential to serve as the foundation of a global market.

[11] A recent study by Bruegel noted that the combined effect of different price structures and incentive schemes means that the increase in electricity prices to deliver a 30% renewables share would vary between countries, depending also on previous efforts.
[12] Review of the EU Emissions Trading Scheme, McKinsey & Company and Ecofys, November 2005.

Steps are already being taken to widen both the geographical and sectoral scope of greenhouse gas emissions trading. It has recently been agreed to link the ETS with trading schemes in Norway, Iceland and Liechtenstein. In the second phase of the EU-ETS, some Member States have decided to include additional greenhouse gases within its scope. The Council and the European Parliament are examining a Commission proposal to include aviation emissions in the EU-ETS. The Commission's review of the EU-ETS is expected to propose including emissions from a wider range of economic activities. Thus, despite some teething problems, there is clearly confidence in the ability of emissions trading to play a leading role in reducing emissions.

A number of lessons learned from the first phase of the EU-ETS, including over-allocation (leading to near-zero allowance prices), different approaches in national allocation plans (leading to potential competitive distortions), "windfall profits" for electricity producers and administrative compliance costs for small installations have been acknowledged. These issues should be addressed by Member States and the Commission in future phases.

<u>Strengthening the scheme</u>

The Commission's Review of the Scheme is expected to provide new rules for Phase III of the scheme for the period 2013-2020 that will address many of the difficulties encountered, improving its ability to deliver flexible and cost-effective reductions and strengthening its ability to provide a solid foundation to the emerging global carbon market.

Priorities for Finance Ministers should include:

- creating a deeper more liquid market to maximize economic efficiency, to which linking the EU-ETS with other trading schemes would contribute (see below);
- considering the impacts of the allocation methodology on competitiveness;
- considering fiscal impacts[13].

1. Linking schemes would contribute to maximizing economic efficiency

Linking to Kyoto-based schemes is facilitated under existing rules but new proposals are expected in the Phase III directive to enhance/ expand current provision. The more emissions reductions can be traded internationally, and the more emissions that are covered, the more cost effective it will be for all to achieve challenging emissions reduction targets. Links between schemes may be direct (mutual recognition of allowances) or indirect (supply and demand in one system affects supply and demand in another through a common element, such as CDM). In general terms, linking allows emission reduction efforts to be redistributed across systems, providing access to a greater range of emissions reduction opportunities, helping reduce volatility, increasing liquidity (which should enhance efficiency) and addressing some competitiveness concerns.

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13 See also EPC note to Ecofin **"**The use of auctioning in the post-2012 ETS allocation scheme**"**, ECFIN/EPC(2007)REP/51207**,** of 11.5.2007. See also Commission Communication to be issued on 23rd January 2008 concerning amendments to Directive 2003/87/EC.

However, linking the ETS to trading schemes must be done with full consideration of the economic and environmental implications. Linking will create winners and losers through the equalisation of allowance prices between two linked systems. There must be confidence that emission allowances, from whatever source, represent genuine emission reductions and not just moving emission-generating activities elsewhere.

Experience of the regulation of international financial markets should be used when it comes to determining the conditions under which different emission trading schemes may safely be linked. There are also issues related to market monitoring and information where the expertise of Finance Ministers may be particularly relevant. As evident in Phase I of the scheme, the release of market-sensitive data (in this case annual verified emissions data) must be done in a regular, transparent, and predictable manner that treats all stakeholders equitably. Further work is required on monitoring or regulatory supervision that might benefit the scheme by providing for a forward look that highlights emerging issues and communicates these effectively to stakeholders at both the Member State and European levels.

2. Competitiveness implications of allocation methodology

In principle, increasing the use of auctioning in the future phases of the EU ETS should be considered as the simplest and most effective allocation method, which would also mitigate the risk of windfall profits being generated. As a consequence of the expected shift toward increased auctioning of EU-ETS allowances, European firms will face additional financial costs related to compliance with the EU-ETS (and/ or to the delivery of the EU 2020 renewables target) to cover their greenhouse gas emissions, including from their electricity consumption, if there is no international agreement or other major players have a much lower level of ambition. These are not costs that most potential competitors in third countries will face. Firms in sectors where international competition is intense may be unable to pass through higher costs, and may lose competitiveness to firms outside the EU. It must be noted that, as shown by recent Bruegel report[14] even in the context of an international agreement EU exports are more carbon intensive and will be more affected.

The additional costs involved may lead to a risk of emissions-intensive industries relocating production to countries with lower environmental standards outside the EU (carbon leakage). While current knowledge of leakage risks is incomplete, there is broad agreement that evidence shows that risks will be concentrated in relatively few emissions-intensive sectors of the economy and is therefore a limited problem without major macro-economic consequences. However some countries may be more affected than others (depending on the carbon intensity of their industry). Leakage concerns will need to be addressed in the context of the forthcoming EU-ETS directive.

An international agreement would be the optimal solution to this issue and the outcome of the UN Framework Convention in Bali in December 2007 is a positive step in this direction. Otherwise, in the absence of a global agreement, the key policy options for tackling the risk of leakage for an exposed sector that were considered include:

- conditional free EU-ETS allowance (with appropriate allocation mechanisms) to industries most exposed to risks of carbon leakage;

[14] Bruegel (2007). "Why Europe is not Carbon Competitive", *Bruegel Policy Brief*, Issue 2007/05, November 2007.

- border taxes/ adjustment;
- government-led international sectoral agreements[15]

Even with (unconditional) free allocation, marginal (opportunity) costs may also give - to a certain extent and depending on the relevant sector - an ongoing incentive to shift the production outside the EU.

The legal and technical challenges of border taxes/ adjustment, combined with possible negative repercussions for international cooperation/ negotiations, make this the least attractive of the options to address leakage. Further work is required on how a system of conditional free allowances could be designed to avoid distortions that might be created by an unconditional system and global sectoral agreements should be explored further.

The expected shift toward the increased level of auctioning of allowances in Phase III of the EU-ETS will have important implications for Finance Ministries in terms of the new revenue streams it will generate but it will also have implications for existing revenues and the flexibility that Member States need to maintain sound public finances. The distribution of auction revenues is entirely a matter for Member States.

In the longer term, the future prospects of energy-intensive industries in a “carbon constrained” world, depend on these industries becoming less intensive. It may therefore be worthwhile considering, in addition to “defensive” measures, whether it would be possible to devise incentives that would enable the adjustment of energy-intensive industries to long-term carbon constraints.

Interactions between the ETS and other instruments

Very few, if any, policy instruments act in isolation, and the ETS is no exception. Examples of measures that interact directly with the ETS include energy taxes, energy efficiency policies, subsidies, feed-in systems and/or quotas for renewable energies, and other tradable schemes such as green and white certificates. As far as greenhouse gas emissions are concerned, the ETS “cap” determines the level of emissions, and so these additional measures will not deliver any immediate additional emissions reductions from the sectors covered by the ETS, although policies which reduce the energy demand can contribute to setting of a tighter cap in future phases.[16] However, other instruments which could have their own rationale, independent of climate change policy – such as increasing revenues for public finances and security of energy supply in the case of renewables - may affect the efficiency of greenhouse gas reduction, increasing or lowering the cost of achieving a given emission reduction target. It is also necessary to consider what is likely to be the most effective for achieving intended outcome, for example taxation and trading can usefully target all greenhouse gas emitters, but taxes are better for covering individual consumers (i.e. when polluters are numerous), whilst emissions trading is more suitable for large polluting sources which are small in number.

- *Energy taxes* interact with the EU-ETS by changing the effective marginal abatement cost faced by firms: the marginal cost of an additional unit of emissions is the allowance price plus the tax on the energy consumption that gives rise to the emissions. In the EU, levels of energy taxes differ between

[15] Neuhoff, Karsten, (2007). "Policy options for addressing leakage impacts", Climate Strategies presentation to the EPC working group, 26 November.
[16] "OECD (2007) "Instrument Mixes for Environmental Policy", OECD, Paris, 2007.

countries, so that firms in the EU-ETS in different Member States face different incentives to reduce emissions. This means that overall abatement costs within the EU-ETS are not minimised at EU level. However, this provides Member States with flexibility over costs of meeting the EU cap. It also allows Member States to respond to particular market failures or objectives. For example energy taxes can support other environmental objectives, raise revenue to fund public services, improve economic efficiency, reduce other pollutants, improve security of supply and fuel poverty.

- *Energy efficiency policies* such as energy labelling may increase the responsiveness of firms or households to energy price increases induced by the EU-ETS. This should lower allowance prices and so reduce the costs of achieving the targeted greenhouse gas reductions.

- *EU targets for renewable energies* cover the use of renewables inside (electricity production) and outside (heating, transport) the scope of the EU-ETS. Policies aiming at an increased level of renewable energy also have their own rationale despite of climate change policy (promoting innovative technology, improve security of supply). For electricity production, impacts on the cost-effectiveness of emissions reductions in the EU-ETS depend on whether the contribution of renewable electricity production to the overall renewables target is greater or less than the cost-effective contribution of renewables to the EU-ETS emissions target. In the latter case, the renewables policy should not affect the cost-effectiveness of the EU-ETS; nor will it lead to a level of electricity production from renewables different from that which the EU-ETS would have delivered in the absence of the renewables policy.

VI – MAIN CONCLUSIONS

EU Member States have already implemented, and are considering, a wide range of instruments to achieve energy savings and develop alternative energy sources. The exchange of practical experiences by Member States on the advantages and disadvantages of policy instruments – both at a national and European level – has allowed the EPC to identify a set of key conclusions that should be considered when designing instruments/instrument mixes:

1. <u>Costs, instruments, objectives</u>

Relative costs of policies

The review of practical experience in Member States demonstrates a diversity of policy approaches and large differences in the costs per tonne of CO_2 abated associated with different measures across EU countries (Annex B illustrates the differences in abatement costs of different technologies estimated by Member States).

Typically, measures to improve building energy efficiency and promote energy efficiency come at least cost, while increasing the share of renewables – particularly solar power – is a relatively expensive way to reduce greenhouse gas emissions.

However, whilst they require a large upfront cost, in the longer term the development of new technology may make electricity from renewable sources less expensive.

To ensure cost-effective policies which reduce emissions and secure other objectives, it will be important to test policy proposals against appropriate benchmarks and alternative abatement opportunities. It has been estimated that 70% of the GHG abatement technologies indicated are available now, only the remaining 30% of opportunities require a learning effect to bring costs down[17]. However, this should not lead to less investment in R&D for new promising technologies and the further development of existing technologies to reduce abatement cost.

Well functioning energy markets and a stable regulatory framework can also help to improve price signals and reduce the costs of policies. The single market for energy is currently very uneven in terms of both price structures and interconnectors and until the situation improves, it will be difficult to realise equitable and efficient delivery of these objectives across the EU-27. More efforts are needed to achieve a truly interconnected and single Europe-wide internal market for electricity and gas.

Trade-offs between climate policy and other policy objectives

Tradeoffs between climate and other policy objectives and the cost implications of those need to be made explicit in delivering EU climate change targets. All targets set – and instruments applied – should undergo careful cost-benefit analyses, both ex ante and ex post. As a great deal of the costs of meeting climate change targets will be born by consumers in the form of higher energy prices[18], full consideration must be given to the estimated total economic and macro-economic impacts of meeting all climate change and energy targets.

Instrument Mixes

Information provided by Member States shows that instruments are currently applied in combination with other measures in sectors both included in and outside the scope of the ETS. This reflects not only the multi-dimensional nature of environmental issues and interconnectivity of climate change targets, but also non-environmental market failures and non-environmental policy objectives.

In sectors covered by the ETS, the “cap” determines the level of emissions, and so any additional measures will not deliver further emissions reductions. They may, however, affect the efficiency of greenhouse gas abatement, increasing or lowering the cost of achieving a given emission reduction target.

There are many good reasons for applying a mix of instruments to address a given environmental problem – but not all existing instruments have been designed to ensure this is achieved. As the incentives provided by different instruments can vary considerably, for them to be effective they need to be coherent and consistent.

[17] Enkvist, Per-Anders et al. (2007). "A cost curve for Greenhouse Gas reduction.", *McKinsey Quarterly*, No. 1, 2007

[18] Delgado, Juan, 2007. ‘A renewables policy for Europe’ Bruegel presentation to the EPC working group, 10 October, also Italy’s Ministry of the Economy and Finance (MEF), 2007, ‘Renewables: issues for Europe and Italy’ presentation to the EPC working group 10 October.

2. Impacts of measures

Fiscal and budgetary impacts

The implementation of measures to meet the Spring European Council 2007 targets will potentially have significant public finances implications. Revenues from environmental taxes already account in the EU-27, on average, for 6.6 %[19] of EU Member States revenue from overall taxation. However if taxes imposed to discourage polluting behaviour are effective, this will result in declining revenues.

The direct economic cost of the Commission's energy and climate change package is estimated to be 70bn euros in 2020[20].

The shift toward greater levels of auctioning of allowances in Phase III of the EU-ETS will have important implications for Finance Ministries, not only in terms of the new revenue streams it will generate, but also for existing revenue streams and the flexibility that Member States need to maintain sound public finances. For reasons of subsidiarity and sustainable public finances, revenues from auctioning should be used in line with sound budgetary principles and, specifically, not be subject to mandatory earmarking or hypothecation at EU level. It should be also borne in mind that the use of such revenues by Member States should not be inconsistent with EU efforts to tackle climate change and should avoid perverse environmental incentives.

Competitiveness impacts

Sectors exposed to international competition and with high energy intensity may see their competitiveness affected. While current knowledge of leakage risks is incomplete, there is broad agreement that evidence shows that risks will be concentrated in relatively few emissions-intensive sectors of the economy, which vary across countries, and is therefore a limited problem without major macro-economic consequences.

In addressing these concerns it will be important to take into account the effectiveness of various possible measures and allocation methods set out earlier in this Report.

Distributional impacts

Measures to deliver GHG reductions and a greater proportion of energy from renewable sources are expected to result in significant price increases for consumers. Further work and monitoring is required to understand the magnitude of these increases, their macroeconomic impacts and how these will vary across the EU-27. These prices increases will have relatively greater impact on low-income households and energy intensive commercial/ industrial users. To some extent, the available empirical evidence shows that to date carbon taxes have small or moderate distributional impacts, as Member States have used the additional revenues generated to provide tax reductions or transfer payments to those most affected.

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[19] In 2005, revenues from environmental taxes in the EU-27 (in the GDP-weighted average) accounted for 2.6 % of GDP and 6.6% of total revenues. *Source: Taxation trends in the European Union - Data for the EU Member States and Norway (Eurostat, 2007)*

[20] *Table III - Overview of impacts at EU level for key scenarios of the impact assessment (Source: EC, Brussels, 23 January 2008, SEC(2008) 85/3)*

There are also potential distributional impacts resulting from the linking of different carbon markets when the level of ambition differs between systems.

International action

International cooperation is critical to have economically efficient and environmentally effective action. In order to achieve cost-efficient solutions the ultimate aim should be to have a global price on carbon. The establishment of a global carbon market, with interlinked regional, national and sub-national schemes together with the use of flexible mechanisms, such as the Clean Development Mechanism (CDM), and the implementation of complementary policies at the national level using a wide range of economic tools will be an important part of an effective, global agreement. The EU-ETS has the potential to form the basis of such a global carbon market through linking to CDM/JI and to other future international schemes e.g. in USA, Australia.

Developing countries account for more than half of the world's low cost abatement potential[21] and EU policies should take this into account, alongside the existing obligation to deliver reductions within the EU. The involvement of developing countries will be key to achieving global climate change objectives, and the issue of financing will be an important element of the negotiations.

Finance Ministers have a pivotal role to play in finding solutions, creating new financial instruments and funnelling private sector investment to tackle the international problem of climate change, including both mitigation and adaptation, in order to provide positive incentives for developing countries to take action to achieve cost-effective abatement.

[21] Enkvist, Per-Anders et al. (2007). "A cost curve for greenhouse gas reduction", *Mckinsey Quarterly*, No.1, 2007.

Annex A: Overview of measures to reduce greenhouse gas emissions and promote energy efficiency

Measures Member States	CO_2 taxes or climate levies	Tax exemptions or reduced excise duties on biofuels	Blending obligations	Car taxes based on CO_2	Subsidies or tax rebates to stimulate purchase of low emissions vehicles	White certificates	Other measures to promote energy efficiency	Green certificates (renewables)	Feed-in tariffs (renewables)
Belgium		**x**			**x**		**x**	**x**	
Bulgaria		**x**					**x**		**x**
Czech Republic		**x**	**x**				**x**		**x**
Denmark	**x**			**x**			**x**		**x**
Germany	**x**[22]	**x**	**x**	**x**[23]			**x**		**x**
Estonia		**x**					**x**	**x**	**x**
Greece		**x**					**x**		**x**
Spain		**x**		**x**			**x**		**x**
France		**x**	**x**		**x**	**x**	**x**		**x**
Ireland		**x**	**x**	**x**	**x**		**x**		**x**
Italy		**x**			**x**	**x**	**x**	**x**	
Cyprus		**x**	**x**	**x**	**x**		**x**		**x**
Latvia							**x**		**x**
Lithuania		**x**	**x**				**x**		**x**
Luxembourg				**x**			**x**		**x**
Hungary		**x**	**x**				**x**	**(x)***	**x**
Malta		**x**			**x**		**x**		
Netherlands			**x**		**x**		**x**		**x**
Austria	**x**	**x**	**x**	**x**	**submitted bill to Parliament**		**x**		**x**
Poland		**x**					**x**	**x**	
Portugal		**x**	**x**	**x**	**x**		**x**		**x**
Romania		**x**					**x**	**x**	
Slovenia	**x**	**x**	**x**				**x**		**x**
Slovakia		**x**					**x**		**x**
Finland	**x**	**x**	**x**	**x**			**x**		**x**
Sweden	**x**	**x**		**x**	**x**		**x**	**x**	
United Kingdom	**x**	**x**		**x**			**x**	**x**	

* possible under the new law on electric power (law N^{o} LXXXVI. of year 2007)

[22] Germany increased energy taxes with the Ecological Tax Reform in 1999.
[23] A reform of car taxes is currently under discussion; it is aimed to introduce a CO2-element on 1/1/2009.

Annex B: Illustrative costs of emissions reduction measures as estimated by Member States

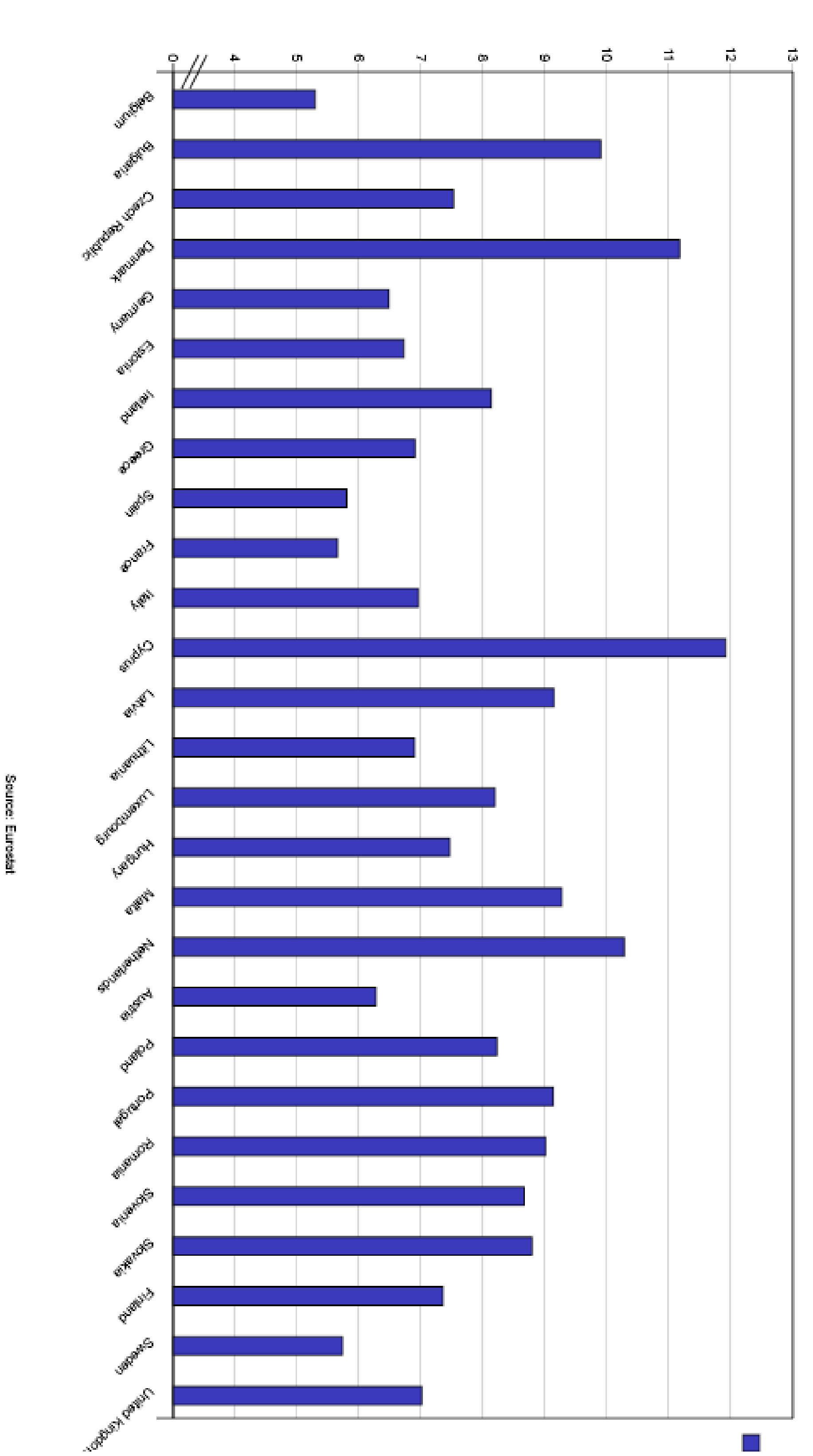
	sector	indicator	€
Austria	Biomass (heat)	subsidy per tCO_2, calculated on the life span of the technology 2006	7
	Solar heating		96
	Business energy saving		10
	Thermal insulation		37
	Climate relevant gases		2
Cyprus	renewables and energy saving grants	subsidy per tCO_2, 2005-2010	150
Czech Republic	energy saving	direct budgetary costs per tCO_2, 2001-5	76
	energy audits		3
	renewables		47
Denmark	Wind	socio-economic cost per tCO_2, 2008-12	37
	Plant expansion through wind	(2002 prices)	34
	CHP		13
	Biomass		44
	Business energy saving		37
	Conversion old houses to CHP		258
	Conversion oil to coal-fired CHP		114
	Domestic solar heating		765
	Domestic heat pumps		87
	Domestic biomass		81
	Building labelling		174
	Changes to energy taxes		44
	fuel taxes		104
	regulation of industrial gases		27
France	thermal insulation	budgetary cost per tCO_2	2
	low-temperature boilers		4-16
	condensing boilers		10-31
	wood		43-46
	insulation of windows		137
	heat pumps		97
	solar heating		290-323
	wind	socioeconomic cost per tCO_2	46-150
	solar photovolatic		600
	biomass		120
	solar heating		220-420
	wood		10-75
	biofuels		160

Ireland	biofuels	foregone tax revenue per tCO_2, 2008-	200

Spain	renewables in electricity	Avg. FIT + subsidy per tCO_2, 2005-10	~70
	transport household equipment agriculture building	budgetary cost per tCO_2, 2008-2012	4,64 57,33 20,10 22,61
(Source of data for Spain: Action Plan 2008-2012, Spanish Strategy of Energy Saving and Power Efficiency 2004-2012.)			

Source: Member States responses to questionnaire on practical experiences with instruments to support energy and climate change targets. The table does not include comprehensive information on instruments and Member States. The figures are based on estimations made by each Member State using different methods and should not therefore be used for any direct comparison.

Annex C: Chart: Total environmental tax revenues as a percentage of total revenues from taxes and social contributions, 2004



Annex D: Glossary of terms

CDM: Clean Development Mechanism

[A UNFCCC project-based credits mechanism to recognise greenhouse gas emissions reductions in countries that have no emission reduction targets under the Kyoto Protocol.]

JI: Joint Implementation

[A UNFCCC project-based credit mechanism where cooperating countries must both have a reduction commitment under Kyoto.]

PPM: parts per million

CO_2e: CO2 equivalent

Mtc: megaton (million tons) of carbon

LPG: liquefied petroleum gas

RES: renewable energy source

White certificate schemes: A (tradable) white certificate scheme complements (but does not replace) existing energy efficiency policies and measures. Certificates can be created from projects that result in efficiency savings beyond business as usual. These can then be used for compliance or trading.

Feed in tariffs: Producers of renewable energy are guaranteed a set rate for their electricity for a lengthy period (typically 20+ years), usually differentiated according to the technology used and the size of installation.

Green certificates: Governments mandate a minimum share of capacity or (grid-connected) generation of electricity to come from renewable energy sources (RES). The share often increases over time, with a specified final target and end-date. The mandate can be placed on producers or distributors. Producers receive credit in the form of 'green certificates' for the renewable electricity they generate, which can be traded or sold, to serve as proof of meeting their legal obligation and to earn additional income.

KWh: kilowatt hour

[The watt hour, is a unit of energy. It is commonly used on household electricity meters in the form of the kilowatt hour (kWh) , which is 1,000 watt hours.

MWh: megawatt hour

TWh: tera watt hours: 10^{12} watt hours

GWh: giga-watt hour: 10^{9} watt hours