Confrontations Europe – Energy & Climate Working Party

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"European Climate Policy: Transition paths"

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This note summarizes the contributions of our five speakers: professors Ariel Bergman (United Kingdom), Marc-Olivier Bettzüge (Germany) and Miroslva Zajicek (Czech Republic), Dominique Auverlot (France) and Michel Cruciani (Sweden). In order to present a comprehensive summary, some statistical data from Eurostat and the European Environment Agency (EEA) has been added to complete the note.

INTRODUCTION:

Since 2009, the European Union has adopted a common ambition based on three pillars: reduction of CO_2 emissions, improvement of energy efficiency and development of renewable energy. However, only emissions covered by the ETS market are part of a common goal. Non-ETS emissions, energy efficiency and renewables remain in the hands of Members States. Therefore, to achieve their individual targets Members States have implemented domestic measures, which poorly reflect the choices made by neighbouring countries, despite the proximity of their markets and existing complementarity.

They face the same challenges: decentralization of production, competitive research, reduction of CO_2 emissions and market dysfunctions. Nevertheless, each state remains eager to reap benefits (job creation, new industrial sectors and advantages of market coupling), an attitude that has so far slowed collective action at regional level. For example, no country wants to use renewable energy production from a neighbouring country to achieve its 2020 goal.

Can this behaviour change? Can we gradually build true European cooperation in common strategic areas to achieve a genuine Energy Union?

These issues are becoming more important as the discussions on the 2030 targets begin. In an attempt to answer these questions, the Confrontations Europe Energy & Climate Working Party held two seminars to analyse policies in Germany, France, the Czech Republic, the United Kingdom and Sweden, to better understand the specificities and identify opportunities for convergence.

MAIN CHARACTERISTICS:

Given the inertia of energy systems, our analysis of the five countries studied shows in 2014 a physiognomy largely inspired by decisions made in earlier decades. These decisions reflect partly the availability or lack of natural resources (coal, gas or oil deposits, for example hydro and forestry) and partly national political choices (acceptance or rejection of nuclear energy in particular). Contrasts appear clearly in figure 1, which reflects the energy balance and for example shows a share of solid fuels (hard coal and lignite) of more than 38% in the Czech Republic compared to less than 5% in Sweden, which has a nuclear energy share of almost 35% compared with 45% in France and just 8% in Germany. Finally, the share of renewable energy approaches 36% in Sweden while it is just over 6% in the United Kingdom.

Figure 1: Composition of the primary energy balance in 2014 (in %)

%	Solid Fuels	Petroleum Products	Gas	Nuclear	Renewable Energy
Germany	25.4	34.5	20.4	8.0	11.3
France	3.7	31.1	13.1	45.3	8.6
Czech Rep.	38.3	21.9	14.9	18.9	8.8
United Kingdom	15.8	36.2	31.6	25.0	6.4
Sweden	4.4	24.9	1.7	34.7	35.9
UE 28	16.7	34.4	21.4	14.1	12.5

Primary supply largely determines final consumption. Dependence on CO_2-emitting sources strongly influences the energy mix used for power generation. In Germany and the Czech Republic, more than 40% of electricity is produced from solid fossil fuels, and approximately 30% in the United Kingdom, whereas Sweden and France have almost freed themselves of it. These two countries use mainly nuclear energy, with a share superior to the European average, and benefit from a large, predominantly hydro, renewable contribution.

Figure 2: Electricity generation per source in 2014 (in %)

	Solid Fuels	Gas	Other	CO2 emitting Sources	Nuclear	Renewable Energy	Non CO2 emitting Sources
Germany	43.7	11.6	2.1	57.4	15.5	26.8	42.3
France	1.7	2.7	0.7	5.1	77.6	17.3	94.8
Czech Rep.	47.6	5.2	0.1	52.9	35.3	11.9	47.1
United Kingdom	29.8	30.0	1.5	61.3	18.8	19.9	38.7
Sweden	0.4	0.5	1.0	1.9	42.2	55.9	98.1
UE 28	25.3	15.4	2.5	43.2	27.5	29.2	56.6

RENEWABLE ENERGY:

The first European directives related to renewable energy were adopted in 2001 (electricity) and in 2003 (biofuels). They did not impose an objective. The directives required best efforts in removing obstacles to the development of renewable energies and their special exemption from state aid rules to improve financial support. The countries have implemented these texts differently:

- Germany adopted in 2000 a series of important measures favouring renewables, encouraging particularly renewable sources of electricity (wind, PV and biogas) through feed-in-tariffs (FITs). This support scheme has been very efficient but extremely expensive.
- Sweden has enjoyed its considerable and rich natural hydroelectricity and biomass resources, the latter being financed by taxes and subsidies since the 1990s. In 2003, the country established a scheme of green certificates, which has managed to stimulate wind generation, as well as biomass although less effectively, at reasonable cost.
- France and the Czech Republic have also opted for support through FITs. It turns out that it has had positive effects in the Czech Republic, but less so in France, no doubt because changes were implemented frequently to contain costs for consumers.
- The United Kingdom also modified its support scheme several times, combining a variety of formulas derived from Green Obligation Certificates, before applying FITs, then the Contract for Difference for all low-carbon technologies.

The results regarding electricity appear in figure 2, which underlines the performance of Germany and Sweden. Figure 3 indicates the level reached for all renewable energy with regard to the 2020 objective.

Figure 3: The share of renewables in final consumption
(all sources, in %)

	Achievement		Target
	2005	2014	2020
Germany	6.7	13.8	18
France	9.6	14.3	23
Czech Rep.	6	13.4	13
United Kingdom	1.4	7	15
Sweden	40.6	52.6	49
UE 28	9	16	20

CO_2 EMISSIONS:

At the EU level, the action against climate change saw a first major step with the creation of the ETS market, operational in 2005, designed to curtail emissions from big installations. In addition, several Members States have launched domestic programs. It appears that two countries from our sample have given serious thought to the fight against climate change. The United Kingdom has introduced a binding 'carbon budget' and also a carbon tax, in the electricity sector alone. Sweden has also introduced a tax on CO_2 emissions. The others have implemented less efficient measures, which are very hard to assess.

In 2009, the EU set mandatory goals for 2020 that would reduce CO_2 emissions by 20% compared to the 1990 level. The latest available data indicate that this objective should be achieved, a result explained however by changes in practices (industrial transformation and relocation), by the closure of polluting sites in Eastern Europe, and finally by the 2008 crisis, which is not yet over.

The goal for 2020 breaks down into two categories: a 21% reduction of emissions covered by ETS compared to 2005 and a 10% reduction of non-ETS emissions, also compared to 2005. For the latter, a national goal is allocated to each state. Our speakers felt that the ETS had not fulfilled its leadership role because of an initial wrong calibration. As a result, it produced a surplus of disproportionately high quotas in relation to need. The surplus of supply over demand has pushed down the price of the allowance, so that it has little influence on the choice of investment. The reform proposals seem much too timorous to push up the price, but the states are content with it because they fear a price increase would endanger the position of the European industry with regard to global competition. As for non-ETS emissions, the data available for four of the countries we studied show that the targets have been exceeded in the Czech Republic and Sweden, and are still achievable for Germany and France.

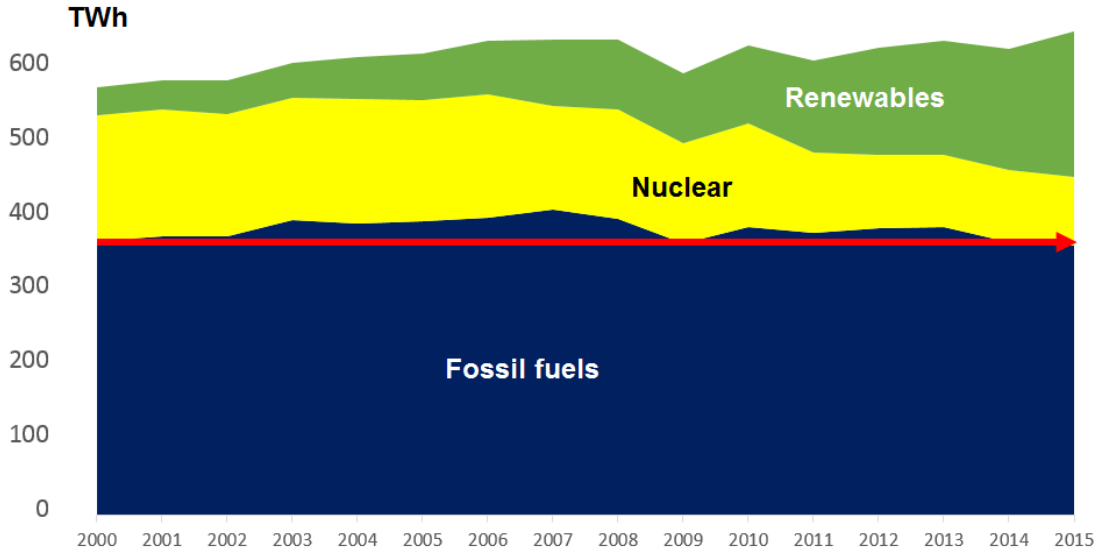
Figure 4: Reduction of non-ETS emissions (in %)

	Target 2020	Achievement 2015
Germany	-14	-9.9
France	-14	-8.5
Czech Rep.	9	-5
Sweden	-17	-22.1

Two countries have adopted voluntary targets for 2020:

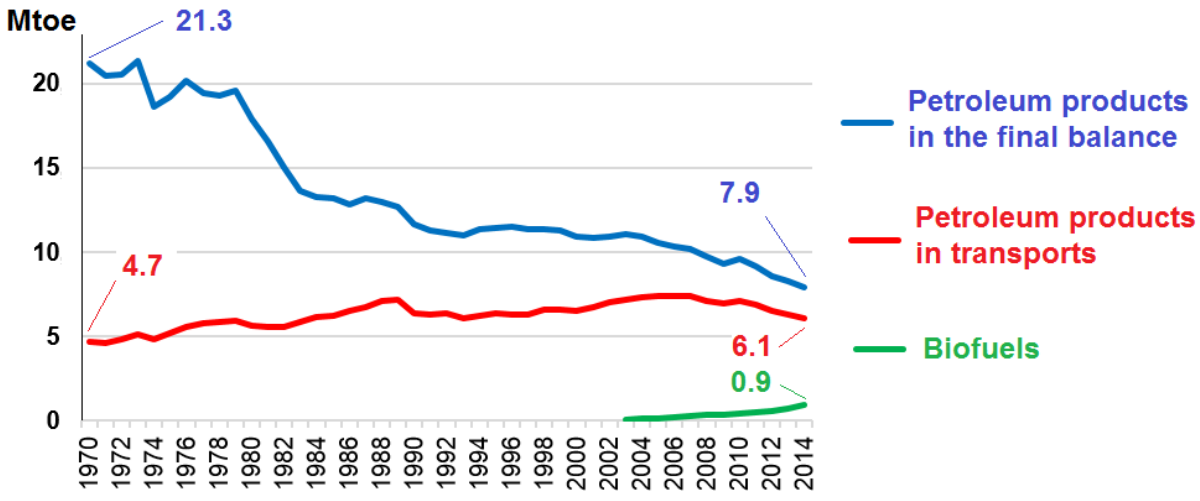
- Germany: During the adoption of the “Energiewende” in 2011, Germany pledged to reduce by 40% its total emissions by 2020 compared to 1990. At the end of 2015, the reduction was around 27.3%, which is a clear indication that the commitment will not be respected. After falling by 1.8% a year between 1990 and 2000, emissions were reduced by just 1.1% a year between 2000 and 2010, and finally by 0.8% a year between 2010 and 2015. The reason is their continued use of fossil fuels for electricity generation, which has remained stable between 2000 and 2015. Renewable energy has replaced nuclear energy, which does not emit CO_2 emissions (figure 5), but in terms of fossil fuels the low cost of coal has blocked the penetration of natural gas.

Figure 5: Balance of electricity generation in Germany



- Sweden: The country decided in 2009 to reduce its emissions by 40% by 2020 compared to 1990 levels, in terms of non-ETS emissions only. The outcome may be considered disappointing (25.3% reduction in 2015). The reason is that emissions from the transport sector are difficult to reduce (52% of non-ETS emissions in Sweden). In this sector, taxation has not influenced the behaviour of consumers, because there is no real substitute for petroleum products, especially for trucks. Support for biofuels, biogas and electricity has not yet had any effect (figure 6).

Figure 6: The share of transport in the consumption of petroleum products in Sweden



ENERGY EFFICIENCY:

According to the usual conventions of the European Union, the measure of energy efficiency is not absolute, but based on a reference scenario. For the 28 Member States of the EU, our analysis indicates that consumption was relatively stable between 1995 and 2014, despite economic growth (GDP grew by 36%). Among our five countries, the Czech Republic, the United Kingdom and Sweden managed to significantly reduce their final energy consumption and at the same time increase their GDP. Their energy intensity has fallen remarkably, while the average income per inhabitant has grown (without prejudice to inequalities in the distribution of this income). Germany and France have published less spectacular results, as we can see in figure 7.

Figure 7: Energy intensity flows (final consumption)

	1995		2014		Variation	
	GDP per capita	Energy Intensity	GDP per capita	Energy Intensity	GDP per capita	Energy Intensity
	€ 2010	tep/M€	€ 2010	tep/M€	%	%
UE 28	20 000	100	30 000	81	+ 24 %	- 20 %
Germany	26 400	103	33 800	76	+ 28 %	- 26 %
France	25 800	94	31 100	69	+ 21 %	- 26 %
Czech Rep.	10 100	249	15 200	144	+ 50 %	- 42 %
UK	22 800	108	30 400	66	+ 33 %	- 39 %
Sweden	28 500	139	40 300	74	+ 41 %	- 47 %

During the same period, the population of the European Union increased by 25 million, with a large disparity across countries. The United Kingdom, Sweden and less strikingly France have managed to reduce average consumption per inhabitant, regardless of important demographic growth. The result is satisfactory for the Czech Republic, which has a stable population. It is not as good for Germany, despite a demographic decline.

Figure 8: Consumption variation per inhabitant

	Population		Change		Consumption per capita		Change
	1995	2014	Million inhabit.	%	1995	2014	%
	Million inhabitants				tep/cap		
UE 28	481.6	506.9	25.3	5 %	2.2	2.1	- 4,5 %
Germany	81.5	80.8	-0.7	- 0,7 %	2.7	2.6	- 3,7 %
France	59.3	65.9	6.6	11 %	2.4	2.2	- 8,3 %
Czech Rep.	10.3	10.5	0.2	1,9 %	2.5	2.2	- 12 %
UK	57.9	64.4	6.5	11 %	2.5	2.0	- 20 %
Sweden	8.8	9.6	0.8	9 %	4.0	3.2	- 20 %

DEBATE:

All the speakers as well as several participants questioned the relevance of multiple targets, which push Members States to adopt policies interacting between them and leading to high costs (for example, the cost was estimated at €113/t for non-emitted CO_2 in Germany). In light of the COP 21 agreement, it would appear preferable to restrict objectives to a single binding target, namely greenhouse gas emission reduction. In fact, on the grounds of diversifying the energy mix, it appears that pursuing several goals simultaneously is more painful and requires more efforts for some countries than others.

This approach is underpinned by the fact that the development of renewable energy has not encouraged the emergence of a globally competitive European industry. China has become the leading supplier of equipment, depriving the EU of potential employment growth, regardless of the cost of policy support. Should we continue this approach by establishing three targets (40% reduction of CO_2 emissions, 27% of renewable and 27% of energy efficiency)?

Concerning renewables, the priority placed on electricity sources, notably wind and solar technologies, poses technical problems. It requires adaptation of infrastructures and new system management to overcome intermittency issues. Our participants discussed the means of managing variability of demand and appropriate conventional sources in terms of balance. If renewable sources generate 45% of electricity in 2030 as the Commission foresees it, what kind of energy will be competitive to supply the remaining 55%?

Four of the five studied countries partially rely on nuclear power, confident in its quality for baseload generation, with a good predictability over the year, a low variable cost and no CO_2 emissions. In France, the nuclear sector remains its industrial jewel, and provides a large number of jobs. The recent law on the energy transition plans to bring its electricity generation share down to 50% by 2025. In the United Kingdom, the Contract for Difference designed to give guarantees to investors will be applied to its two next nuclear reactors (Hinkley Point C). At least four other reactors could be programmed sooner or later. In Sweden, the government elected in 2014 has envisioned increasing the tax on nuclear energy, hence threatening its profitability. Finally, the government decided to repeal this tax in 2018. The shift followed discussions on whether nuclear energy would guarantee the industry (19% of GDP) a stable supply at an affordable price until the cost of renewable energy falls sufficiently to become a substitute. Nuclear energy also still has a promising future in the Czech Republic, where their command of this technology is a source of national pride. The share of nuclear in electricity generation should increase from 35% in 2015 to 58% in 2040. Two nuclear power plant projects (Temelin and Dukovany) are underway.

Discussions on the ETS were intense. All participants believe it the best tool for reducing emissions at lowest cost. However, as mentioned above, an ill-designed framework and some external impacts (economic crisis, emergence of renewable energy and fall of consumption) are limiting its function, which was to incentivize investments in low-carbon technologies. To enhance its role of price signal, several countries have introduced a carbon tax:

- In France, a carbon tax was introduced in 2015. It should reach €56 in 2010 and €100 in 2030 per ton of CO_2. It applies to non-ETS emissions only.
- The United Kingdom created a tax of £18 per ton of CO_2, but this tax targets only the energy sector. Therefore, operators must add the price of ETS onto the tax. It is unclear whether Brexit might change the current situation.
- Sweden remains the pioneer in terms of tax, because it introduced its first taxation scheme in 1992. Taxes vary according to the type of energy and its use. This flexibility enables Sweden to adapt the level of taxation to guide the choices of investors. For example, use of natural gas is not taxed for transport but is taxed for heating.

We must point out that there is no consensus or unanimity on how to determine the best instrument for fixing carbon costs. There are still those in support of management by a cap on the amount or by market rather than a fixed price.

Opinions also still differ as regards the establishment of border carbon adjustment, which would introduce the notion of fairness in the competition between products arriving from a country taking measures to reduce emissions and those arriving from countries where the regulation does not exist or is less severe. Two limitations were mentioned. On one hand, it is difficult to assess the quantity of CO_2 embedded in every product. On the other, pro-trade countries consider this mechanism a hindrance.

A compromise was reached regarding the high cost of support schemes in favour of renewable energy. It is estimated at around €23 billion a year in Germany, €4.2 billion in France, €1.7 billion in the Czech Republic

and €0.75 billion in Sweden. In several countries, particularly in Germany, this cost is covered mainly by household consumers and small companies whereas heavy industry is exempted.

These policies also exert redistributive effects because support schemes enrich a minority of investors, creating a “green rent”. We calculated that for an investment of €2 million in a PV farm the investor will receive €7 million within 20 years of production.

Besides direct subsidies, the need to strengthen the electric grid to connect renewable generation to the network implies an important economic, social and environmental cost. We calculated that for an offshore wind farm, the maintenance cost represents around €40/MWh, which is higher than substitution from coal to natural gas.

Moreover, in Germany and other countries, the growth of renewable generation has generated overcapacity, causing a fall in electricity prices in the wholesale market and a slowdown of investments in conventional sources. While market prices are plunging for big consumers, the retail market price has increased because of duties paid by consumers to finance renewable energy. This rise has occurred since 2008, which is also when the crisis began, and it has led to a compression of income for the average European citizen. This double phenomenon has caused a growth in energy poverty. In 24 Members States of the EU 10% of the population are experiencing energy poverty, while in 14 Members States the figure rises to 20% of consumers.

Finally, the participants deplore a growing nationalism as regards energy and climate policy. Member States now bargain to reach a better deal for their country. In this context, interconnection appears the best instrument for enhancing regional cooperation. Within the Energy Union, the Commission encourages the development of cross-border interconnection to reach 10% of installed capacity by 2020 and 15% by 2030. The European executive insists on these figures on the grounds that interconnection enhances security of supply and helps to harmonize regulatory frameworks, therefore convergence. Such a policy is on course in the “Nord Pool”, which groups Scandinavians and the Baltic States. Reinforcing interconnection will facilitate price convergence and back-up systems. However, such interconnections are still unprofitable. Moreover, convergence may imply a rise of electricity prices in areas where price levels are currently below average, which will place the industries of these countries at risk of losing their present competitive advantage.

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