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The 2030 EU Climate and Energy Package: why and how?

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WE STILL HAVE A PROBLEM – THE RATIONALE FOR ENERGY AND CLIMATE POLICY

It is not surprising that in difficult economic times a long-term issue like climate policy has slipped down the agenda. However, Europe still has fundamental challenges to face in this regard. The IPCC's 5th assessment report underscored again the urgency of action on climate change. Europe will need to prepare its position for the crucial 2015 climate change negotiations hosted by France. Moreover, Europe's energy sector is in dire need of long-term orientations. Europe's fuel bill is a significant weight on its economy; the weight of evidence suggests that Europe will not replicate the US shale gas revolution. It is also important not to exaggerate the importance of the US shale revolution for competiveness and economic performance. Europe will need to develop its own collective, competitive solutions.

THREE THOUGHT EXPERIMENTS ON THE DESIGN OF THE EU CLIMATE AND ENERGY PACKAGE

In comparison with 2008, there is significant divergence in Member States' vision for the 2030 climate and energy package. Some want renewables targets, others don't. Neither the Commission nor Member States are yet ready to address energy efficiency in the new package. And so on. This article conducts three thought experiments, thinking through three radically different designs for the 2030 package. These are a CO2 only package, an innovation package, or a subsidiarity package. These reflections lead to the conclusion that a combination of elements is needed. Firstly, carbon pricing via the EU ETS should remain a central pillar, and be reinforced. Secondly, technology deployment objectives remain necessary: the key question should be what kind of targets and how to negotiate them, not whether. Finally, there is a need to build flexibility into the new package, in order to take into account the diversity of Member States' circumstances and preferences.

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INTRODUCTION

The recent IPCC report reaffirms the existence, urgency and human origin of global climate change. In comparison to previous reports, it expresses near certainty (95%) that humans are responsible for the observed warming.[1]

The EU has made a political commitment to reduce its emissions by 80-95% by 2050. France, the United Kingdom and Germany all have similar goals inscribed in domestic legislation or quasi-legislative instruments.[2] Given the high degree of EU integration, these objectives can only be reached via a coordinated EU approach.

At the same time, Europe is still in the midst of profound economic crisis. Europe needs to generate growth and jobs in the short-term, while pursing fiscal consolidation and aligning its economic model to long-term challenges.

Finally, climate change is coming back to the international stage. The EU will be required to prepare its international position for the next major cycle of international negotiations, with the heads of state summit in 2014 and the Paris COP in 2015.

1. THE INTERNATIONAL CONTEXT

1.1. International (geo)politics

Climate change has profound implications for the global economy and global economic policy. This can only increase as its physical and policy implications become starker over time. For example, China and the USA have been strengthening their bilateral relationship on climate change at the highest level; both have been strengthening their domestic policy as well.[3] Such engagement is to be welcomed. However, Europe should ensure that it and others are not excluded from global rule-making on such an important issue.

The UN climate summit in Paris provides an important occasion for Europe to be at the heart of global governance. Failure in Paris would be a significant setback for the multilateral approach to climate change and to domestic policies; it would also have negative repercussions beyond the climate change regime. It would be a significant setback to the multilateralism which supports EU interests in a world of multiple great powers.

1.2. Europe's negotiation strategy

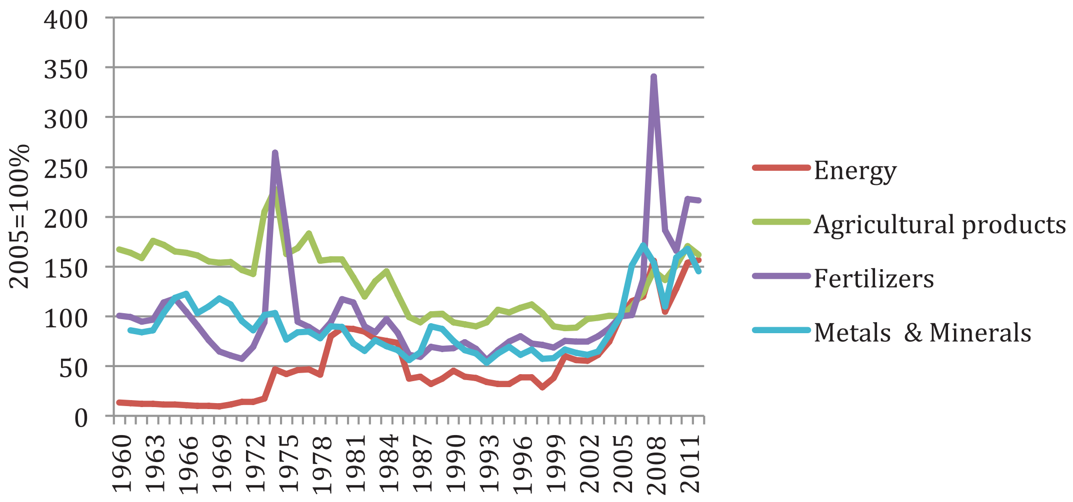
The EU's domestic policy is central to its international negotiation strategy. As the world's largest market, its domestic policies and standards exert a strong market pull.[4] The EU's policy entrepreneurship provides valuable experience for others. For example, China, South Korea, Mexico, and South Africa are all implementing carbon pricing via either trading or tax schemes. The contents and credibility of the EU's post 2020 package are therefore important internationally.

Within the negotiations, the EU's positions form an important centre of gravity. But a fragmented EU cannot be an effective negotiator: hence the importance of a tie to a domestic consensus and policy basis. This strategy of a coherent EU position needs to be complemented by alliances with progressive developing countries. Large emerging countries are highly sensitive to the demands of developing countries; shifts in the positioning of emerging countries can influence the US. But building progressive alliances depends on the credibility of the EU's position and its underpinnings in domestic action.

An EU political commitment is a vital signal to other countries also to come forward with their own emissions reduction offers. But the EU should not be concerned that it is going alone. Firstly, the talks in 2013 in Warsaw should launch a collective step-by-step process for formulating and submitting commitments by early 2015. This will give assurance that others are getting on board; indeed both BASIC[5] and the USA[6] have recently stated that they will be ready to commit by 2015. Secondly, it's unlikely that the EU will have a legislated package by 2015, in contrast to 2008/9 where the EU entered negotiations with legislation.

1. IPCC (2013), "Working Group I Contribution to the IPCC Fifth Assessment Report, Climate Change 2013: The Physical Science Basis: Summary for Policymakers.
2. UK Climate Act (2008) in the UK; POPE (2005) in France; Energiekonzept (2010). N.B. as an *unterichtung durch die Bundesregierung* this does not have the force of legislation.
3. For example, US President Obama and Chinese President Xi negotiated an important agreement on the super greenhouse gases HFCs at their summit in June 2013. Domestically, see for example Obama's Climate Plan, and the 2014 Climate Plan released by the Chinese State Council.
4. Morgera and Kulovesi (2013), "The Role of the EU in Promoting International Standards in the Area of Climate Change", University of Edinburgh
5. Joint statement issued at the conclusion of the 16th BASIC Ministerial meeting on climate change, Foz do Iguaçu, Brazil, September 15th and 16th 2013, https://www.environment.gov.za/mediarelease/16thbasic_ministerialmeeting_climatechange
6. USA (2013), "U.S. Submission on the 2015 Agreement ", Oct. 2013.

Figure 1. Real price indices for various resources (1960-2012)



Source: World Bank Data.

2. THE INTERNAL EU CONTEXT

2.1. Some global boundary conditions: increasing scarcity

The world appears to be moving into a new phase of structural resource scarcity. Global supply is being stretched by unprecedented economic growth. Between 1960 and 2012 the world economy grew by 44.5 trillion USD_{2005}.[7] Slightly less than one third of this growth took place in the last 12 years since 2000. If the world economy grew at 2.8% between now and 2035, it would add a further 45 trillion USD—in less than half the time.

In parallel, the marginal productivity of resource supply is declining. Resources are becoming more intensive to extract, in terms of other resource inputs, capital or environmental damages. The combination of these two factors can be seen in global resource price indices (figure 1).

Real price indices for energy, agricultural products, fertilizers and base metals increased by 97, 74, 141 and 140 percentage points respectively from 2000 to 2012. While there are some nuances to this rather sombre supply picture (shale gas—discussed further below), the overall picture is one of a robust long-term structural trend towards increasing resource scarcity. This will structure global geopolitics, trade, innovation and demand. EU climate and energy policy, and its broader economic policy, needs to be situated within this long-term context.

7. World Bank data.

2.2. Energy security

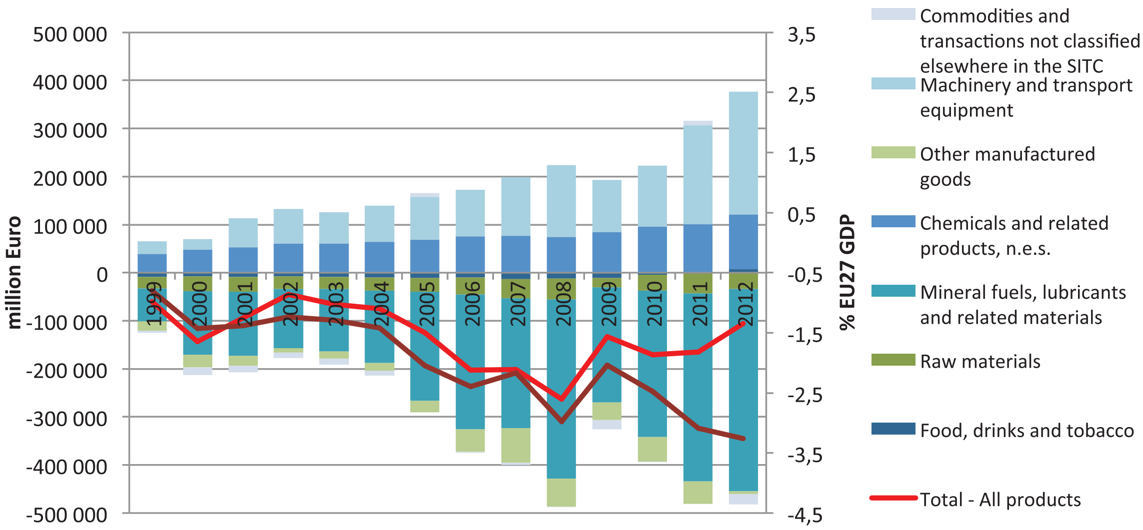
The decline of domestic sources of oil and gas pose significant risks to European energy security. EU oil and gas production is predicted to decline by more than a factor of 2 between now and 2030.[8] Net fuel imports already equate to 3.2% of EU27 GDP in 2012. Europe's negative trade balance is largely explained not by a lack of competitiveness in manufacturing sectors, but rather by its large imports of fossil fuels from abroad, particularly oil (figure 2). Greater energy efficiency and substitution away from imported fossil fuels therefore represents an opportunity to reduce Europe's trade deficit, which may be beneficial in terms paying down both public and private debt.

Europe's fuel dependency is a problem in particular for Eurozone countries, whose currencies cannot fluctuate to rebalance external trade. The pressure of adjustment must therefore fall on wages and internal prices. A link between the monetary system and the energy system is present *via* inflation, which determines real interest rates and thus interacts with the ECB's monetary policy. Energy policy is therefore a macroeconomic issue for the EU and the Eurozone.

At the same time, the world (or more specifically, the USA) is undergoing a significant shift in the global energy landscape. US production of natural gas grew by 27% between 2005 and 2011.[9]

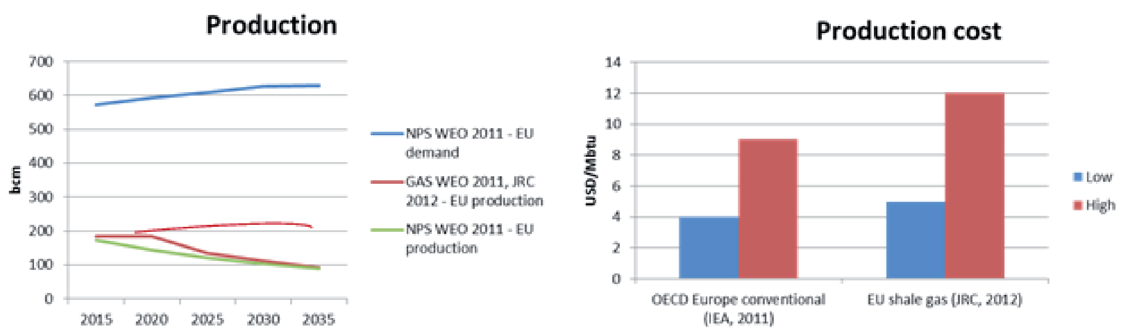
8. EC (2011), Energy Roadmap.
9. EIA data.

Figure 2. EU27 net trade balance by product (left axis) and fuel trade balance as a % EU27 GDP (right axis)



Source: Eurostat data.

Figure 3. EU gas production, demand, imports and prices



Source: Data from IEA (2011), *ibid*, and JRC (2012), *ibid*.

This naturally raises the question of to what extent this could be replicated for the EU.

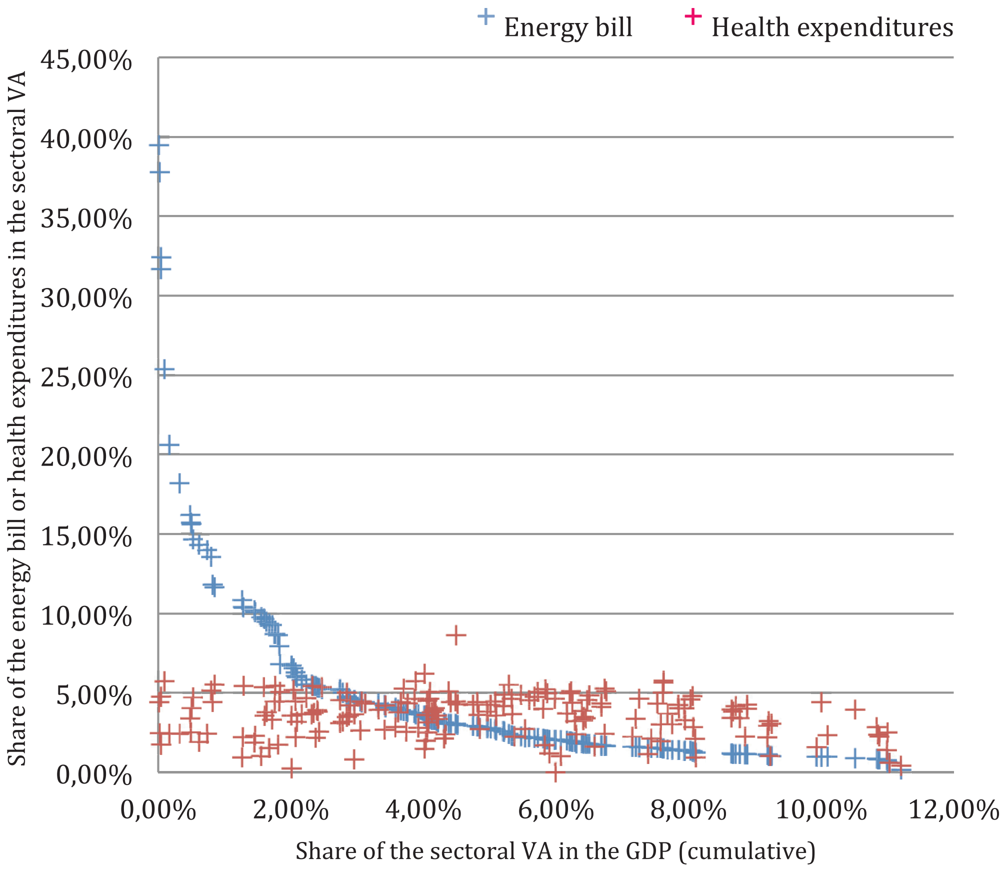
The weight of evidence points to the unlikelihood of repeating the US experience in the EU.[10] Europe is still at an early stage of exploration and test drilling. Its different geology, population density, resource availability, regulatory framework and production capacities mean that the growth of shale gas production would take time, and will be marginal compared to aggregate EU demand (it may be more significant for some countries, such as Poland).

EU countries face a strategic choice on shale gas, which is their prerogative. But regardless of this choice, the EU will continue to remain a significant importer of fossil fuels. It will continue to be a price taker on international markets. Figure 3 shows a reasonably consensual range for possible unconventional gas production in the EU, and a comparison between domestic conventional and unconventional gas prices. Unconventional gas may be significant for some EU countries, but for the EU as a whole its impact on domestic supply will likely be marginal.

The changed energy landscape does not fundamentally put in question the current EU energy strategy, even if one were to forget about climate

10. Cf. Geny (2010), "Can Unconventional Gas be a Game Changer on European Markets", Oxford: Oxford Institute for Energy Studies, 2010; Joint Research Centre (2012), "Unconventional Gas: Potential Energy Market Impacts in the European Union"; IEA (2011), "World Energy Outlook 2011"; IEA Special Report (2011), "Are We Entering a Golden Age of Gas?".

Figure 4. Gas expenditures and employers' costs of health insurance in US manufacturing sectors (2010)



Source: Data from the US Manufacturing Survey 2010/11.

change for a moment. Efficiency, improving the internal market to benefit from more liquid, secure and diversified supplies, and fossil fuel substitution will still be crucial to the long-term security and affordability of EU energy supplies.

2.3. Manufacturing competitiveness

2.3.1. The changing global energy landscape: implications for EU competitiveness

The unconventional revolution in the US has also raised questions in the EU about its impacts on EU manufacturing competitiveness. Natural gas prices to industry have more than doubled for a selection of EU countries from 2004 to 2012, while they have almost halved for the US.[11] We argued above that a US-style shale revolution is unlikely in the EU, and that the broad contours of the EU energy strategy remain valid.

Nonetheless, the potential competitiveness impacts of this situation are a separate question.

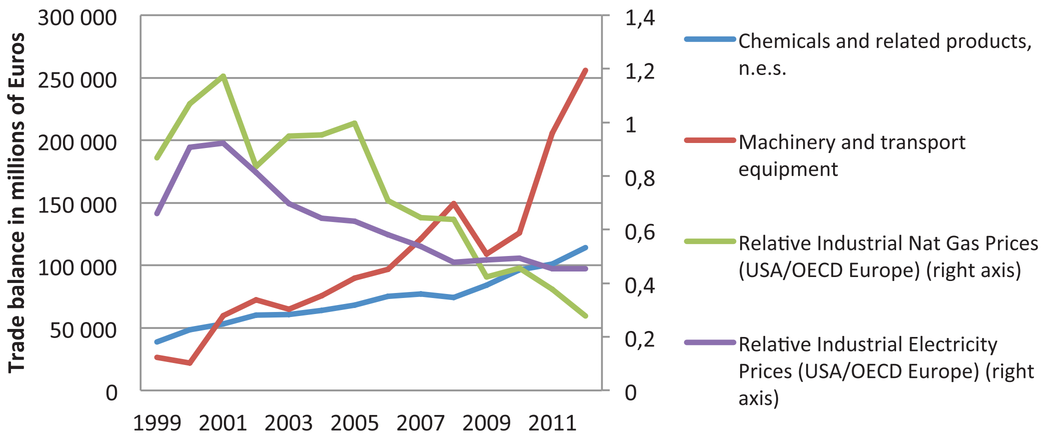
Figure 4 shows energy expenditures as a share of sectoral value added for US manufacturing sectors at a highly disaggregated level. It should be noted that this is total energy expenditures, not just the share thereof that would be elastic to a carbon price or to a drop in natural gas prices. Finally, it compares these with the employers' cost of health insurance, sector by sector. This is an interesting comparison, as health care is roughly twice as expensive in the US than in the EU, at around 20% of GDP versus around 10-12% in the EU.[12]

Around 60% of US manufacturing sectors have employers' health care costs that exceed their total energy bills (this excludes all other labour costs, taxes, transport costs, etc. which may also impact on cost competitiveness between the EU and the US). This illustrates a general conclusion: energy input costs are highly concentrated in a small number of primary manufacturing sectors.

11. IEA data. EU data are for the Czech Republic, Finland, France, Germany, Hungary, Poland, and the UK.

12. Cf. Piketty (2013), "Le Capital au XXIe Siècle", Seuil, ff. 762.

Figure 5. EU27 External trade balance in chemical, pharmaceutical and related products and machinery and transport equipment vs. energy price differences EU27 vs. USA



Source: IEA industrial gas and electricity prices, Eurostat trade statistics.

For the manufacturing sector in aggregate energy is not generally a significant factor of comparative advantage. For example, between 1978 and 2012 the average electricity and gas price differential between Japan and the USA was 259% and 333% respectively.[13]

Europe's key sources of comparative advantage are increasingly based around down-stream, high-value added products, such as downstream chemical and pharmaceutical products, and transport and complex machinery. European competitiveness in these products has thus been relatively unresponsive to recent divergence in energy prices between the EU and the USA (figure 5).

Manufacturing is important economically. It is important to keep a balanced economy, with a strong tradable sector: persistent current account deficits bring external vulnerabilities that were exposed during the crisis. Manufacturing is highly productive economically and is an important source of technological innovations.

However, only a small sub-set of sectors are energy intensive. These are important, but it is possible to find sector-specific measures to offset policy-induced energy price increases, as is the case under the ETS and renewables policies currently. Fundamentally, however, energy prices are not significantly responsible for the current state of EU manufacturing in aggregate, nor will they be in the future.

2.3.2. The industrial implications of the low-carbon transition

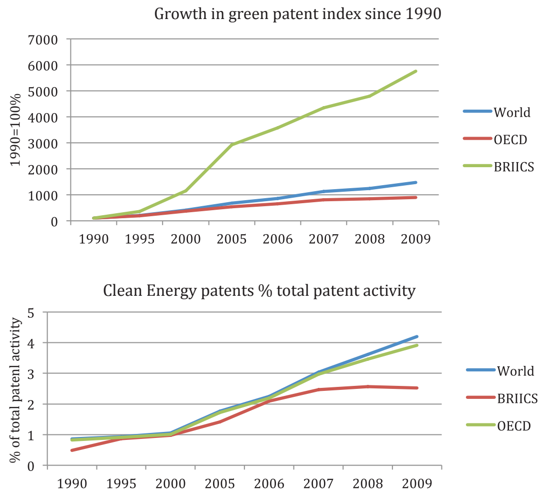
In large part, the difficulties of EU industry are due to the lack of demand, in particular internal demand. The crisis has played a role, as has the lack of supply-side competitiveness in some EU countries, which has prevented them from benefiting from external demand. But more fundamentally, Europe is faced with a long-term shift in its economic structure. Between 1970 and 1990, gross fixed capital formation averaged 22% of GDP for France, the UK and Germany. The 20 year average for 1990-2010 fell by 3 percentage points to 19% of GDP.[14] Europe achieved the reconstruction and catch-up of its capital stock, and demand shifted from primary and secondary manufacturing to other sectors (services).

The demand perspective for EU industry consists of the transformation of Europe's existing capital stock to make it resilient and productive given the long-term context. The low-carbon, resource efficient transition is an investment-intensive, macro-economically significant project. Averaged over the period 2010-2050, the necessary capital investments equate to about 1.5% of GDP annually. The majority of these are in energy efficiency, with high co-benefits in terms of energy security and productivity, job creation and household purchasing power. Overall over the period 2010-2050, annual average fuel expenditures are reduced sufficiently to compensate the additional capital investments (table 1).

13. IEA data.

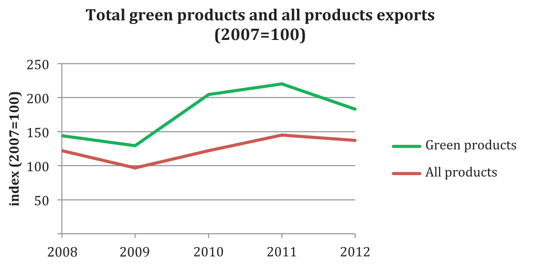
14. World Bank data.

Figure 6. Green patent activity since 1990



Source: OECD data.

Figure 7. World trade of climate-related single-use environmental goods



Source: COMTRADE data.

Table 1. Capital investments and fuel savings in the low-carbon scenario for the EU27

	Additional capital costs energy supply*	Additional energy efficiency capital investments**	Total additional capital costs	Savings on fuel purchases	Changes energy system costs
Billion 08/yr	105.4	152.2	257.6	-315.4	-55.6
% 2008 GDP	0.8	1.2	2.1	-2.5	-0.4

Source: Data from EC (2011), "Energy Roadmap". *Energy installations such as power plants and energy infrastructure, energy using equipment, appliances and vehicles. ** House insulation, control systems, energy management, etc.

In the long-term the transition thus consists of replacing external fuel imports with significant investments in domestic EU productive capacity. This would create demand for the associated primary and downstream manufacturing products (insulation materials, steel; sophisticated energy management systems). Over time, it would also have indirect effects on the domestic purchasing power of EU households.

2.3.3. Green innovation and competitiveness

Inevitably, a long-term macro trend like global demand growth and increasing resource scarcity will structure global market demand, supply and technology innovation. Global markets are increasingly placing a premium on innovative, resource-efficient products. The growth of market interest in green products can be (imperfectly) captured by looking at patent applications by sector. Figure 6 shows the growth of "green" patenting since 1990, as well as the growth of clean energy patenting in overall patenting activity.

The growth of market interest in green products can also be seen in trade flows. For "climate-related single-use environmental goods", available data shows that world trade has grown unabated since the early 2000's.[15] World exports of climate-related single-use environmental goods grew by 120% from 2007 to 2011, compared to 45% for all products (figure 7).

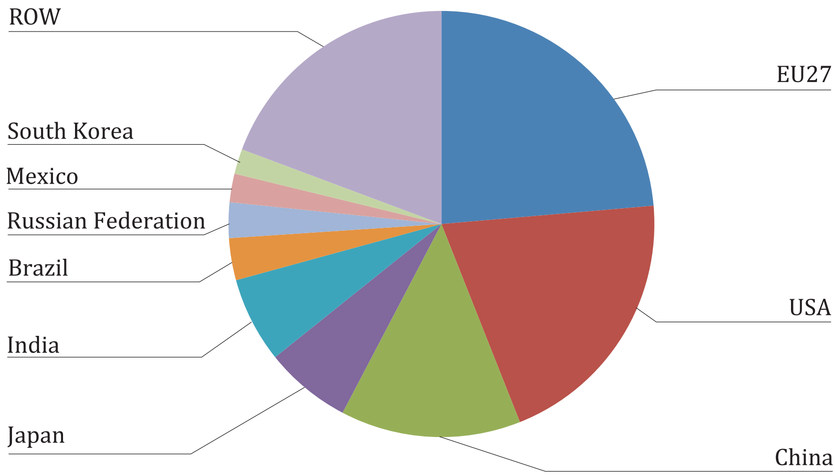
This trend is also reflected in sales data from the low-carbon and environmental goods and services sectors (LCEGS). Worldwide, total sales from these sectors were an estimated £3.4 trillion in fiscal year 2011/12.[16] The EU made up the largest share of this activity (figure 8).

2.3.4. Summary

Policy makers are faced with a dynamic, uncertain context. However, the long-term trends toward increasing resource scarcity and a market premium on efficiency and fossil fuel substitution are robust. There is little evidence that the EU energy sector can escape this macro-trend without profound change towards an efficient low-carbon system. In this context policy needs to support profound industrial innovation towards more efficient modes

15. Vossenaar, R.(2010). Climate-related Single-use Environmental Goods, ICTSD Issue Paper No. 13, International Centre for Trade and Sustainable Development, Geneva, Switzerland.
16. UK Government (2013), "Low carbon and environmental goods and services: 2011 to 2012", BIS.

Figure 8. Global breakdown of the LCEGS market 2011/12



Source: *Ibid*, underlying data.

of production and consumption, while protecting exposed energy-intensive industries in the short-term. Both of these objectives are compatible with a well-designed climate policy.

2.4. The need to put the EU energy sector back on the rails

The EU electricity sector is currently in a difficult situation, which risks the cost-effective achievement of post-2030 energy and climate goals. This can be clearly seen on the stock-market. Since their peak in 2008, the stock value of the top 20 utilities in the EU has declined by 50% (500 billion Euros).[17] This has led to a deterioration of financial market access and investment capacities. This poses particular challenges when considering that a big share of the existing power infrastructure in Europe will have to be renewed during the next decades.

The current difficulties of the European power market are mainly related to the unexpected impact of the economic crisis and the evolution of the global energy markets. Energy and climate policies have interacted with these external shocks.

The economic crisis led to a significant decline in final electricity consumption. After a CAGR of 1.7% in the period 2000-2007, EU27 electricity demand fell in absolute terms by 2.4% between 2007-2011.[18] The corresponding figures for the UK, France and Germany are -6.9%, -1.47% and -1.1%. This has led to increasing overcapacities, and declining wholesale market prices and profit margins.

This has been further reinforced by two factors. First, relatively few old power plants have been decommissioned under local air pollution policies[19] and the ETS. This is due also to the crisis induced weakness of the CO_2 price. Second, new generation capacities (mainly renewables and gas) have entered the market. To a large extent, these capacity additions (particularly for gas) were in the planning stage before the crisis hit. Net capacity additions in the EU27 between 2007 and 2011 reached 128 GW, of which 26 GW of thermal power plants (gas and coal), 38 GW of wind power and 47 GW of solar power.

A final factor relates to the interaction of the shale revolution in the US and the weak CO_2 price in the EU. Cheap gas has displaced coal from the US market, lowering its global market price and hence prices in Europe. At the same time the crisis has driven down the CO_2 price. The net result is that old coal plants have suddenly become much more competitive against new efficient gas plants (figure 9). As an example: between 2009-2011 electricity generation from coal grew by 3%, while it fell by 3% for gas in the EU27.[20]

It is crucial that policy adjusts to recover the investment dynamic and provide for a more environmentally and economically rational use of existing assets. Recent analysis by the EU utilities

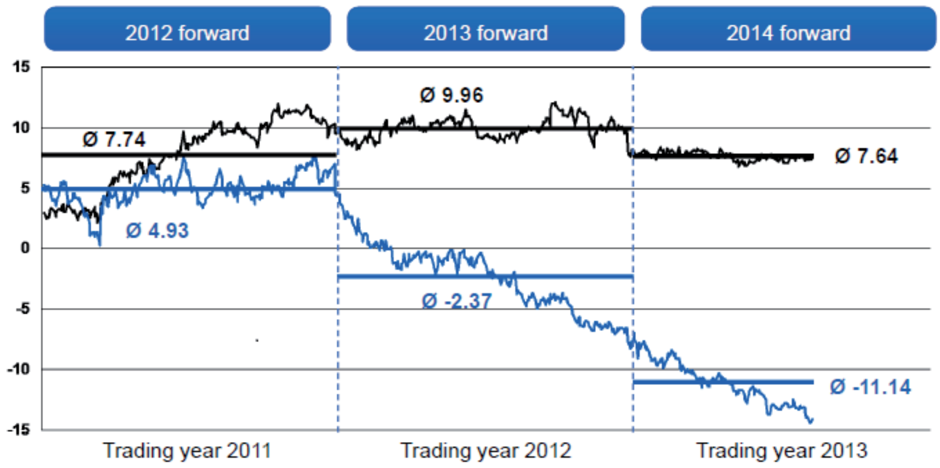
17. *The Economist* 12/10/2013: "How to lose half a trillion euros: Europe's electricity providers face an existential threat".

18. Eurostat data.

19. Notably the Large Combustion Plant Directive.

20. Eurostat data.

Figure 9. Profit margins of coal and gas-fired power plants in Germany



Source: RWE Supply and trading, 2013.

shows that further delay in the decarbonization of the power sector could result in significant additional costs (up to 4,000 billion Euros by 2050, compared to an early action scenario[21]).

Providing this policy clarity is urgent, given the current state of the EU market and the importance of the investment and consumer price issues at stake. Many EU governments (including France, the UK, and Germany) have put in place policies and strategies to address their long-term energy transformations. These are finding themselves in jeopardy due to the lack of clarity on the EU framework.

3. WHAT PRIORITIES FOR THE NEW PACKAGE?

3.1. Building on existing institutions

Europe has a wide variety of instruments and policies in place. The discussions on the new package are therefore not starting from a *tabula rasa*. Some of those institutions could be tasked with the more technical implementation of policy decisions. For example, the institutions for cooperation on the EU energy infrastructure and market design[22] would have a key role in elaborating the infrastructure strategy and policy needs in the context of a new package. We can presume that the EU ETS will remain in place and that the EU will have to, in any scenario, take on an economy-wide CO_2 target.

The purpose of the sections below is therefore not to describe a radical departure from existing approaches. Rather it describes how these can be adjusted and prioritized depending on the overarching objectives of the package.

3.2. Ends before means

In this regard, it may not be productive to enter directly into a discussion on the nature and level of quantitative targets in the context of the new package. Rather, it may be more relevant and strategic to step back and ask: what is to be achieved by the new package? Decarbonisation? Innovation and competitiveness? Energy security? Flexibility between national approaches? The "dominant logic" would then be reflected in the consideration of policy priorities within the new package.

A more explicit understanding of the overarching objectives and approach behind a policy package can help to clarify the rationale for and limits of various policy choices.

3.3. Energy and decarbonisation challenges in the decade 2020-2030

At the same time, regardless of approach and priority, there are certain cross-cutting challenges that EU climate and energy policy will face in the decade 2020:

21. Eurelectric (2013), *"Power Choices Reloaded – Europe's lost decade"*.

22. e.g. the Agency for the Cooperation of Energy Regulators (ACER) and the European Networks for Transmission System Operators (ENTSO).

A significant increase in energy efficiency: almost all EU and national decarbonisation scenarios see a significant increase in energy efficiency and an absolute reduction in the level of energy consumption. Much of this is required to happen in the existing capital stock (buildings).

An increasing level of variable renewables and uncertainty over large-scale technologies (nuclear and CCS): almost all EU and national decarbonisation scenarios see a continued role for growing renewable use after 2020. The level of this growth varies between country and scenario exercise, of course, but the general growth trend is present nonetheless. By contrast, there are much wider ranges regarding nuclear and CCS, due both to technical, political and social uncertainties and diverging preferences between Member States. At the same time, it's clear that exclusion or failure on one or several major decarbonisation levers (efficiency, nuclear, renewables, CCS) will raise costs.

A shift in energy vectors in particular an electrification of final energy demand: almost all EU and national decarbonisation scenarios see a growing role for electricity in final energy consumption (buildings and transport in particular). A significant penetration of electricity in transport and buildings would need to start in the decade 2020-30, and would require both technological innovation and coordinated infrastructure development.

A shift from variable to fixed costs, and from centralized to decentralized investment needs: the low-carbon transition implies a shift from variable fuel costs to high upfront fixed capital costs. This implies financial structures that are long-term and capital intensive, and market arrangements that are capable of internalizing long-term avoided fuel and carbon costs. The transition also implies significant investments from households and companies for the purchase of efficient capital goods (appliances, cars, equipment) and the refurbishment of the building stock. Incentivizing such investments among diffuse and temporally myopic actors is a major policy challenge.

Infrastructure intensiveness: a low-carbon energy system is generally intensive in infrastructure, both within and between Member States. For example, Euroelectric's low-carbon scenario sees 54% more electricity trade between Member States than the Reference scenario by 2030.[23] This implies a significant coordination challenge to ensure that sufficient infrastructure is built.

A shift from goods to services in final consumption: a low carbon transition also implies an increasing substitution of goods to services in order to meet the same final demand. For example, energy service companies (ESCOs) combine the classic provision of energy goods (gas, electricity) with services in energy management and efficiency. 41% of respondents to PWC's annual Global Power and Utilities Survey expect their business model to be "transformed" by 2030, a further 53% expect "important changes" in their business model.[24] This trend is still nascent and uncertain, but appears an integral part of the low-carbon economy. It raises questions of the organisation of service markets within and between Member States.

3.4. What are the cornerstones of low-carbon policy?

Based on this assessment, several cornerstones of low-carbon policy can be described. These are common both to national and EU policy:

- *Economic signals, including prices*: the low-carbon transition implies incentivising action from a wide variety of actors, at multiple governance levels and in multiple sectors. This requires sending clear economic signals. Prices, such as a price on carbon, are an important aspect, but not the only. Broader quantitative targets, for technology penetration for example, can also shape the market anticipations and decisions of economic actors.
- *Innovation and deployment*: targeted policies are also required to incentivize innovation and deployment in new technologies. These are necessary to overcome non-price market failures relating to technological and organisational innovation. They include niche market creation, targeted price instruments (feed-in tariffs), performance standards, and push policies such as R&D.
- *Financial instruments*: the low-carbon transition is capital intensive, and based on a business model that depends on public policy (internalization of externalities, lowering discount rates). Added to this, current credit and fiscal conditions are difficult and uneven across Europe. Financial instruments are required to leverage private capital and lower risk premiums and private discount rates. These instruments need to be tailored to the wide variety of different investors and investment requirements (households, companies, the public sector at every level).
- *Addressing non-price barriers to efficiency*: standards, information and targets are also required to overcome non-price barriers to energy

23. See Euroelectric (2013), "Power Choices Reloaded".

24. PWC (2013), "Annual Global Power and Utilities Survey".

efficiency investments (split incentives, information asymmetries, the public good nature of efficiency improvements to long-lived capital stock).

4. THREE THOUGHT EXPERIMENTS

In the following sections, we sketch the capacity of three different kinds of EU package, designed around three different dominant logics, to address these challenges. It is not suggested that any of these are either optimal or politically possible approaches. Rather the objective is to stimulate a structured consideration of the objectives and policies of the new package.

4.1. Dominant logic No. 1: a CO_2 price-driven package

In this scenario, the CO_2 price forms the dominant logic and the political common denominator among Member States. The EU ETS becomes the central driving pillar for EU climate policy, due to its CO_2 focus and its coverage of all Member States. The CO_2 target is translated into a CO_2 price at EU level, and this price becomes the key driver of Member State action. Member States are responsible for their own policies for the transition, driven by the EU level CO_2 price. This immediately raises a number of questions:

- *1. How to reform the EU ETS such that it provides a sufficient transformational investment signal?* Experience with the EU ETS has shown that the price signal has thus far been too short-term and uncertain to significantly impact large-scale capital investment.[25] A much greater policy commitment to a long-term, rising price trajectory would be required to shift investment decisions. Options such as long-term legislated targets, price corridors and/or a clear institutional mechanism for credibly managing supply would likely be required to convince investors.
- *2. What sectoral coverage for the EU ETS and how to address non-ETS sectors?* The EU ETS currently covers around 45% of EU emissions from the power and industry sectors. It does not address residential or transport energy consumption. If the EU were to adopt an economy-wide emissions objective, targets and policies would be needed to cover the non-ETS sectors (transport and buildings). Including these sectors within a climate framework driven by the ETS would require shifting to an upstream ETS at least for residential and transport fuels. This is quite fundamental reform and could raise issues of EU competence to develop a tax-like instrument (upstream ETS).
- *3. How to differentiate between sectors*? A CO_2-only climate policy would require significant carbon prices: at least in the order of 40-50 Euro/ton by 2030.[26] However, different sectors have different sensitivities to carbon pricing. For the power sector, carbon prices of 40-50 Euro/ton would be significant. On the other hand, energy intensive sectors could face serious competitiveness issues under such a price, absent mitigating measures. This raises questions of how to do design mitigating measures (continued free allocation, border adjustments, opt-outs and EU sectoral agreements?). There are trade-offs with any of these options, and with the overarching objective of economic efficiency from harmonized prices. In final demand sectors (transport, the residential sector), even a relatively high CO_2 price is an insignificant price driver, and would not overcome non-price barriers.
- *4. How to differentiate between Member States*? One of the attractions of a CO_2 price/ETS based package is that it, ostensibly at least, reduces the issue of effort-sharing. However, more carbon intensive, poorer Member States are likely to be opposed to facing a high and uniform carbon price mechanism, without some mechanisms for differentiation. The current harmonized ETS system combines parallel side payments and exemptions (through EU ETS auction revenues and transitional free allocation to the electricity sector) and differentiation via other climate policies (renewables, non-ETS target). If the ETS price were to rise significantly, such mechanisms may be perceived as insufficient. A CO_2 price driven package may also reduce the bargaining space between Member States, as the harmonized CO_2 target and resulting price becomes the central driver.[27]
- *5. How to induce technological innovation and energy efficiency*? Existing evidence suggests that the EU ETS has induced some innovation efforts in covered sectors; these have been limited, however, by the short-term, uncertain price signal.[28]

25. See the discussion in Spencer *et al.* (2011), "Decarbonizing the EU Power Sector Policy Approaches in the Light of Current Trends and Long-term Trajectories", IDDRI.

26. See e.g. Euroelectric (2010), "Power Choices", which estimates a carbon price of 52 Euro in their central decarbonisation scenario by 2030, which excludes complementary policies on renewables.

27. See the discussion in Spencer and Fazekas (2012), "Distributional Choices in EU Climate Policy: 20 Years of Policy Practice", *Climate Policy*.

28. Spencer *et al.* (2011), "Decarbonizing the EU Power Sector Policy Approaches in the Light of Current Trends and Long-term Trajectories", IDDRI.

Marginal carbon pricing appears insufficient to address non-price market failures on innovation and energy efficiency.

- *6. How to ensure compatibility with energy market design*? A functioning EU ETS requires liberalized, competitive energy markets, such that the marginal price of carbon is reflected in wholesale and retail prices. However, the EU is currently seeing a proliferation of market interventions, which are intended to palliate some of the existing market and policy deficiencies.[29]
- *7. How to coordinate on infrastructure*? A technology neutral, CO_2-only approach gives little clarity around the content of the low-carbon transition. This raises the question of how long-term infrastructure coordination can be achieved, in particular concerning intra-state infrastructure. The current approach combines more directive targets (renewables, for example) with an institutional and financial architecture to facilitate the construction of the resulting infrastructure needs.[30]
- *8. How to ensure policy coordination and delivery between Member States*? Policy coherence and coordination between Member States provides economies of scale and creates larger and more robust market anticipations. It is also necessary for infrastructure coordination, which requires more clarity on the content of the transition that a price and emissions trajectory may provide. Finally, there are greater risks for policy delivery: the CO_2 cap and price will deliver objectives (for the sectors they cover) but there may be upside risks for the CO_2 price if Member States fail to deliver on the necessary complementary policies.

4.2. Dominant logic No. 2: a green innovation, industry and energy security package

In this scenario, technological and organisational innovation and deployment is the dominant logic of the package. The EU ETS plays a residual role to ensure the achievement of carbon targets (as currently), and potentially a more focused role in the power sector. But the main role is played by complementary policies. These are intended to unlock innovation and deployment of new technologies, which are necessary to enable the achievement of long-term carbon targets (e.g. in renewables, batteries, CCS). Green industrial competitiveness is a parallel consideration: the package is designed with the expectation that EU companies will benefit from first mover advantage in growing global markets for green products. Finally, the package is also motivated by energy security: it seeks to promote more fundamental change than a substitution from coal to gas, for example. Several considerations arise:

- *1. What combination of push and pull policies*? Hitherto, EU policy has been significantly based on policies intended to create market pull for new low-carbon products (feed in tariffs, appliance and car standards, etc.). These have been complemented to a lesser degree by push policies, such as the earmarking of ETS revenues to support demonstration projects for CCS. The successes of the EU's pull policies should be acknowledged. They have permitted significant role out of new technologies and cost decreases through technology and market innovation. However, they have also revealed a number of drawbacks. In some sectors, the EU has not been able to secure expected trade benefits, due in part to an imbalance between push and pull policies, including between regions (see the comparison in figure 10). Finally the EU's push policies have also encountered difficulties, notably in the case of CCS demonstration which has suffered from insufficient funding and the lack of incentives created by the low carbon price.
- *2. What sectoral/technological targeting for innovation policies?* Hitherto, pull policies have tended to be rather broad in their technological or sectoral focus. Blunt pull policies for renewables have also incentivized marginal innovations in existing systems, such as biomass co-firing in existing power plants. An alternative example, the CO_2 regulation for cars is supplemented by a "super credit" system incentivising ultralow-emissions vehicles (electric or plug-in hybrid).

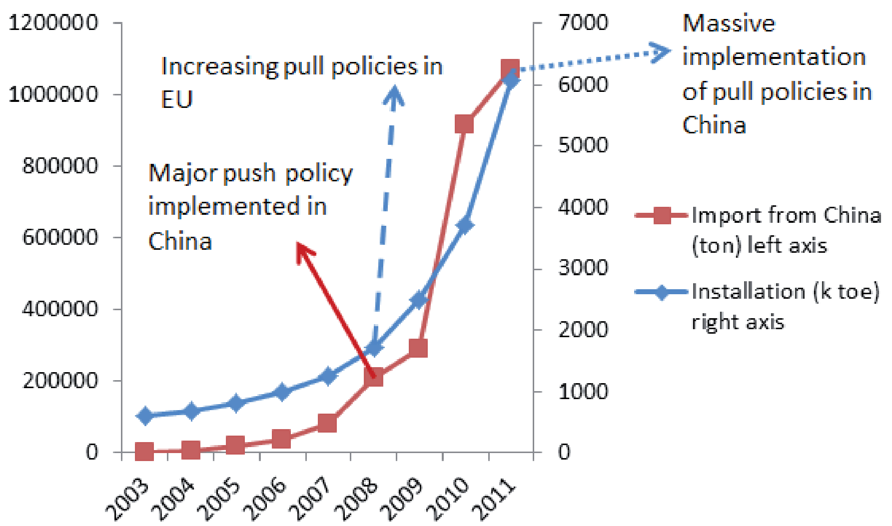
There have also been potentially some gaps, of which the cement industry is a good example. Recent research based on extended interviews with European cement company executives reveals that two key factors prevent the wider scale commercialisation of radical innovations in cement.[31] First, the lack of visibility on the stringency of post-2020 carbon pricing policy has slowed decision-marking on the development larger scale plans for these technologies. Secondly, current cement and building regulations are often designed based on a specific product composition standards rather than a performance standard. Hence, low-carbon

29. A good example is the UK Energy Market Reform.

30. The institutional architecture includes the Agency for the Cooperation of Energy Regulators (ACER), European Network of Transmission System Operators, and accelerated procedures for the approval of projects of European interest. The financial architecture includes the Connecting Europe Facility and the EIB.

31. *Climate Strategies* (forthcoming).

Figure 10. Solar power installation in the EU (right axis in blue) and EU's PV panel imports from China (left axis in red)



Source: Wang (2013), "An analysis of EU-China PV trade flows and domestic supportive policies of PV industry", IDDRI.

cements of new composition face challenges in gaining market acceptance.

Finally, the EU's pre-existing sources of comparative advantage need to be considered when designing sectoral innovation policies. It is not surprising that the EU has been relatively unsuccessful in the global PV market: electronics and related sectors are not traditionally a strong sector for the EU. This may be a further argument for more targeted policies.

Careful consideration of the appropriate technological and sectoral perimeter would be required for new targets or policies to stimulate low-carbon innovation post-2020.

- 3. *Flexibility and subsidiarity:* the 2008 package contained substantial pull policies which all Member States were required to implement. In this regard, it did not reflect Member States' differing technology strategies and priorities. There is a clear case for harmonized pull policies for highly traded product markets (appliances/cars), for mutualizing some of the innovation effort related to push policies (CCS demonstration, or the SET plan), and for creating larger, more coordinated market anticipations regarding the role of different technologies (renewables, CCS). But a broader framework to accommodate a range of technology strategies between Member States may be justified where EU spill-overs are less evident and local preferences more important.
- 4. *Energy security:* a core stated goal of the 2008 package was improving energy security. There is indeed evidence that it has done so to a certain extent. However, the core energy security challenge is in the transport sector and to a lesser extent the building sector. The contours of post-2020 policies in these sectors is much less present in the technical and political discussions around the future package. What policies would be required to incentivize greater fuel efficiency in the vehicle fleet and greater penetration of new drive-train technologies (hybrids and electricity)? What policies would be required to support improvements in residential energy efficiency, in particular in the building stock?
- 5. *What role for the EU ETS?* In this package, the EU ETS plays a role as a key driver of innovation and deployment in the power sector. The ETS is not expanded to others sectors (transport and buildings). Indeed it is focused more closely on the power sector, with continued free allocation to industry, or alternative mitigation measures (opt-outs and sectoral agreements, for example). A higher price is implemented (40-50 Euros/ton) through more stringer ETS caps, which also reduces the incremental costs of targeted pull policies and increases the degree of market rationalization of technology choices.
- 6. *How to ensure the achievement of the EU wide objective?* A key question remains regarding how this approach would still ensure the achievement of an economy-wide EU27 GHG target? Sectoral policies in the non-ETS sector (buildings, transport) may not give sufficient certitude as to the overall objective. In this case, adopting binding targets for Member States' non-ETS targets would be a further option, which would immediately raise questions of effort sharing.

4.3. Dominant logic No. 3: a subsidiarity package

In this scenario, a flexible approach is the dominant narrative. After the quite top-down approach to the package design in 2008, this approach seeks to combine top-down and bottom-up elements. The cornerstone of this is a negotiated approach to Member State targets and flexibility on policy options. This immediately raises a number of questions:

- 1. *How to decide on an overall EU GHG target?* Within the context of the international negotiations, the EU will have to come forward with an overall EU-wide emissions reduction target. It is unlikely that it would be timely or credible to derive this from a solely bottom up approach. The EU target would therefore have to be determined via a more top-down approach. Political opinion could coalesce around the analytical authority of the Commission. However, this target would be proposed internationally without clarity on how it would be implemented or the effort sharing approach between Member States. This would likely be detrimental to the credibility of the EU's offer and its coherence within international negotiations.
- 2. *How to deal with concerns about distortions to the internal market*? Table 1 shows internal EU27 trade share in total EU27 trade exchanges for a number of energy intensive sectors.[32] With this degree of integration it is unlikely that a wide divergence in policy approaches to the core electricity and industry sectors would be tolerable, either for Member States or companies. Indeed, there is already a fair amount of EU jurisprudence involving companies claiming unfair treatment in EU climate policy vis-à-vis other Member States or sectors.[33] A harmonized EU ETS with a single EU cap and a harmonized approach to carbon leakage therefore remains ineluctably a central pillar of climate policy even in a package which emphasizes subsidiarity.

32. It does not measure trade intensity; a sector may have a high external EU27 trade share but a low total trade intensity relative to the domestic EU27 market. The indicator simply shows the EU27 share of what trade takes place.

33. See e.g. Singh, N. (2009), "Emissions Trading Before the European Court of Justice: Market Making in Luxembourg", in Freestone and Streck, *Legal Aspects of Carbon Trading: Kyoto, Copenhagen and Beyond*, OUP.

Table 2. EU27 internal trade share of heavy industry

Sector	EU27 internal trade share (% total trade exchanges)
Paper	77.7
Cement and lime	74.0
Glass	76.7
Iron and steel	73.4
Aluminium	71.6

Source: Eurostat data.

- 3. *How to differentiate within the contours of the EU ETS*? In this context, the package explores means to differentiate between Member States within the framework of a harmonized EU ETS. The current approach does so in several ways, including redistributing auction revenues to poorer Member States, allowing some more carbon intensive Member States a transitional free allocation to the electricity sector, and the use of trading mechanisms to balance efforts within and between the non-ETS and ETS sectors. In this package scenario, such approaches are continued and strengthened, without distorting the basic principle of equal treatment for covered sectors due to their importance in the internal market. A key is to be more explicit on the logic of such measures: free allocation to the electricity sector for poorer Member States prevents them from paying the carbon price on legacy assets, while still ensuring that all new capital stock reflects carbon constraints. Auction revenue sharing could be more directly tied to concerns of fuel poverty in poorer Member States, etc.
- 4. *How to negotiate complementary policies?* In this approach, the need for complementary policies on the non-ETS sector, technology deployment and efficiency is still recognized. For highly traded product markets, harmonized standards are still the preferred option for the reasons outlined above. For the non-ETS sector and technology deployment objectives, the approach recognizes the drawbacks of the use of overly synthetic indicators (GDP/capita) for determining effort-sharing. A negotiated approach is adopted, with the Commission proposal and the EU's overall objective providing key reference points. This kind of structured, negotiated approach was used before Kyoto for the definition of the EU effort sharing. If it is developed alongside the key EU harmonized policies in the non-ETS sector (efficiency standards for cars, for example) then such policies would provide further reference points, and the actual "bargaining space" would be more limited. As was

the case for the negotiation of National Allocation Plans under Phase I and II of the EU ETS, the Commission could be given the competence to arbitrate on Member States' proposals within the context of overall EU objectives for CO_2 or technology deployment and based on clearly defined principles.[34]

5. SYNTHESIS AND CONCLUSIONS

From the discussion, we draw a number of conclusions:

- 1. *The EU ETS should remain a central pillar*. There are four central reasons for this. First, the need to preserve the internal market. Second, the capacity of the EU ETS to provide a framework for coordinating Member States' actions via the CO_2 price. Third, the need to provide a harmonized, price-based economic signal to those sectors where it is a significant factor of transformation (electricity, industry). Fourth, the institutional machinery for addressing concerns of carbon leakage and differentiation between Member States already exists and can be built on. In practical terms, a number of questions would need to be addressed:
  - a. How to reform the ETS to provide the right balance of investment certainty and reactivity to changing conditions?
  - b. How to build on existing approaches to address carbon leakage and effort-sharing?
- 2. *Technology deployment objectives remain necessary: the key question should be what kind of targets and how to negotiate them, not whether.* There are at several reasons for EU approaches to technology deployment. First, they support economies of scale and larger, more robust market anticipations, and hence provide a greater impetus to innovation. Second, they support the necessary coordination between Member States, the EU and companies on infrastructure, market design and organisational innovation. However, there is a need to accommodate Member States' circumstances and preferences. A number of questions would need to be addressed:
  - a. Almost all Member State and EU scenarios see a continued role for renewables after 2020.[35] Could renewables objectives be negotiated to take into account different Member States' potentials and preferences, but providing a robust EU perspective to the industry?
  - b. Nuclear and CCS appear to be qualitatively different technologies, due to the lumpiness of investment and the social and technological uncertainties they entail. For these reasons they may not be appropriately addressed via quantitative targets. How could the EU framework support these technologies for the Member States that wish to use them?
  - c. More focused sectoral innovation policies will be needed beyond electricity supply. What combination of pull targets and push policies could be used, and what should the sectoral focus be?
- 3. *Financing instruments*: beyond the two points above, climate policy requires dedicated financing instruments. There are market failures and capital market failures that justify dedicated responses, for example in the role played by the KfW or the Green Investment Bank. This is true particularly in Europe, where issues of effort sharing and the investment capacity of different Member States are important.
  - a. What financing instruments could be included in the package based on existing instruments such as the EIB and revenue sources (ETS)?
  - b. What role could broader financial sector frameworks and fiscal policies potentially play?
- 4. *What programs or targets could incentivise improved energy efficiency in existing long-lived capital stock?* Addressing energy efficiency in buildings involves high transaction costs and a diverse range of local circumstances. For this reason, it is difficult to address at the EU level. However, the EU framework needs to incentivize Member States to undertake the necessary policies to improve energy efficiency in the build stock.
  - a. What framework could best support the improvement of efficiency in the building stock?

34. For an account of this in the case of National Allocation Plans, see in Spencer and Fazekas (2012), "Distributional Choices in EU Climate Policy: 20 Years of Policy Practice", *Climate Policy*.

35. Cf. the planning scenarios for 2020-2030 developed by the UK National Grid.