



A LOW-CARBON INDUSTRIAL POLICY AS A STRATEGY FOR EMERGING FROM THE CRISIS

SUMMARY REPORT



European Economic and Social Committee

Workers are very worried about the future of social and environmental Europe. The remarkable work of our friends from Syndex, who I congratulate, will be a very useful instrument that will help us elaborate our future proposals.

Georges Dassis
President of the Workers' Group
European Economic and Social Committee



This report was drawn up on the basis of analyses a specialist literature and the experience of sectoral experts from Syndex, as well as a series of discussions with the relevant European sectoral employers' organisations and trade unions, several European Commission DGs (DG Research & Innovation, DG Employment and Social Affairs, DG Climate and Action and DG Enterprise & Industry) as well as several EIB (European Investment Bank) officials.

Syndex cabinet

Foreword

This document reflects the point of view of its authors. It does not necessarily reflect the individual or collective views of members of the EESC's Group II which commissioned this report, of European federations of employers' organisations and trade unions, nor of European Commission directorates-general participating in this project.

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1. An unsustainable economic model requiring implementation of a coordinated industrial policy at European level

The sub-prime crisis which emerged in 2007 was the culmination of an entire process, a result of the specific form of growth which started in the early 1980s in the United States – variants of which spread to many allegedly advanced countries in subsequent years – and which ran out of steam. This type of growth, referred to by some economists¹ as "neoliberal" or "financialised capitalism" (as distinct from the "Fordism" of the prosperous post-war decades) is characterised by a specific institutional setup, the main features of which are as follows:

- an increasingly restricted role for the State, which essentially acts as a referee enforcing rules in the context of a strong trend towards deregulation;
- internationally, a movement towards free trade;
- the predominance of oligopolistic competitive structures;
- a "rapport salarial" [wage relation] which is essentially disadvantageous for employment;
- a liberalised and globalised financial system, with relatively abundant credit².

These features are clearly interconnected and mutually stabilising, comprising a coherent system. For example, the disadvantageous wage relation for employment in advanced countries in the form of wage compression or even deflation is itself the result of:

- specific international integration and a free-trade approach to international trade ultimately resulting in a downward pressure on salaries due to competition from countries with lower labour costs;
- liberalisation of capital flows facilitating the reallocation of capital on the basis of costs, giving employers a strong argument in wage talks;
- oligopolistic competitive structures conducive to these trends, for example by enabling internal competition between different facilities belonging to the same group;
- particularly in the United Kingdom or the United States, government policies aiming to weaken collective representation of employees, including in sectors where trade unions have traditionally been strong, thus shifting the balance of power towards employers.

In order to maintain consumption at reasonable levels in a context of stagnation or low salary growth, households increasingly draw on credit. Hence, the result is a model in which credit plays an increasing role in fuelling growth.

Thus the Fordist growth model based on real salary growth is replaced by a growth model based on excessive borrowing. However, in addition to the initial causes of the sub-prime crisis and the meltdown of the banking system in September 2008, the current crisis is part of an even deeper systemic crisis linked to growth based on the untrammelled exploitation of natural resources, a factor which has led to the downfall of numerous societies.³ By refusing to internalise negative external impacts, economic development has to a very large extent been reliant on credit. By drawing largely on non-renewable resources and fragile ecosystems, we have exhausted them; as a result, the "services" provided by these

¹ Including numerous French advocates of State regulation, such as M. Aglietta, R. Boyer or A. Lipietz, to mention only a few examples.

² Outlined here is the "classical" analysis of Fordism as presented by State regulation advocates.

³ Jared Diamond, *Effondrement*, Gallimard 2006.

natural systems have continuously thinned out over the last 20 years. In this respect, the United Nations Environment Programme (UNEP) has made some depressing observations⁴:

- non-sustainable use and climate change are resulting in the degradation of land;
- the availability of fresh water per head of population is declining in the world, with contaminated water still the main environmental cause of death and disease;
- water-based ecosystems are still heavily exploited, with the viability of food resources and biodiversity under threat;
- a large majority of species are declining in terms of distribution and/or total numbers.

2008 saw successive energy, food and financial crises reflecting the extent of the systemic crisis we are currently experiencing, requiring a response that involves more than just economic recovery.

Like other natural raw materials, energy is one of the key factors underpinning our society's economic and social development. However, our current patterns of resource use are not tenable. More efficient use of resources will be crucial in maintaining the competitiveness of European industry in a context of more expensive energy and raw materials. In industry, labour costs only amount to 16% of operational expenditure⁵; the remaining 84% are linked to goods and services including energy and raw materials.

More rational use of resources⁶ should help the EU to:

- boost economic performance while reducing resource use;
- identify and create new opportunities for economic growth and greater innovation and boost the EU's competitiveness;
- ensure security of supply of essential resources;
- fight against climate change and limit the environmental impacts of resource use.

To this end, it is necessary to develop new products and services and find new ways to reduce inputs, minimise waste, improve management of resource stocks, change consumption patterns, optimise production processes, and improve logistics.

Thus, as the European Trade Union Confederation (ETUC) has emphasised, the challenge now facing Europe is to develop an industrial policy combining technological and organisational innovation, capable of supporting a new model of growth based upon production using little energy and few resources and satisfying new societal needs; such a policy must:

- "enable every enterprise to seize an opportunity for innovation or breakthrough thanks to the fact that it has access to the appropriate financial and human material resources to transform a conclusive test into a long phase of success;
- encourage cooperation both between the 'complementary parties' and the 'competitors', promote the pooling of knowledge, community projects, networks of players, territorial cooperation, and social networks;
- choose to exploit joint pools of added value and productivity linked to the industrialisation of 'made-to-measure', closely incorporating products and services, by preserving and passing on collective knowledge, capitalising on it and regenerating it through lifelong learning."⁷

⁴ UNEP, *Global Environment Outlook*, 2004.

⁵ Eurostat, *European Business Facts and Figures*, 2009.

⁶ Europe 2020: Resource-efficient [Europe](http://ec.europa.eu/resource-efficient-europe) <http://ec.europa.eu/resource-efficient-europe>.

⁷ ETUC Resolution on Industrial Policies and Worker Participation, May 2011.

2. The three pillars of European policy to combat climate change: what kind of European industrial policy do we need?

The Kyoto protocol was signed in 1997; implementation began in 2005, and in 2009 a climate and energy package was adopted by EU countries setting out a triple 20 % objective to achieve a reduction of 20% in greenhouse gas emissions by 2020; these objectives are as follows:

- 20 % renewable energies in each country's energy mix;
- a 20 % cut in CO₂ emissions through a "cap and trade" scheme for manufacturers emitting CO₂;
- 20 % fewer emissions through greater energy efficiency.

emission reduction potential by measure

	MT CO ₂
Renewable energy	600-900
Carbon capture and storage	0.875
Energy performance of buildings	190-290
Eco-design/ energy consumption label	170
Tyre labelling	6-16
Energy efficiency regulation	11.2
Smart energy programme	132
Fuel quality	62.5
Clean cars strategy	50
Inclusion of aviation in the ETS	183
Vehicle procurement policy	1.9

Source: European Commission, 12 October 2010

To put this in context, the emissions trading system is cutting quotas⁸ by 1.74 % or 37.44 MT per year, equivalent to nearly 400MT over 400 years; however, this figure is only a rough estimate corresponding to the European Union's objective.

Thus, according to the European Commission, most of the emission cuts are to come from renewable energy and emissions trading.

We can translate these three measures into economic terms as follows:

- Under current market conditions, renewable energies are long-term investments as many of them are much more costly to produce given the currently available technology (with the exception of existing hydroelectric sources). Initial investments are strongly subsidised, together with returns on capital invested through high purchase prices for energy produced⁹.
- The creation of an emissions market sets a price for carbon paid by manufacturers emitting CO₂¹⁰ in order to limit emissions and make them more expensive, with the logical (but as yet unproven) effect of higher prices for CO₂ emissions encouraging investments to reduce them. The sectors concerned by this market are required to reduce overall emissions by 21 % compared to 2005.

⁸ Threshold above which quotas must be purchased (cap and trade).

⁹ Although they have been cut recently, wind and solar energy subsidies are still high.

¹⁰ 11 032 sites were concerned by this in 2009.

- Finally, the 20 % of CO₂ emissions reductions from higher energy efficiency is not comparable as a constraint to the first two measures. These energy efficiency gains will have to come from across economic sectors and will be achieved through various measures: regulation in the fields of housing and transport, investments in cogeneration systems, directives on electric motor and water heater energy efficiency, etc.¹¹ Sectors not concerned by the emissions trading market are required to reduce overall emissions by 10 % compared to 2005.

These are the three pillars of a low-carbon economic policy in Europe, which needs to be complemented by a social policy, an R&D policy and a trade policy.

In what way do these measures have to do with an industrial policy?

We can distinguish between two types of industrial sectors:

- industries transforming raw materials and emitting CO₂ in the course of their production processes, including intermediary industries such as manufacturing of steel, non-ferrous metals, cement, refineries, paper pulp, chemicals, building materials (tiles and bricks, ceramics, insulating materials, etc);
- industries manufacturing products from transformed materials, with the resulting manufactured products such as cars, buildings, machinery and ICTs emitting CO₂.

The manufacture of equipment used in renewable energy production, carbon capture and storage (CCS), and ensuring greater energy efficiency, is at the intersection of these two types of industry given that while their manufacture definitely emits CO₂, use of such equipment does not result in CO₂ emissions and indeed prevents them.

Thus, it is inclusion of CO₂ in the value chain which will enable European industry to be both competitive and low-carbon; some would even argue that European industry can be competitive because of and not in spite of being low-carbon, as in the case of renewable energies or energy efficiency.

What are the traps and obstacles facing the strategy, the declared objective of which is to establish Europe as a leader in the field of low-carbon technology, skills and competitiveness?

What industrial policies do European, national, regional and local government authorities need to pursue in order to achieve this objective?

2.1. The development of renewable energy

With regard to renewable energy, a great deal of hope is attached to their development and many European countries are pursuing proactive policies to support them.

In the context of the dramatic nuclear incident at the Japanese nuclear power station of Fukushima in early 2011, several EU countries including Germany and Italy have decided to scrap nuclear energy, thus giving renewable energies an unprecedented boost in Europe.

The EU's 2009 renewable energy directive sets a binding overall objective for 2020 of 20 % of final gross energy consumption coming from renewable energy. It is up to each Member State to specify how this objective should be achieved through a national action plan covering all energy sectors (energy production, transport, construction, industry). In the EU countries, there are various forms of renewable energy support measures, for example purchase prices for electricity or heat, green certificates or even tax breaks.

In most cases, renewable energy produced using existing technology is still not competitive compared to conventional energy sources; developing them therefore requires government support in the form of subsidies.

In the longer term the competitiveness of renewable technologies will depend both on their own experience curve and the relative increase in the costs of using conventional technologies. Renewable technologies' unit costs are likely to fall in step with the development of such technologies (experience

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See Progress Towards Achieving the Kyoto Objectives, European Commission, 12 October 2010.

curve) and extent of their use (economies of scale). In the field of energy production (electricity and heat) wholesale prices are mainly determined by two factors, the cost of fossil fuels and possible prices of CO₂ emissions.

The International Energy Agency (IEA) estimates that 205 billion dollars (at 2009 prices) – 0.17% of global GDP – of public support will be needed between now and 2035. Between 2010 and 2035, 63 % of such support should be targeted at renewable energy. Average public financing per unit of energy production should decrease throughout the world from 55 dollars per MWh in 2009 to 23 dollars per MWh in 2035, mainly due to rising wholesale prices of electricity from conventional sources.

Renewable energy subsidies are fully justified in view of UN climate objectives, energy security considerations, and industrial policy concerns (technological leadership and social inclusion). Energy is a key factor determining the competitiveness of European industry. Several non-European industrial sectors (including steel and aluminium production) benefit from energy prices which are as little as half of those in Europe. A large rise in European energy prices could significantly undermine competitiveness with serious repercussions for employment.

A substantial rise in the cost of fossil fuels would help to push up electricity wholesale prices in Europe due to numerous factors including CO₂ prices and higher post-Fukushima nuclear energy costs. European industry could see its competitiveness fatally undermined in relation to competitors not affected by indirect carbon costs and with fossil fuel reserves of their own. In addition, European industry could be asked to cover the additional costs involved in developing (non-hydroelectric) renewable energies.

A distinction should be drawn between existing widespread hydroelectricity production in Europe and wind and solar energy on which hopes of achieving the 20 % target essentially rest.

The use of both wind and solar energy will mean significant and partially government-subsidised investment costs, together with high electricity bills for many years to come. The cost of preventing one tonne of CO₂ is significantly higher than the market price of CO₂. **In view of this, renewable energy expenditure can be considered in the short and medium terms as applied R&D expenditure.**

In terms of using technologies and equipment, modernising and organising the networks needed for them to work properly, taking into account information needed to manage them effectively, and developing appropriate transport and electricity distribution models, the transition towards large-scale renewable electricity production for diversified and secure purposes is only in its industrial infancy.

In this field we therefore need to frame a specific industrial policy to address this situation in the context of a financial crisis which looks set to continue in Europe for several years.

An investment of 100 in renewable energy prevents x % of carbon emissions in relation to coal, y % in relation to oil, and z % in relation to gas, with a substantially higher preventive cost paid by consumers. In other words, it is significantly less costly to emit CO₂ and to purchase quotas than to invest in lower emissions with a significant increase in electricity prices and costs. What does this achieve?

There is a difference here between solar and wind power: wind energy is less expensive in the short term and less promising in the long-term, whereas solar is very costly in the short term but promising in the long term.

Based on the costs of using technologies¹² estimated by the IEA¹³ we have evaluated the impact of granting carbon credit on the costs of wind technology. With a carbon cost of €20.40/tonne (IEA estimate), wind energy operating costs would approach those of gas and coal; in this case, KWh prices for the three technologies would be comparable.

However, for this to happen, two conditions would have to be met:

- Firstly, rapid deployment of carbon capture and storage (CCS) technologies would have to reduce the carbon premium on electricity wholesale prices. R&D funding would have to be

¹² This method enables us to compare in real time total production costs (investments, fuel, dismantling and waste management) in relation to electricity production over the lifetime of a given technology.

¹³ IEA, Costs of Generating Electricity, 2010.

stepped up. For coal, CCS technology could cut carbon costs by 87% from \$24 per kWh to \$3 per kWh¹⁴, based on CO₂ costing \$30 per ton of carbon.

- secondly, the additional cost of renewable energy could be covered by granting a carbon credit for each tonne of CO₂ prevented.

Such a development could certainly give rise to a proactive industrial policy to promote new technologies but it must not lead to a situation in which these technologies are ensured subsidies without guaranteed benefits, with the European economy taking on major risks and not enjoying any returns in terms of economic activity and employment. **In this context, we need to consider a requirement for private operators to reinvest some of their profits either on a voluntary basis or by means of taxation.**

2.2. The emissions market (ETS)

The two first experimental phases in 2005-2007 and 2008-2012

The first experimental phase of emissions market development lasted from 2005 to 2008 and was followed by a consolidatory phase between 2008 and 2012. From our perspective, the main lessons are as follows:

- a new financial market has been created for CO₂ emissions bringing supply and demand together while potentially attracting investors in order to ensure its liquidity. In addition to certain teething problems giving rise to malpractices, the market suffered from structurally weak demand initially due to over-allocation and then due to the crisis;
- the emergence of CO₂ prices as an indicator due to the creation of this market is only possible if supply is structurally exceeded by demand over the long-term; however, allocations of emissions quotas during the initial 2005-2008 phase led to CO₂ prices collapsing to less than 1 euro per tonne;
- the market is dominated by electricity companies which represent around 65%-70% of European CO₂ emissions;
- for the system to work, emissions quotas must be allocated according to fair rules in order not to cause inappropriate distortion in competition between sectors or between players from a single sector;
- the situation raises the question of European industry in relation to global industry in terms of the impact of climate policies on conditions for competition.

In this initial phase, the allocation of free but tradable emissions quotas on the market enabled some companies to realise profits, but only to a limited extent given the collapse of CO₂ prices from 2007.

During the second ongoing period from 2008 to -2012, allocation rules remain unchanged, except that emissions quotas can be transferred to the following period, at least till 2020.

The 2008 financial crisis had a severe impact with reduced production giving rise to new surplus allocations among companies emitting carbon, surpluses which will continue till economic growth resumes. CO₂ prices then stayed below the level of 20 euros per tonne till mid-2011.

Most industrial companies are therefore saving their emissions quotas till the third phase beginning in 2013, which will introduce numerous changes.

However, we have observed that only the two sectors most concerned by CO₂ emissions, i.e. steel and cement production, have enjoyed any significant financial benefits due to a major fall in production.

Quotas and use per sector, 2005-2009

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ibid, previous footnote.

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	Allocations gratuites			Emissions vérifiées			Ecart en %			Ecart en tonne
	2005-2008	2009	2010	2005-2008	2009	2010	2005-2008	2009	2010	2010
Installations de combustion	1471	1255,1	1260	1491,2	1496,4	1362,2	1,4%	19,2%	8,1%	102,2
Raffineries de pétrole	160,8	151,4	151,7	151,7	153,3	144,3	-5,7%	1,3%	-4,9%	-7,4
fours à coke	22,8	22,5	22,4	20,9	21	15,8	-8,3%	-6,7%	-29,5%	-6,6
grillage de minerai	25,2	21,9	22	17,2	17,6	11	-31,7%	-19,6%	-50,0%	-11
fonte et acier	155,6	184,7	185	131,5	133,3	95,4	-15,5%	-27,8%	-48,4%	-89,6
clinker pour ciment et chaux	193,7	209,6	212,1	186,9	189	150,1	-3,5%	-9,8%	-29,2%	-62
verre	22,5	25,2	25,5	20,5	22,7	19,4	-8,9%	-9,9%	-23,9%	-6,1
produits céramiques	18,1	18,6	19,1	14,8	13,4	9	-18,2%	-28,0%	-52,9%	-10,1
papier et pâte à papier	37,1	37,9	38,4	29,8	31,2	27,5	-19,7%	-17,7%	-28,4%	-10,9
autres activités	0,3	22,6	23,2	7	22,3	19,4		-1,3%	-16,4%	-3,8
Total Union Européenne	2107,1	1949,5	1959,4	2071,5	2100,5	2185,4	-1,7%	7,7%	-5,4%	-105,3

Source : EUA ETS 2010

Towards appropriate CO₂ prices: the third phase (2012 -2018)

The European Commission has set a total of free quotas equivalent to just under 2.04 billion tonnes of greenhouse gas emissions for allocation to the 20 industrial sectors concerned, and has thus defined a cap or overall objective for cutting emissions with a linear reduction of 1.74 % per year starting from the reference year 2010.¹⁵

This is an industrial and sectoral approach to allocating quotas; however, some adjustments are envisaged in the event of undesirable effects (e.g. price of electricity and aluminium).

In allocating quotas, the European Commission distinguishes between three types of industrial sector depending on their exposure to international competition and thus their capacity to pass on additional costs due to carbon prices through their sales prices¹⁶:

- electricity producers are the only sector which will be obliged to purchase all their CO₂ quotas by auction from 2013;
- industrial producers emitting greenhouse gases and not exposed to the risks of carbon leakage¹⁷ will have to purchase 20 % of their quotas by auction in 2013; this percentage will gradually rise to 80 % in 2020;
- industrial producers emitting greenhouse gases and exposed to carbon leakage risks due to international competition will keep their entirely free quotas provided they meet the benchmark¹⁸ for their sector, defined as the 10 % lowest CO₂ emissions per tonne. This benchmark represents a new cap, above which companies will have to purchase quotas by auction.

Thus, for each industrial sector which is exposed to carbon leakage (apart from electricity production), the total of free emissions is determined for all sites according to the following simplified formula:

$$\text{Average production for the 2005- 2008 period}^{19} \times \text{benchmark} \times 0.8 \text{ in 2013 (} \times 0.2 \text{ in 2020)}$$

This total of free quotas is known for the entire 2013-2020 period. The more a given site uses state of the art technology for its sector, the more of its needs will be covered by the free quotas²⁰.

¹⁵ Memo from the European Commission, 22 October 2010: this total has been calculated without taking the aviation sector into account, as this will have its own cap, which has not yet been fixed.

¹⁶ European Commission decision of 27 April 2011.

¹⁷ Carbon leakage is the relocation of production as a result of differing carbon prices in Europe, ultimately resulting in more carbon being emitted from outside the EU.

¹⁸ The 52 benchmarks are expressed in tonnes of carbon dioxide (CO₂) per tonne of manufactured product. These are multiplied by historical production volumes for a given site to determine the number of free quotas allocated to that site. Figures are based on the years 2007-2008 with the exception of cases in which there was no cooperation between steel producers.

¹⁹ In the event of production capacity increasing or decreasing significantly over the period, the average is calculated for the period 2005 – first half of 2011.

²⁰ Most of the benchmarks refer to products, but there are also benchmarks for heat and fuel. Historical emissions data remain the benchmark for process-linked emissions.

These distinctions have been introduced by the European Commission to meet various requirements:

- raising carbon prices in the sector producing the most CO₂ emissions, i.e. electricity production, a sector which it does not see at risk of external competition. These higher prices and the resulting higher electricity prices should enable the low-carbon investments needed for real and measurable emissions cuts in the medium term;
- a gradually increasing cost impact of introducing carbon prices in industrial sectors not exposed to international competition, which should enable the requisite investments;
- striking a compromise between incentives to reduce emissions and not overly undermining the competitive position of sectors exposed to international competition.

The second important change has to do with quotas for sites being set not at national but at European level in order to put a stop to national preferences reflected in the allocation of quotas to certain sectors at the expense of others. To this end, a reference document was needed on best available technologies (Best Available Techniques Reference, BREF).

Last but not least, the third change has to do with the allocation of profits from the auctioning of quotas to national budgets. This is a significant break from the principles underlying the system; after all, the emissions market was set up in order to avoid fiscal measures. The exclusive use of market mechanisms was to some extent able to cover emissions reduction costs in the relevant sectors without the public authorities having to play anything other than a regulatory role; in doing so, they gave up a double dividend (cutting emissions quotas without any new budgetary revenue).

The auctions are intended to maximise CO₂ prices in order to promote investments cutting carbon emissions²¹. The Commission then has to encourage this link, with 20-50% of revenue from auctions to be used to combat climate change.

Very likely this is only a suggestion, particularly in a context where the debt crisis following government salvage of the financial and banking system requires unprecedented efforts, both in terms of cutting expenditure and tapping into new sources of revenue for EU Member States.

We should also mention here the inclusion of greenhouse gases²² and sectors²³ not covered by the first two experimental phases, in particular the non-ferrous metals, aviation and petrochemicals sectors.

However, in view of its high electricity consumption per tonne of product, the aluminium sector had already been affected in economic terms by higher electricity prices partly as a result of carbon prices. For the same reason, electricity-powered steelworks were also affected. In order to take into account this situation resulting in high electricity prices which in the absence of correction would have made recycling-based metals production in the intermediate metals sector more expensive than ore-based production, the Commission plans to allow State aids under certain conditions in order to avoid carbon leakage²⁴.

The civil aviation sector represents an interesting case as the first intrinsically international transport sector to be subject to emissions trading: it will need to overcome the impact of a cost constraint applied to all carriers both European and non-European without any other justification other than a contested and internationally controversial policy to combat climate change.

²¹ The Commission estimates that 1.5 % of GDP per year in additional investment will be needed up to 2050.

²² Emissions of nitrous oxide (NO₂) resulting from the production of nitric acid, adipic acid and glycolic acid, as well as of perfluorocarbon by the aluminium sector.

²³ Organic chemicals, hydrogen, ammonia and aluminium.

²⁴ The conditions will be specified by the end of 2011.

What evaluation is needed for which recommendations?

If we compare the changes to the emissions quota system from the beginning of the third phase (in 2013) with the criticisms and recommendations set out in our previous studies carried out for the European Trade Union Confederation (2007 and 2009)²⁵, the following observations may be made:

with regard to allocating quotas in such a way as to ensure transparency and fairness to producers, the Commission's rules have been the subject of often heated debate among specialists from the relevant sectors. Compromises have been reached with all sectors, except for the steel sector which took legal action in 2011. This conflict with a particular sector is symptomatic of the potential disagreements on such a new and technically complex subject as CO₂ emissions. This will not be the only or the last conflict given the difference between European rules and those of non-European trading partners. We therefore need to look at this subject in considerably greater depth if there is a possibility of adopting such rules internationally.

With regard to the emissions market, there is no doubt that this is a European innovation which will:

- either be imitated in various regions and countries outside Europe, thus facilitating the adoption of common rules, which could ultimately enable the establishment of a platform for the international trading of emissions quotas at standardised prices – this is clearly a scenario envisaged by the European Commission;
- or, be threatened as a tool for cutting emissions, having failed to effectively set carbon prices as a reference for companies emitting greenhouse gases.

With regard to carbon leakage, the compromise between the need to cut emissions and the competitiveness of European industry is still not enough to safeguard the latter in the long-term. With regard to carbon leakage, the compromise between the need to cut emissions and the competitiveness of European industry is still not enough to safeguard the latter in the long-term. Such border adjustment must be based on two pillars:

- carbon traceability for all products traded on the planet as a basis for information on the climate costs of internationally traded goods and services;
- a common definition of carbon emissions, the legitimacy of which could only be guaranteed by an independent agency. This initially European agency could either directly become international or link up with other agencies set up elsewhere in the world. The example of the REACH²⁶ agency is very instructive in this respect and could be taken as an example of how to develop technical expertise independently from lobbying organisations thanks to the involvement of all stakeholders²⁷. Thus, the REACH Regulation sets out to reconcile the need for better protection for human health and the environment with more competitive European industry. It has enabled standardisation of tests and classification throughout Europe of all the substances for which the agency has responsibility, by means of its scientific committee.

This border adjustment would work as follows:

- any economic operator wishing to import a product into Europe would declare its carbon content; in the event of this failing to meet the relevant European benchmark, the importer would, just like any European producer, be required to acquire the additional emissions quota to make up the shortfall;

²⁵ Syndex, Istas and Wuppertal, *Changement climatique et emploi*, Brussels, 2007; Syndex, S.Partner and WMP, *Les dérèglements climatiques, les nouvelles politiques industrielles et les sorties de crise*, Brussels, 2009.

²⁶ Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

²⁷ Independent agency carrying out scientific work. The agency's executive director is appointed by the Management Board. This in turn comprises one representative for each Member State (1 vote for each country), together with two representatives of the European Parliament, also with one vote each, and six members appointed by the Commission, including three representatives of the Commission itself (DGs Enterprise and Environment and Ispra JRC), each with one vote, and three stakeholder representatives – the chemicals industry, environmental NGOs, trade unions – without voting rights. There are also three observers from EEA countries: Norway, Island and Lichtenstein.

- similarly, for exports, European exporters would be freed of any carbon constraint through the sale of quotas linked to the exported products.

This border adjustment would not be a tax given that it would operate through the purchase and sale of quotas on the market. It would be compatible with goods trading rules advocated by the WTO in that it would ensure equal treatment of national producers and importers, thus complying with the golden rule of non-discrimination between national and foreign producers in international trade.

With regard to allocating free emissions quotas as advocated by industrial companies in order to face international competition, such allocation would by no means guarantee proper use of the proceeds of their sale on the market. Such allocations currently amount to a hidden subsidy²⁸; instead, they should be used solely for low-carbon investments, whether short-, medium-, or long-term.

Thus, the third phase of implementing the emissions market is based on a very restrictive and static definition of emissions quota allocation, limited to actual production. A more dynamic approach would be to extend its scope to expenditure on R&D, training staff in low-carbon research, and on low-carbon-related job retraining.

Such allocations would promote short-and medium-term investments to encourage energy efficiency and innovation together with longer-term developments.

2.3. On energy efficiency

CO₂ emissions through enhanced energy efficiency, the third pillar of the policy to combat climate change, is currently the only non-binding measure, as well as the only one which follows on from energy policies pursued since 1973 initially in relation to oil and much more recently in relation to electricity in view of nuclear programmes generating electricity at low prices (which in this case are not equivalent to low costs).

These measures are non-binding given that there is a clear incentive to cut the costs of an increasingly expensive resource at the same time as reducing CO₂ emissions.

Lower costs go hand-in-hand with lower CO₂ emissions, thus making energy efficiency a vital tool for boosting the competitiveness of European industry. Energy efficiency yields a double dividend which industrial companies are in a good position to tap into thanks to targeted investment.

However, it should be pointed out that in the absence of a policy offering either regulatory or financial incentives, energy efficiency investments approved by industry have been slow to materialise recently. Why?

There are several possible explanations for this relative indifference:

- firstly, energy-intensive industries point to charts and graphs focussing on past performance, arguing that the biggest savings have already been made and that is difficult for them to make further progress unless there is a technological breakthrough. Such arguments may appear convincing, but energy analyses of individual sites show incontestably that there is scope for a further 15-30% of energy efficiency gains depending on the sector;
- secondly, energy efficiency gains always require the involvement of employees and their representative organisations in ensuring optimal operation of a given site, a factor which gives social dialogue and its outcomes an importance which companies are often reluctant to acknowledge and which many trade unions are unaware of;
- finally, the question arises of investments and likely returns in an environment characterised by the short-termist industrial strategies in Europe of largely financialised multinational groups.

Hence, current developments suggest that the much-cited "win-win" of energy efficiency combining lower CO₂ emissions with competitiveness hardly seems to apply in Europe today.

²⁸

This is clearly the interpretation followed by the Slovak Government, which applies an 80 % tax on emissions quotas not used during the year (source: US Steel 2011).

We are a long way from achieving the 20% energy savings objective. According to European Commission figures, Europe is likely to achieve just 10% of energy savings in 2020 relative to 2005. Based on this observation, the Commission's new strategy aims to make good the lag in achieving the EU's energy saving objectives for 2020²⁹.

With regard to industry in particular, the draft new directive includes few specific measures to support the development of technologies enabling more energy-efficient processes, these measures remaining a Member State responsibility.

Admittedly, phase III of the ETS appears to have removed one of the obstacles to the development of cogeneration in industry. In phase III, quotas will be allocated to all types of sites regardless of their use or capacity.

This extension of the scope of quota allocation is important in supporting the development of cogeneration in energy-intensive industries, and should be complemented by measures to promote investment in other technologies linked to electricity supplies, subsystems driven by electrical motors, compressed air systems, pump systems, HVAC (heating, ventilation, and air conditioning) systems, lighting, drying processes, separation, concentration and smart networks.

Making industry still less energy-intensive while increasing the proportion of energy from renewable sources and integrating them into energy production systems remain two key challenges for the EU. That said, many of the numerous measures described in National Energy Efficiency Action Plans (NEEAP) have yet to be implemented.

For industry, energy efficiency is a key lever for maintaining competitiveness, along with materials efficiency. However, many of the current measures remain voluntary. Large-scale industrial changes require the implementation of binding measures enabling the acceleration of energy saving in industry.

Countries like the United Kingdom show what it is possible to do by introducing a carbon constraint for companies exempt from the ETS by establishing a system of paying quotas. However, in contrast to the United Kingdom which has stopped recycling revenues from the scheme, we feel they should be paid into a European energy efficiency fund to support industrial investments through zero-interest loans.



²⁹

Directive of the European Parliament and of the Council on energy efficiency, and amending Directives 2004/8/EC and 2006/32/EC.

3. Convergence between industrial and climate policies

Industrial and climate policies have become two aspects of the same economic reality in which raw materials policy in the broad sense of the term has the objective of saving and recycling every little gram or watt in order to boost the competitiveness of European industry on a fierce global market.

For this to happen, we need to rethink our bloated or even incoherent economic systems in such a way as to reconcile European carbon policy with energy policies which are still too national in outlook as well as materials and energy efficiency policies at the intersection of these two. To this end, we need to launch a social dialogue, integrated with and backed by industrial and climate policy.

The choice made since adoption of the Kyoto Protocol has been to encourage a price signal which in theory should enable achievement of the goal of reducing emissions through competition between economic operators. As we have already seen, the problem is that this approach has not worked; in particular, it has led to an incoherent system with three different prices for each tonne of carbon prevented:

- a market price which is open to speculation through the emissions quota market; since the 2008 financial crisis this has varied in the range of 10-15€, and seems unlikely to rise over the next few years in view of European growth prospects;
- a subsidised price which in practice is applied to renewable energies with major differences between different types of energy (the carbon price is much higher for solar energy than wind energy);
- a price for energy efficiency varying according to sector but which can definitely be negative in some cases.

We would advocate a regulated price which could be used as a benchmark and enable convergence between the various situations to which it is applied.

3.1. How can we establish a price for carbon?

There are two initial non-exclusive approaches available to climate policies for establishing carbon prices:

- either the price can be set by the emissions market by limiting supplies as the European Commission has been unsuccessfully attempting to do for several years, and which the introduction of auctioning is intended to maximise regardless of the economic cost;
- or a tax (or, in the opposite case, a subsidy) can be introduced as an administrative charge resulting from a political compromise between the results obtained and the collective cost.

There would therefore appear to be a choice between a market- or administration-generated price. In practice, the market is reserved for operators emitting large quantities of greenhouse gases, with taxes for small operators.

For large industrial companies, at the current stage we would definitely recommend a regulated price, i.e. a price which would fluctuate between maximum and minimum levels in line with CO₂ prices which would be partly (50 %) tied or indexed to a basket of international energy prices.

This proposal is mainly motivated firstly by the need to limit speculation and secondly by the importance of linking CO₂ prices to energy parameters specific to the global economy, with low CO₂ prices when energy is expensive, and vice-versa.

The price of CO₂ would therefore be linked to the supply of emissions quotas allocated free of charge on the basis of a calculation to limit global warming, with demand for CO₂ driven by economic growth combined with changing demand for energy which in turn is linked to CO₂ emissions.

This would also resolve the potential contradiction between an effective energy efficiency policy and the emissions market³⁰.

3.2. The global economic environment since 2005 and its impact on European climate policy

The Kyoto Protocol was adopted in 1997, and the first steps towards European climate policy, which at the time expressed a vision of a pro-active Europe as the leading global power in the fight against climate change, were debated and worked out during the 1990s and early 2000s. It was at this time that the EU adopted its Lisbon strategy envisaging it becoming the most competitive knowledge-based economy by 2010. "With manufacturing transferring to emerging economies, developed countries are dependent on the knowledge-based economy to generate sustainable growth," explained Cinzia Alcidi, a researcher at the Centre for European Policy Studies. Becoming the most competitive economy in the world may have seemed ambitious, but the context of the time was very different: " in 2000 when the strategy was drawn up, we were in the middle of strong growth, just before the internet bubble burst... everything seemed possible," according to Jean-François Jamet, economist at the Robert Schuman Foundation³¹.

Even though the situation has changed radically, the basic assumptions are still the same. In such conditions, it is logical to ask whether these assumptions should be updated.

What is the impact on EU climate change policy instruments of the current phase of global capitalism characterised by

- economic growth and the resulting new strategic weight of the emerging economies, and
- even stronger financialisation of all economic activity

The first impact is that over the past few years China has become the main supplier of renewable energy equipment used in Europe, both for wind turbines and photovoltaic cells. Thus, while Europe's lead in the fight against climate change may be borne out in terms of lower emissions³², it is not translating into new industries or new jobs on European territory. Without going into all the factors and policies which have led to the current situation, we should mention the establishment of the WTO and the emergence of China as a freely trading nation as major events.

The emergence of China followed by other emerging economies as players in world trade is a remarkable economic development which has changed the face of the global economy leading to growing financial imbalances which could fundamentally change strategic relations between regions and countries.

This extraordinary growth in trade is driving current globalisation with the following direct results:

- the rapid de-industrialisation of European countries taken as a whole and of the United States as a result of the trend whereby China is gradually becoming the reference market for numerous products, a phenomenon which affects sectors manufacturing consumer goods and to a lesser extent capital goods. Thus, since 2005, the de-industrialisation process has continued, in particular under the impetus of growing competition from emerging economies led by China, with very rapid growth in the trading deficits of EU countries with China. Between 1998 and 2009, European industry (including energy) in the 27 Member States fell from 23.1% to 18 % of gross

³⁰ Declaration by Peter Vis on 16 June 2011.

³¹ L'Expansion, 3 March 2010

³² Partially due to increasingly anaemic economic growth.

value added by all European economies, a historic drop of five percentage points in 5 years, a process which has not yet finished³³;

- increasingly fierce competition at global level for access to natural resources, particularly energy, food and industrial raw materials, a phenomenon which also affects processing industries.

In the case of competition for raw materials, rapid Chinese industrialisation is the main factor behind strong tension on the markets for industrial and energy raw materials which has pushed up prices rapidly over the last few years.

3.3. Energy efficiency is a powerful lever for the competitiveness of European industry

Given that Europe is poor in raw materials, there has been an immediate impact on processing industry, and alongside a need for greater energy efficiency, progress is also needed in materials efficiency in order to maximise the value added produced from each unit of material or energy.

In economic terms there has been a measurable distortion of production costs with a sharp rise in the share of raw materials and energy for intermediate industries and higher intermediate product prices.

Even for industries which are inherently more sensitive to CO₂ prices, the relative impact of these prices is reduced. So, even if CO₂ must still be taken into account in global competition, its relative weight as a potential additional cost is relatively smaller in the current economic situation. This is all the more true if we consider CO₂ as a by-product of the processing of materials and combustion of fossil fuels, from which it follows that energy and materials efficiency gains are a priority for European industry, and that these in turn will automatically deliver lower CO₂ emissions.

The industrial policy of efficiency has therefore become primordial with a reduction in CO₂ emissions becoming a goal in itself. Climate policy thus ties in with the competitiveness of European industry and is becoming part of industrial policy aimed at encouraging energy and materials productivity gains.

This is an important change in perspective given that low-carbon policy is becoming a result of an industrial policy on raw materials which promotes the following³⁴:

- materials efficiency, i.e. less materials-intensive economic growth;
- collecting and recycling waste materials in order to make use of them;
- R&D on substituting critical raw materials widely used in low-carbon sectors (indium, lithium, rare earths, copper, etc.);
- retraining of labour employed in intermediate industrial sectors such as the consumer products sector.

The most striking example is in the non-ferrous, aluminium and copper sector which has seen a strong reduction in its energy expenditure of 95 % and 85 % respectively for primary production from ore and secondary production from waste. While Europe is a major producer of waste, more and more often raw materials in the form of waste are heading to China or India for recycling. In other words, lower energy costs and resulting reductions in CO₂ emissions are not sufficient to make European recycling industries competitive. How can we explain this phenomenon?

In this context, the Commission's "critical raw materials"³⁵ initiative is an important first step in raising the question of recycling for the 14 raw materials which it identifies. For these critical raw materials, there are numerous practical difficulties throughout the recycling value chain.

³³ Working document on the Commission Communication "An integrated industrial policy for the globalisation era: putting competitiveness and sustainability at centre stage", October 2010.

³⁴ CCMI, opinion adopted in connection with consultation on the European Commission's communication on Tackling the challenges in commodity markets and on raw materials, May 2011.

³⁵ The Raw Materials Initiative - Meeting Our Critical Needs for Growth and Jobs in Europe (SEC 2008 2741).

At present, recycling activities often still run into the problem of low economic viability, due to high collection and processing costs. As a result, there are only a few recycling factories in Europe at the moment. Improved collecting activity could help to stop the "leakage" of products (mobile phones, computers, catalytic converters, etc.) most of which are currently recycled in emerging countries.

The forestry sector is a good example of a symbiotic approach. Wood is mainly used as a raw material in manufacturing processes, with production residue being used to produce renewable energy from biomass. This reduces the sector's energy dependency while helping to meet renewable energy objectives. The forestry sector produces about 30 % of total EU biomass energy in this way. In the paper pulp sector, biomass represents about half of primary energy use. A symbiotic approach serves as a basis for reducing market failure in terms of information.

However, imperfect information flow is not the only thing holding back greater materials efficiency; investments which have to be made by all stakeholders are another problem. Thus, economic incentives are the best lever for increasing materials efficiency in industry.

There are two complementary approaches here.

- The first of these aims to support and structure investments in the recycling sector.
 - Firstly, a requirement could be introduced for all product distributors to collect waste materials
 - Secondly, sectors processing collected waste materials could be allocated carbon credits.
- The second of these two approaches could change business models through eco-innovation and a smoothly running economy.

Through a better understanding of product life cycles, eco-innovation represents the main instrument under this approach, enabling enable products to be designed in such a way as to improve their materials and energy efficiency. Integrating the disposal of a product in its design would enable more effective recuperation of materials. However, this is not currently the case, for example the various metals in crushed cars cannot be separated, which reduces recycling rates. To change this, a new European directive on eco-design should include binding standards, not simply principles and procedures. These standards could refer to BREF 2009 industrial energy efficiency benchmarks.

Introducing binding European standards would be a powerful lever for speeding up eco-innovation and products, while giving European industry numerous competitive advantages (particularly in terms of selective access to Community markets, support for R&D activity, etc.).

The transition to a functional economy, i.e. from ownership to use, would mean businesses having to rethink their business models, with a focus not on selling products but using them (availability). One well-known example is the hiring model used by Michelin for lorry tyres or by the Swedish SAAB company which does not sell aeroplane engines but their capacity. Also, in such an economic model fewer goods are produced than in the ownership model. Total use is less than total ownership due to reduced non-productive time.

3.4. The specific issue of electricity

Apart from raw mineral and energy materials, particular attention should be paid to electricity, which is both an intermediate product and raw material.

Electricity is almost impossible to store, is produced in very different ways and requires a specific infrastructure for each energy mix; it is a major tool and component of any industrial policy. Like other forms of energy a specific characteristic of electricity in Europe is that it is still controlled by the national policies of Member States.

At the heart of European industry, rising electricity prices are becoming an increasingly serious competitive disadvantage compared to competitors from emerging economies, for whom cheap electricity is becoming a strategic development asset.

The liberalisation of the European market in the context of transition to the low-carbon economy and of a clear investment shortfall in some countries is resulting in high electricity prices for electricity-intensive European industry. The process of de-industrialisation is continuing, and is affecting sectors which until now had been relatively unscathed.

Carbon prices are not the only factor behind rising electricity prices but they do contribute to them, alongside renewable energy subsidies, the maximisation of budgetary revenue from auctions, the concentration and privatisation of groups operating as oligopolies in a deregulated market, and an increasing imbalance between supply and demand in the context of insufficient capacity and the substitution of electricity for non-electrical energy, as well as the recurrent problems in interconnecting the European electricity grid.

The European Commission is perfectly aware of the destructive effects of higher electricity prices in its efforts to encourage a derogation to European rules on State aid.

The answer to this threat of excessively high European electricity prices would involve an industrial policy combining the production and consumption of high voltage electricity.

In other words, we need not only to confirm the segmentation of the electricity market between industrial and individual clients, but also to link investments and energy efficiency in production, promoting them through long-term supply contracts tying the development of electricity prices with energy efficiency gains, in a similar way to allocation of free quotas. The Excelsium project in France bringing together investors in the construction of nuclear power stations is an example of this approach, but one which only partly succeeded, as despite linking production and consumption, it overlooked the associated aspects of energy efficiency and social dialogue..

Besides, with regard to the content of long-term supply contracts, it would also - as in the ongoing negotiations between public authorities and energy-intensive sectors - be worth tying the practices of scheduling or interrupting electricity consumption to the presence of a genuine social dialogue in order to be able to benefit from electricity prices at the most appropriate level, while remaining aware of the constraints that such practices will have on production and thus on staff working conditions.

3.5 A fair social transition: from employee adaptability to resilient work teams

The Communication on "An integrated industrial policy for the globalisation era" adopted by the European Commission on 28 October 2010, a tool of the Europe 2020 strategy, sets out a strategy that aims to boost growth and jobs by maintaining and supporting a strong, diversified and competitive industrial base in Europe offering well-paid jobs while becoming less carbon intensive.

However, the Commission's arguments are unconvincing given that its proposals are still exclusively focused on liberalising the European internal market, whereas the main challenge is presented by the relations between the European Union and other internal economic players (rather than the countries comprising the EU).

The Communication overlooks employment and training, as well as the social partners.

More promising for jobs and competitiveness is the roadmap on a "resource-efficient Europe" adopted by the EU on 20 September 2011, which emphasises the need for European industrial policy to take into account a low-carbon economy, the need for competitiveness, and issues linked to resource efficiency (energy, metals and raw materials).

These issues require profound change to the European production system. Such changes can only make European industry more competitive if they involve an integrated approach balancing both economic and social progress. A fair social transition can only be dealt with effectively through a structured and proactive approach in which social dialogue plays a key role.

Developing integrated social dialogue is a pre-requisite for framing an innovative industrial policy

Taking account of the structural characteristics of change and the relevant timescale, we cannot focus on short-term priorities, due to the constraints of the financial crisis. All too often, restructuring activities, which are becoming increasingly common, involve negative social repercussions, such as lost added value, job and purchasing power losses, lower job quality, and deteriorating employment and living conditions. However, at a time of permanent industrial re-organisation, an all embracing social approach is the only way of ensuring long-term socio-economic stability. This condition can only be met if we anticipate change and plan for it in the long-term, while taking into account the social costs and endeavouring to minimise them. Hence, an appropriate approach to change must be socially responsible, putting in place an effective dialogue between the social partners.

In a context where corporate restructuring has become part of a permanent process of adaptation, it is essential to ensure that workers are actively involved in change. Employee involvement in change must not be restricted to an attempt to minimise the impact of a critical economic situation. An integrated, proactive and innovative industrial approach should enable employee participation as a structural element of the decision-making process, at each stage of restructuring measures, from implementation through to evaluation and follow-up. This participatory approach would be key in limiting social uncertainty on strategic decisions, in anticipating social tension and in maximising the benefits of change for all.

In this connection, two tools can play a key role in anticipating and responding to changes:

- firstly, a High-Level Forum was set up in May 2011 to allow dialogue between European social partners and various Commission departments on the issue of the transition to a low-carbon society. **This forum should thus enable the following:**
 - the development of objectives and cross-cutting strategies for all European policies;
 - the identification of obstacles arising from European law (internal market, competition, European semester);
 - the identification of new funding sources and the testing out of existing sources;
 - the exchange of best practises;
 - at international level, inspiration for other regions.
- secondly, at sectoral level, sector-based employment-skills councils have been set up at European level (ESCs), and these, in cooperation with their national counterparts, should provide essential support in the process of managing change within the sectors concerned, together with the High-Level Forum.

Transferring know-how to ensure the survival of tomorrow's industry

In European industry, a large number of skilled staff employed in crucial professions, with expertise derived from collective and individual experience rather than from training, will be retiring over the next ten years. Unless we are willing to see numerous European industries die out, we must urgently ensure that

individual and collective skills and know-how are passed from one generation of employees to the next, thus enabling competitiveness to be preserved³⁶.

Ensuring resilient work teams

The financial crisis has delivered some dangerous shocks. The bursting of "bubbles" due to surplus liquidity and its unproductive use has given rise to industrial under-investment, often a precursor to the planned phasing out of production facilities.

Our response to acute but temporary and limited crises must be combined with anticipation of changes to production systems on the road to a low-carbon economy. For this to happen, we need to go beyond restructuring focusing on employee flexicurity, by addressing broader issues connected with the maintenance of collective expertise and resilient production facilities.

As well as the risk of losing valuable professional skills, there is also the danger of lagging further and further behind in the acquisition and implementation of new technologies and skills, thus undermining the attractiveness of industrial professions and the social visibility of the potential which they offer for recovery.

In this context, periods of inactivity involving e.g. "partial unemployment" should be put to good use through measures to train staff and improve the competitiveness of facilities. When correctly used, partial unemployment facilitates the maintenance of production capacity and recovery potential once a cyclical crisis is over. Especially in the metal production sector, German industry showed clearly during the 2008-2009 crisis that after a major drop in activity, production capacity can be re-launched once demand recovers. This strategy for industrial flexibility, not found in all European countries³⁷, should be gradually implemented to avoid competition between European countries, thus alleviating the social and professional impact of cyclical downturns, which have become both more frequent and more severe due to financialisation. However, its use should be subject to maintenance of production capacity by a given employer. Partial unemployment is the kind of approach which should be used when industries are restructured, in order to enable employees to adapt and companies to invest.

. Indeed, manufacturing industry is more vital than ever, both because of its contribution to economic prosperity, and because of the solutions it can provide for new requirements and new social problems in the context of transition to sensible and rational management of natural resources and of social and environmental shared assets.

3.6. Financing instruments for a European low-carbon policy and governance issues



Community financial instruments are crucial in implementing an integrated low-carbon EU policy in response to the proactive policies of emerging economies and the United States.

Emerging economies (especially China) and the United States are investing massively in "low-carbon" technologies; the EU is not investing enough, and as a result it risks losing its leadership position in this sector, which is decisive in terms of both employment and the wider economy.

³⁶ However, the situation varies considerably from one country to another.

³⁷ Especially in Eastern Europe and Great Britain.

The European Union urgently needs a strategy to promote innovation in the field of European low-carbon product and process technologies, while preserving and strengthening a social model which is characteristically European.

The EU must also urgently invest in technology enabling European industry to improve energy and materials efficiency, to diversify energy sources by shifting towards renewable energies and smart grids, and to develop low-carbon product and process technology sectors.

Besides setting prices and sending the right pricing messages for carbon under the conditions described above, the EU will also need a range of substantial, more efficient private and public-sector financial instruments.

Governments will need to support R&D together with projects demonstrating and applying new technologies while providing predictable and appropriate support for investment in energy-intensive industries, and making use of such tools as legislation, regulation, public investment and sound management of the "green and low-carbon" jobs generated by appropriate training and educational programmes. All of this will require significant funding at both European, regional and sectoral level.

Financial instruments are crucial in implementing an integrated low-carbon EU policy taking full account of the need for a smooth social transition.

Existing European financial instruments can be used to fund these policies, but they are not yet sufficient for this task: these instruments include the EU's general budget, the European economic recovery plan, and Structural Funds of European cohesion policy for the 2007-2013 period. The main outlines of the EU draft budget (2014-2020) represent an austerity budget in a context of financial crisis and of managing cuts in Member State government debt.

Financial instruments should be stepped up and used more in support of a strategy to develop low-carbon industry in the European Union.

The European Commission has set an ambitious goal for the funding of EU low-carbon policies in a context of Community budget restrictions for 2014-2020.

The European Commission suggests continuing with the mainstreaming of EU climate policies in various fields of activity through a series of financial instruments supporting multiple EU objectives. It proposes to increase the share of the 2014-2020 multiannual budget devoted to mainstreaming climate policies to at least 20%, "with contribution from different policies, subject to impact assessment evidence".

According to European Climate Action Commissioner Connie Hedegaard, around EUR 200 million will be earmarked for climate policies - three times more than in the previous budget.

The Commission estimates that technology development requirements for 2010-2020 in the context of the future strategic framework for research and innovation in the EU amount to EUR 50 billion; this will be needed in order to combat climate change and greenhouse gas emissions, while ensuring the EU's energy security and competitiveness.

In the context of the financial crisis and problems in managing Member State sovereign debt, the measures needed for a low-carbon industrial policy will be affected by likely restrictions on the various components of the EU budget (in particular the Structural Funds) for 2014-2020.

Some new innovative financial instruments such as the FTT (financial transaction tax) proposed by the European Commission, which could raise EUR 50 billion per year, will be mainly used to reduce Member State contributions to the EU budget, rather than for investments and measures under a European low-carbon industrial policy.

However, despite the context of EU budgetary restriction, the European Commission has presented a draft EU budget for 2014-2020 supporting the objectives of the EU's Europe 2020 strategy; this budget sets out to devote 20% of the Community budget to investments in measures included in the European climate and energy package (3x20 %) which focuses on the fields of promoting renewable energy, energy and natural resource efficiency, and projects to demonstrate and disseminate CCS (carbon capture and storage) technologies.

Innovative financial instruments in which the EIB plays a dominant role: how should trade union organisations be involved, in order to ensure that low-carbon European industrial policy takes account of social transition measures ?

Innovative financial instruments have been recently developed, with some funding being earmarked to the European climate and energy package and measures under a low-carbon industrial policy. For such instruments, the EIB (European Investment Bank) has a key role to play:

the NER 300 mechanism (auctioning of 300 millions tonnes of CO₂ for new entrants, for an estimated total of EUR 4.5 billion), to be allocated to funding of demonstration projects and pilot projects in the fields of CCS, new-generation renewable energies and smart grids.

a European Fund to Promote Energy Efficiency set up in July 2011, with EUR 256 million of funding at the time of its launch and a declared objective of EUR 800 million. This includes a contribution of EUR 125 million by the European Commission (European Economic Recovery Plan), by the EIB (EUR 75 million), and the Italian Cassa di Risparmio di Venezia (EUR 60 million).

- a system of long-term EIB loans in 2010 (as part of the European Economic Recovery Plan) totalling EUR 20.5 billion, to be used for investment projects in the fields of energy, public transport, water, waste management, forestry and low-carbon R&D projects.

- New joint EIB/European Commission financial instruments to be used for climate and energy policies: the RSFF mechanism

A new Risk-Sharing Finance Facility was set up in June 2007 through a cooperation agreement between the EIB and the European Commission to support R&D and demonstration projects in Europe with a focus on energy efficiency and renewable energies.

With core funding of EUR 2 billion drawn equally from the EIB and the Commission's seventh research framework programme (7 FP 2007-2013), the RSFF will therefore enable the Bank to lend over EUR 10 billion in order to finance investments in research, development and innovation. By the end of 2010, over 60 loans had been signed for a total of EUR 6.3 billion.

RSFF funding is also available to promoters and other research-intensive bodies, regardless of their size or ownership arrangements. Such bodies could include large companies, small and medium-sized enterprises (SMEs), project-based companies, public-private partnerships (PPPs) and joint ventures, research institutes, universities, and science and technology parks.

In the context of the roadmap on a "resource-efficient Europe" adopted by the EU on 20 September 2011, the Commission will launch a "EU Resource Efficiency Transition Platform". It will establish a financial round table to support investment projects to promote efficient use of European industrial resources; this would bring together banking representatives, both private and institutional (the EIB and the EBRD), in order to look into the possibilities of developing appropriate financing arrangements, and using innovative financial instruments to this end.

For all of these innovative financial instruments, in which the EIB plays a leading role, financing arrangements for investment in the development of EU low-carbon industrial sectors takes into account compliance with social and environmental standards as set out in the EIB Charter. However, the key issue for the future will be involving trade union organisations in governance of such innovative financial

instruments to ensure the best possible management of social change in the transition to low-carbon products and processes in European industry.

The European Investment Bank (EIB) is a key financial instrument separate from the EU's general budget. The EIB's financing policy is governed by a Social and Environmental Charter which trade union organisations can refer to in connection with financing for low-carbon investment projects.

In 2009 the EIB published a "Statement of Environmental and Social Principles and Standards" based on fundamental ILO conventions; this Statement is now taken into account in the Bank's strategy for selecting and implementing projects.

Greater use should be made of this financial institution, possibly in order to set up special (national) funds to finance energy and climate policies and measures taken under low-carbon European industrial policy, as well as to support R&D activities not only by large companies but also SMEs.

The EIB should also apply its sustainable development strategy more widely by engaging in dialogue with trade unions and civil society stakeholders (NGOs), and by acknowledging the need for representation of the social partners on its management board.

The European Bank for Reconstruction and Development (EBRD) also offers interesting potential in terms of financing investment in low-carbon industrial products and processes in Eastern Europe.

4. Sectoral review

The common issues facing all EU industrial sectors in terms of their capacity to meet the challenges of a low-carbon economy and society are focused on competitiveness factors relating to industrial value chains, resource (energy and materials) efficiency, and product/process innovation.

Below we look at all sectors in relation to these issues – competitiveness issues, existing and future low-carbon technological sectors achieving resource (energy, materials) efficiency as well as Community sectoral policies and measures, together with Syndex or ETUC/ETUF proposals for improving/revising the EU's low-carbon industrial policy with a sectoral dimension.



Sectors	Competitiveness issues linked to the carbon and resource (energy, materials) efficiency factor	Existing and future low-carbon technological sectors achieving resource (energy, materials) efficiency	Current and planned measures envisaged by the EU's industrial policy with a sectoral dimension taking into account the carbon and and resource (energy, materials) efficiency factor	Syndex or ETUC/ETUF proposals for improving/revising the EU's low-carbon industrial policy with a sectoral dimension
<p>Processing industries</p> <p>Steel production</p>	<p>Competitiveness issues of the carbon factor in the context of the post-2012 third phase of the ETS system with benchmarks and risk of carbon leakage. Product/process innovation, energy and materials efficiency (optimisation of the scrap iron sector). Close existing link between production processes and CO₂ emissions (smelting and electricity-based production).</p> <p>Technological progress determines endogenous CO₂ emissions; it is also crucial for low-carbon and high-efficiency products in application sectors: automotive, energy, construction, equipment.</p>	<p>New technological sectors selected in the ULCOS projects of ESTEP ETP: TGR, Ulcored, Hlsarna (all three linked to CCS technology): combination of CCS with new technologies for extracting iron from ores</p>	<p>Post-2012 ETS system and benchmark based on steel production BREF.</p> <p>Steel production ETP (ESTEP): ULCOS R&D projects aiming to reduce CO₂ emissions by 50% (Funding NER 300, FP7-FP8, post-CECA RFCS,.....).</p> <p>Stakeholder in low-carbon projects of RTD ETP concerning the automotive, construction and renewable energy sectors.</p>	<p>Closely linking CO₂ emission quotas to R&D activity;</p> <p>controlling carbon leakage requires border adjustment;</p> <p>introduction of CO₂ content standards for each sector based on state-of-the-art technology;</p> <p>carbon traceability of steel products, a European agency for carbon standardisation;</p> <p>organising the transfer of individual and collective skills and expertise between generations of employees.</p> <p>Letter from the EMF (European Metalworkers' Federation) to the EC on the implementation of ETS and the need for investment in EU RTD steel projects.</p> <p>Joint EMF-Eurofer approach to the impact of EU low-carbon policies.</p>

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<p>Non-ferrous metals</p>	<p>Competitiveness issues of the carbon factor in the context of the post-2012 third phase of the ETS;</p> <p>risk of carbon leakage; increased costs and risks of energy and raw materials reducing the competitiveness of the sector.</p> <p>Sustainable production strategies involving a high degree of recycling, and of energy/materials efficiency.</p>	<p>New alternative technologies recommended by the non-ferrous metals BREF</p>	<p>ETS, BREF benchmark system, European Commission decision on German compensation for costs of transmitted electricity</p> <p>Sustainable Mineral Resources RTD ETP (SMR ETP)</p>	<p>Joint EMF-Eurométaux letter on compensation for costs of transmitted energy</p>
<p>Refineries</p>	<p>EU context of declining refinery capacity with a new range of more effective tools.</p> <p>Energy efficiency as a crucial competitiveness factor</p> <p>Possibility of supplying downstream industries (petrochemicals, chemicals) and ensuring a certain degree of security in supplies to European industry</p> <p>Risk of carbon leakage.</p>	<p>Cogeneration enabling efficiency gains of 20%-30%, in medium/long term dissemination of CCS;</p> <p>energy efficiency, improved heat integration of components, heat recovery from effluents, condensate recovery, flare compressors, etc.</p>	<p>ETS and phase 3 benchmark system (refineries BREF)</p> <p>CCS Directive and pilot project in the context of NER 300</p> <p>Draft energy efficiency directive including cogeneration</p> <p>The European industrial bioenergy initiative</p>	<p>Industrial policies must provide as many guarantees as possible, in least in terms of standards and legislation, in order to ensure continued competitiveness in the European refineries sector</p> <p>Need for policies and measures on CO₂ border adjustment and protection of EU refineries from carbon leakage</p> <p>Policies and measures to support energy-efficiency investments</p>
<p>Paper pulp</p>	<p>In a context of overcapacity of the EU paper pulp sector, rising energy and raw materials costs are a major competitiveness challenge</p> <p>At 22% energy is the main cost facing the European paper sector, compared to fibres (21%) and wood (17%).</p> <p>Improved energy consumption in the paper sector is due to the development of cogeneration, the growing number of integrated pulp/paper production sites, the growing share of production from recycled paper, the increasing share of biomass in the</p>	<p>New technologies defined by the BREF:</p> <p>substituting biomass for fossil energies requires innovative technologies enabling a higher yield;</p> <p>technologies for transforming biomass and enabling less water to be used in the process; use of CCS technologies;</p> <p>emerging technologies: gasification of black liquor, enabling the sector to become a net supplier of electricity, based on derived products, low-carbon products with a higher added value: biofuels, molecules and green chemicals products.</p>	<p>ETS: phase 3 post-2012 benchmark system based on BREF</p> <p>RTD ETP of the timber sector (FTP), which the EU's paper sector is involved in</p> <p>Participation in the Star Colibri project financed by FP7 on biorefineries;</p> <p>the RTD AFORE on biorefineries in the European paper pulp sector has been approved.</p>	<p>The transition to a low-carbon economy could help to limit the effects of productivity gains in the least efficient units, or even create jobs</p> <p>The potential of jobs in kraft pulp factories developing low-carbon technologies (gasification of black liquor and CCS) and biorefinery activities (potential to double revenues through development of a higher value-added product);</p> <p>new professions and skills likely to be needed in the fields of biorefinery, eco-design, paper recyclability, cross-sectoral energies and technologies</p>

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<p>Chemicals</p>	<p>energy mix; sector covered by ETS but limited risk of carbon leakage; the transition to low carbon represents more of an opportunity than a threat in terms of competitiveness.</p> <p>The EU chemicals sector has an energy expenditure of 350 MTEP a year, 1/3 in the form of electricity and 2/3 in the form of heat from the combustion of fossil fuels.</p> <p>Basic chemicals emit the most CO₂, followed by intermediate and specialised chemicals.</p> <p>Materials and energy costs and efficiency are a competitiveness factor, depending on the age of production facilities, as well as the quality of systems for monitoring and controlling processes.</p> <p>Aim of strengthening product/process innovation and recycling sectors.</p> <p>Limited risk of carbon leakage.</p>	<p>Biorefineries based on ligno-cellulosic biomass</p> <p>Evaluation of emerging technologies carried out and partly updated by the BREF (e.g. procedures for converting methane or methanol, improving mixtures, intensification of processes), transition from discontinuous functioning to intensified continuously functioning reaction technology, organic synthesis assisted by microwaves, catalysis (conventional or enzyme-based), new low-carbon high-efficiency products, biotechnology, nanotechnologies, intensification and miniaturisation of processes, etc.), chemicals enhancing the sustainability of downstream sectors (lighter materials with better insulating properties, energy storage solutions, etc.), plant-based chemicals, medicinal chemicals.</p>	<p>ETS phase 3: benchmark system, CO₂ + N₂O.</p> <p>SusChem sustainable chemicals RTD ETP: examples of projects: clean technologies, new recycling technologies, effluent treatment "High-level group on industrial policy and the chemicals sector"</p>	<p>(nanotechnologies, biotechnologies).</p> <p>Direct public investment in "high-impact R&D projects", development of industrial pilot projects, EU legislation in combination with the demands of international competition, ensuring that the various initiatives to promote low-carbon chemicals and high resource efficiency remain coherent; challenge of steering the process by an acknowledged joint authority in coordination with the SusChem ETP. Policies and measures to anticipate change and promote employment in the chemicals sector; strengthening the EU's thematic strategy on waste prevention and recycling in relation to chemicals.</p>
<p>Plastics</p>	<p>1kg of plastic contains about 2 KTEP, 1 from energy use and 1 from materials used.</p> <p>Competitiveness issues in optimising new low-carbon, highly energy- and resource-efficient products/processes in the plastics sector: organic plastics, composite materials, plastic conductors, new fields of development and competition (application sectors: energy, automotive, construction, aeronautical, green ICTs).</p> <p>Technological development of plastics recycling.</p>	<p>New technologies defined by the polymers BREF:</p>	<p>ETS phase 3: benchmark system.</p> <p>SusChem sustainable chemicals RTD ETP: EU thematic strategy on waste prevention and recycling</p>	<p>Promoting low-carbon, high materials-efficiency innovation e.g. high-performance plastics which can be used to replace metals in the design of complex objects (e.g. cars) or energy generators (batteries, photovoltaic, etc.) Strengthening the EU's thematic strategy on waste prevention and recycling in relation to plastics.</p>

<p>Rubber</p>	<p>Competitiveness impact of the carbon factor:</p> <p>ability of the rubber sector to meet technical requirements of the client automotive sectors in the context of objectives set out in the CO₂ directive.</p> <p>Cars: more efficient tyres in terms of carbon impact and fuel consumption</p> <p>Meeting the challenge of rising prices and natural rubber supply problems.</p> <p>Issues linked to downstream recycling of products</p>	<p>New technologies defined by the polymers/rubber BREF</p>	<p>ETS, Phase 3 benchmark system:</p> <p>carbon factor in the rubber process.</p> <p>Carbon factor for rubber products: CO₂ directive on cars requires more efficient tyres.</p> <p>EU FP7 RTD programmes on rubber</p>	<p>Need to optimise organisation of the EU rubber-based products recycling sector.</p> <p>Stronger support for low-carbon, high-efficiency tyres and for natural rubber substitutes.</p>
<p>Glass</p>	<p>Glass manufacturing processes are energy-intensive (energy = 20% of production costs)</p> <p>Significant potential of energy efficiency in processes (technologies, recycling, etc.).</p> <p>Low risk of carbon leakage; the carbon factor represents more of an opportunity than a threat</p> <p>(Positive impact of transition to low-carbon in application sectors: construction, renewable energies, automotive).</p>	<p>Low-carbon glass furnace technologies, e.g. replacing fuels by less carbon-intensive forms of energy, glass recycling (cullet), pre-heating glass production mix.</p> <p>Recommendations of glass BREF: improving primary techniques (different raw materials, changes to furnaces and lighting arrangements and conventional combustion) and secondary technologies (electrostatic precipitators, baghouses, etc.).</p> <p>New glass product technologies to improve energy consumption in application sectors.</p>	<p>ETS and Phase 3 benchmark system,</p> <p>glass products covered by construction energy efficiency directive and draft EE directive, ReN energy directive (PV), CO₂ cars directive,</p> <p>Construction RTD and PV ETPs.</p> <p>EU thematic strategy on waste prevention and recycling.</p>	<p>Need to support technological innovation.</p> <p>Need for EU sectoral strategy involving the glass and construction sectors more closely.</p> <p>Removal of obstacles to the circular economy offers significant scope for improvement.</p> <p>Strengthen the EU thematic strategy on waste prevention and recycling</p>
<p>Cement and lime</p>	<p>Energy used in manufacturing processes represent 30-40% of cement production costs:</p> <p>preparing the raw mix is electricity-intensive (25-35 kWh per tonne of raw materials), as is its conversion to clinker.</p> <p>Substitute fuels – a lever for competitiveness given</p>	<p>Short/medium term: substitute fuels (waste, biomass), recovering furnace heat, wider use of dry process, use of decarbonised materials before and after baking;</p> <p>medium/long term: Japanese process - furnace with sintering in fluidised bed, replacing clinker by polymers or various other chemicals with low or even</p>	<p>ETS and Phase 3 benchmark system,</p> <p>Construction RTD ETP.</p>	<p>CO₂ border adjustment mechanisms.</p> <p>Stronger policies and measures to encourage low-carbon processes:</p> <p>reducing the clinker factor and the role of standardisation, greater use of replacement fuels, transition to dry process, encouraging RTD for new innovative processes (cement</p>

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	<p>that destruction of waste by furnaces earns money at the same time as clearing up slag from steel production.</p> <p>Competition between cement producers in mastering new low-carbon, high-efficiency processes and products.</p> <p>ETS Phase 3: high risk of carbon leakage.</p>	<p>negative emissions (cement as a carbon sink), CCS (carbon capture and storage).</p>		<p>without clinker, CCS).</p>
<p>Product industries</p> <p>Construction</p>	<p>Competitiveness issue: adaptation by construction companies to new market rules set out in the new European directive and European and national energy efficiency standards both for new and existing buildings.</p> <p>The residential and service sector accounts for 40% of EU energy consumption and 30% of CO₂ emissions.</p>	<p>Introducing new insulating materials, new high-efficiency heating, cooling and ventilation systems, using renewable energy.</p>	<p>2002 buildings energy efficiency directive, new 2009 directive, draft energy efficiency directive. Construction ETP (ECTP) co-financed by FP7:</p> <p>Construction ETP (ECTP) co-financed by FP7,</p> <p>European Construction Forum (sectoral and tripartite body), establishment in 2010 of a European sector-based employment-skills council for construction</p>	<p>Challenge: innovative products/processes and suitable vocational training programme for employees in the sector.</p> <p>Joint initiative by FETBB and FIEC of the European Construction Forum involving the sector and the sector-based employment-skills council.</p>
<p>Automotive</p>	<p>Environmental (pollutant and greenhouse gas emissions) and economic (oil prices, energy dependence) constraints are currently weighing so heavily on the automotive sector that the domination of internal combustion engines is under question, with likely gradual development of electric and hybrid vehicles.</p> <p>Stimulating European funding mechanisms for R&D on low-carbon vehicles has become a key competitiveness factor for the sector in the EU</p>	<p>More fuel-efficient internal combustion engines, with gradual transition to electric vehicles depending on the pace of progress in electric (EVT) and hybrid (HEV) vehicle technologies.</p>	<p>European CO₂ cars directive: objective of average 130g CO₂ /km, average 95g CO₂ /km in 2020, -50% by 2030.</p> <p>European strategy on clean and energy-efficient vehicles launched in 2010. European CARS 21 R&D programme</p> <p>CARS 21 high-level automotive group.</p>	<p>Challenge: limit the movement of innovation centres (especially batteries) to emerging countries.</p> <p>Setting up an adjustment fund for low-carbon vehicles.</p> <p>Establishment by EFM and CLEPA of a European observatory of automotive sector skills, with closer links to the CARS 21 programme in order to anticipate social changes in the sector and boost the resilience of industrial automotive production</p>

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<p>Rail</p>	<p>Competitiveness issue for rail network operators (deregulation), as electricity is the second largest operating cost.</p> <p>Component manufacturers: need to establish European standards at international level</p>	<p>New technologies and systems established by the European ERRAC RTD programme in the context of the Strategic Rail Research Agenda (equipment, networks and systems)</p>	<p>Strategic Rail Research Agenda (SRRRA) 2020: agreement on energy-efficiency objectives for rolling stock of 20% per passenger/km and tonne freight/km, by 2020 (UNIFE, CER, UIC, European Commission, DG Transport and Research)</p> <p>European ERRAC RTD programme (Rail Energy project, JTI project)</p>	
<p>Electrical construction</p>	<p>Aim of ensuring secure supplies to EU electricity-intensive sectors at a competitive price, ensuring European leadership in energy technologies and innovation</p>	<p>New clean combustion technologies for coal-fired power stations, new generation of renewable energies, new energy efficiency technologies, smart networks</p>	<p>European 2011-2020 energy plan, SET Plan, European Electricity Grid Initiative (EEGI) with its 30 projects</p> <p>Address European project, renewables directive,</p> <p>Draft Energy Efficiency Directive, Smartgrids , ZEP, PV, TPWind ETPs</p>	<p>Need for proactive EU policies and measures: strategic planning, an ambitious shift in focus to renewable energies, with coal being retained due to clean combustion technologies and CCS.</p>
<p>ICT</p>	<p>Cutting energy costs has become a priority for the ICT sector:</p> <p>energy amounts to 1/3 of operating costs for telecom operators.</p> <p>Lowering CO₂ emissions through the development of smart applications in the use of ICTs by application sectors.</p>	<p>Cloud computing, miniaturisation of hardware, simplification of infrastructures, reduction of data centres' air-conditioning needs, equipment powered by renewable energies, optimising energy use by equipment and systems.</p>	<p>Joint EU digital strategy by DG Research & DG Information Society and Media.</p> <p>ETPs: ENIAC (JTI), ARTEMIS, NEM, eMobility, EPoSS.</p>	<p>Going beyond support for R&D and the EU's standardisation policy.</p> <p>Downstream support for R&D, through public procurement policies delivering a leverage effect.</p> <p>EMF petition to EP: making the EU telecom infrastructure sector more competitive, EFM position on the EU semiconductor sector (EU policy on validation technologies)</p>

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<p>Machinery and equipment</p>	<p>Competitiveness issue: machines consume 70% of energy used in industrial processes.</p> <p>EU industry must be able to comply with new European standards on industrial engines.</p>	<p>New electro-mechanical technologies in connection with the "Manufacture" ETP.</p>	<p>2009 European directive on industrial motors and objectives of the 2006 Eco-design Directive. "Manufacture" ETP (factories of the future)</p> <p>EU "Electra" initiative (Orgalime, EMF, DG Enterprise & Industry).</p>	
<p>Agri-food</p>	<p>Energy efficiency, water and agricultural raw materials as key competitiveness factors.</p> <p>The sugar sector is covered by the ETS.</p>	<p>Low-carbon, high-efficiency technologies: cogeneration, changing the energy mix in the process with a shift away from fossil fuels, BAT and new technologies recommended by the agri-food BREF.</p> <p>Bio-refineries, energy production from waste.</p> <p>Food product life-cycle analysis.</p>	<p>Policies and measures: "Food for Life" ETP cofinanced by FP8 will include projects using high-efficiency process technologies and the new biofuels generation.</p> <p>ETS only for the sugar sector.</p> <p>The European industrial bioenergy initiative.</p>	<p>EFFAT communication and initiative: "conference on climate change and the agri-food sector" in 2010, promoting low-carbon product/process technologies as levers for competitiveness and employment.</p>
<p>Trans-sectoral technology sector</p>				
<p>CO₂ capture & storage (CCS)</p>	<p>Competitiveness issues: achieving economic viability for CCS investments, depending on post-2012 ETS; establishing the EU as a leader on the field of sustainable fossil fuels</p>	<p>Pre-combustion, oxy-combustion and post-combustion technologies</p>	<p>Policies and measures: CCS Directive, ETS, NER 300 and 7FP funding, ZEP (zero-emission fossil power plants) ETP</p>	<p>An appropriate legislative and financial framework, combining economies of scale and more efficient carbon conversion, political proactivism to encourage CCS investment and social acceptance</p>
<p>Nanotechnologies</p>	<p>Improving energy and materials efficiency in application sectors: construction, insulating materials, energy production and storage, renewable energies, ICT, automotive</p>	<p>Nanomaterials, nanotubes, nanocomponents, nanomachines, nanofoods.</p>	<p>Trans-sectoral "nanofutures" ETP established in 2010 with 8 sectoral ETPs and including civil society stakeholders</p>	<p>Issue of health and safety, working conditions and ethics: ETUC resolution, 2010</p>

- **Names and institutions of persons interviewed**

- **European Trade Union Federations:**

- EMF : Mr Eddy STAM & Wolf JÄCKLEIN
- EMCEF : Mr Sylvain LEFEBVRE
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- ETUC : Mr Tony MUSU

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- EAA (aluminium) : Mr Patrick De SCHRYNMAKERS & Erich CUAZ
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- GLASS FOR EUROPE (flat glass) : Mr Bertrand CAZES
- CERAMUNIE (ceramics) : Mr Renaud BATIER
- EUROPIA (oil refineries) : Ms Isabelle MILLER & Mr Chris BEDDOS
- EUROCHAMBRES (European chamber of commerce and industry) : Ms Marlene GÜNDLER
- CIAA-FOOD-DRINK-EUROPE (Agro-food) : Mr Tove LARSSON
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- CEI-Bois (timber) : Mr Filip D JAEGER
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- ORGALIME (machinery and equipment) : Ms Sigrid LINHER
- PLASTICS EUROPE (plastics) : Mr Michel LOUBRY
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