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Eastern Europe's energy challenge: meeting its EU climate commitments

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Key to tables

Several tables in this paper use the official EU two-letter abbreviations for the 27 member states, which are listed below:

Austria	AT
Belgium	BE
Bulgaria	BG
Czech Republic	CZ
Denmark	DK
Germany	DE
Estonia	EE
Ireland	IE
Greece	EL
Spain	ES
France	FR
Italy	IT
Cyprus	CY
Latvia	LV
Lithuania	LT
Luxembourg	LU
Hungary	HU
Malta	MT
Netherlands	NL
Poland	PL
Portugal	PT
Romania	RO
Slovenia	SI
Slovakia	SK
Finland	FI
Sweden	SE
United Kingdom	UK

Summary

This study of eastern Europe's painful energy adjustment over the past 20 years concludes that the region has, overall, done well in wasting less energy and in cutting CO_2 emissions, but stresses that it could do far better. Central and eastern Europe is still a veritable orchard of low-hanging fruit, in terms of potential efficiency improvements and renewable energy increases, for the European Union to grasp.

The European Union's 2009 package of energy and climate agreements – which had the overall aim of a 20 per cent cut in Europe's emissions by 2020 – were only grudgingly accepted by the EU's 10 central and eastern member states. Their acceptance came only after concessions allowing them slower implementation and softer targets on some of the package's elements. Any further reduction in EU emissions – to 30 per cent, as has been proposed – will involve eastern Europe doing more, not less, because this region, proportional to its size and population, holds Europe's biggest potential for extra energy efficiency and for renewable energy.

The policy recommendation is for a new EU energy and climate deal. This would involve a trade-off in which the older, richer member states in western Europe would pay more to the newer, poorer member states of central and eastern Europe, to encourage them to do more to reduce their CO_2 emissions. This should take the form of:

- allowing, even requiring, a far larger portion of the EU structural aid allocated to central and eastern Europe to be spent on energy efficiency and renewable energy. This would better align the EU's budget with its declared priority on climate policy. The opportunity to do this arises with the imminent start of preliminary negotiations for the next EU financial settlement for the period of 2014–20. As it happens, the rotating presidency of the EU will be, throughout 2011, in the hands of two new member states, first Hungary and then Poland. They should be pro-active in this negotiation, not just passively reactive as new member states have previously tended to be on climate policy.
- Europeanizing national renewable energy support schemes so as to allow pan-European trade in renewable energy, or renewable energy certificates. The aim would be to allow money – from the larger national subsidies offered by richer and more ambitious western European states such as Germany, Spain, and Denmark – to be

invested in areas of higher renewable energy potential in central and eastern Europe. Eventually, to preserve its single market, the EU will have to bring some pan-European discipline to national renewable energy subsidy schemes, as it does with all other forms of state aid. Given the urgency of climate action, this rationalization should occur sooner rather than later.

However, new member states cannot easily be helped if they will not help themselves, by speeding up their capacity to absorb outside funding for energy efficiency and for renewable energy projects. The governments of eastern Europe can only do this by giving climate policy the same priority as they have to energy security, where they have galvanized the EU into taking concrete measures to improve gas interconnections and storage inside the EU. They should capitalize on this success by easing their attitude to gas imports. Gas is the least polluting of the fossil fuels, and could serve as a useful transition fuel, particularly in Poland that uses so little gas and so much coal.

1. The Challenge

The 10 states of central and eastern Europe that joined the European Union in 2004 and 2007 never did like the package of energy and climate agreements agreed in Brussels in late 2008, which passed into law in 2009. They demanded, and won, concessions allowing them slower implementation and softer targets on some aspects of Europe's post-2012 energy and climate regime. They thus accepted the overall package while still, for the most part, regarding climate change as a rich man's concern, a legitimate goal, perhaps, for the older member states from western and northern Europe but irrelevant and ill-suited for developing countries such as themselves.

The general economic downturn of 2009–10 has brought temporary relief to all EU member states – new as well as old – from the economic pressure of carbon constraints. In the current phase (2008–12) of Europe's Emissions Trading Scheme (ETS), most of Europe's industrial companies have been allocated (for free) more carbon allowances than they need. Those few, mainly in the power sector, which are short of allowances, can buy extra CO_2 permits on the ETS at a rate of Euros 11–15 per tonne of CO_2. This is generally well below the level which would force them into less carbon-emitting types or uses of energy. The downturn has also made it very easy for most new member states to stay within their emission targets in sectors outside the ETS – chiefly transport, services, and agriculture. Therefore, in the fight against climate change, Europe is treading water rather than making headway.

However, the recession has merely postponed the challenge for central and eastern Europe (also referred to here as the EU-10 or the new member states, though two others in that group, Cyprus and Malta, lie outside this study). Precisely because the carbon constraints are not biting at present, there are some moves within the EU to try to ensure that they do in the near future.

The Copenhagen climate summit of December 2009 produced no firm reciprocal offers by other countries to match Europe's unilateral commitment to a 20 per cent cut in overall emissions by 2020, let alone Europe's conditional extra offer to raise the reduction to 30 per cent if others followed. EU governments then, in early 2010, asked the European Commission to analyse the impact of increasing the EU reduction to 30 per cent. The

Commission produced a report in May 2010. The thrust of this report showed that, with the downturn in economic activity and in emissions (which fell 11 per cent in 2009), the recession has already accomplished some of the 20 per cent cut, and greatly reduced the extra economic cost of raising the reduction to 30 per cent. Moreover, the report argued convincingly that exploiting the recession and raising the EU's level of ambition before 2020 will avoid more drastic emissions reduction action after 2020. For the time being, the report remains a report. The Commission decided that turning it into a formal proposal for a unilateral 30 per cent emission reduction by the EU would not win sufficient political support among EU governments, though a few, such as the new UK coalition government, favour this. However, sooner or later, the issue of a bigger emission reduction will return to centre-stage. It has to if Europe is to get anywhere near its ambition of pushing emissions to 85–90 per cent below the 1990 level by 2050.

'If you didn't like 20 per cent, you'll hate 30 per cent'

What is significant, for this study, about any raising of the EU emission reduction goal is that Brussels will look to the new member states to provide much of the additional increase. This is not surprising because:

- The greatest energy efficiency savings are, logically, to be found in the least energy efficient countries, e.g. those in central and eastern Europe.
- More of Europe's renewable energy potential lies in the forests, farms, and rivers of central and eastern Europe than in western Europe.

In its May 2010 communication,[1] the European Commission made clear that it would look east for the main physical, though not financial, contribution to a 30 per cent cut:

'As regards the geographical distribution, the emission reduction potential for moving from 20 per cent to a 30 per cent target is proportionally higher in the poorer member states [i.e. those in central and eastern Europe]. Several of these are projected to overachieve their 2020 targets for emissions from the non-ETS sectors without additional efforts beyond business as usual [i.e. no further policy changes]. This means a significant emissions reduction potential remains untapped, even after implementation of the [2009] energy and climate package.' However, the Commission acknowledged that 'it will be necessary to mobilize the public and

[1] European Commission communication May 2010.

private financial resources to enhance emission reduction without jeopardizing economic growth [in central and eastern Europe].' In other words, the new member states will need to be paid for doing more on climate, a point stressed by this study (see conclusion).

This study raises such questions as: how much can the poorer member states contribute to a low carbon economy in Europe? How hard should Brussels push them on energy and climate policy? How hard should they let themselves be pushed? Is it unfair to ask such relatively poor countries to undertake such expensive energy policies, and to expect what are essentially developing countries to endanger their growth rates? On the other hand, might it be in the long-term self-interest of central and eastern Europe to have EU policies that force the pace of their adjustment and make up for their 40 years of indifference to energy efficiency under communism? Might it be an advantage to the general cause of mitigating climate change for EU policy-makers to have such a large orchard of low-hanging fruit – in terms of potential efficiency improvement and renewable energy increases – within their grasp in central and eastern Europe?

2. The Context

Climate scepticism

In few of the 10 central and eastern European new member states is climate change a priority. For instance, in August–September 2009 a Eurobarometer opinion poll asked a sample, taken from across the 27 EU states, about what was 'the most important problem facing the world'.[2] Across the EU an average of 47 per cent thought climate change was the global priority. Only two new member states, Slovenia (70 per cent)[3] and Hungary (52 per cent) were above this average; the other eight were below. One of the eight, the Czech Republic, has the famously climate-sceptic (and Euro-sceptic) Vaclav Klaus as its president.

Concern about energy security

This has been the major energy policy concern of the new member states. To their dismay, on joining the EU, they found Brussels far more preoccupied with energy market liberalization and climate change. The concern of the EU-10 centres on their energy dependence on Russia. The three Baltic states rely on Russia for 100 per cent of their gas (and for most of their electricity and oil imports). Russia is also the source of all gas for Slovakia and Bulgaria, and for over half the gas going to the Czech Republic, Poland, and Hungary. At best, energy security concerns have been a distraction from climate policies, as EU-10 states focus on diversifying their sources of gas. At worst, energy security worries have run counter to climate policies, with countries like Poland and the Czech Republic seeking to maximize use of their own coal and lignite deposits (and to minimize gas and oil imports). 'We are caught between the rock of western Europe's carbon obsession and the hard place of our own energy security' is how one Polish minister puts his country's dilemma.

Developing country mentality

Responsible leaders in the EU-10 countries do not accuse the European Commission and western and Nordic member states of trying deliberately to sabotage their economic growth. However, many of them do claim that the extra cost of the EU climate programme will

[2] http://ec.europa.eu/public_opinion/archives/ebs/ebs_322_en.pdf

[3] On most of the issues in this study Slovenia is the outlier. This is not surprising given its geography and the fact that, as part of Titoist Yugoslavia, it was never, like the others, exposed to the full centralized command economy of the Soviet bloc. As a sort of Slav version of Austria, it has few problems in common with central and eastern Europe. In meetings of central and eastern Europeans to coordinate a common approach on EU climate policy, Slovenia has been described by its partners as 'present but not active'.

prevent them from achieving the extra rate of economic growth which they need in order to catch up with the older EU states. Gordon Bajnai, Hungary's technocrat caretaker prime minister in 2009–10, claimed that new member states need to grow consistently at 2 percentage points faster than the EU average to achieve this catch-up. In practice, he said that this meant countries like Hungary growing at a rate of at least 4 per cent a year. A Polish minister expressed horror, in private, at discovering that the European Commission had modelled its climate programme on an assumed annual rate of growth for Poland of 2.9 per cent, which he complained was far too low. A similar fear, sometimes heard, is that the region is swapping fuel dependence on Russia for technology dependence on western Europe, chiefly Germany. It is certainly true that assembling and installing wind turbines and solar panels imported from Germany provides relatively little local employment. However, while Germany is so far reaping the benefit of green technology jobs, it is also shouldering the initial development costs of these technologies.

Complaints

It still rankles with new member states that western Europe does not pay due regard to what happened to their economies in the painful post-communist transformation in the 1990s. That was the period when, in central and eastern Europe, output plummeted, unemployment soared, energy prices rose, many energy-intensive metal-bashing factories closed, and energy consumption fell – as did carbon emissions. When the Kyoto protocol was negotiated in 1997, emission reduction targets given to central and eastern European states – not yet EU members – were easy to meet, because the reductions were based on the years of 1988–90, the last highpoint of communist heavy industry. However, when the EU came to re-design its own climate programme in 2008 – now including central and eastern European within the Union – it chose 2005 as the new base year for all future emission reductions by EU states. (The Commission had one good argument for using 2005, which was that this was the first year for which there was reliable data on actual emissions.) The new member states complained that basing future reductions on 2005 wiped out all recognition of their pre-2005 'national sacrifices', or effectively subsumed them into an 'EU achievement' in emission reduction. A group of seven central and eastern European states, led by Hungary, therefore proposed a uniform 18 per cent emission cut for each and every state, based on 1990, as the fairest formula. However, the old member states, plus the Commission, retorted that the 1990s transformation of the eastern half of the EU could not be properly termed a 'sacrifice', because there was nothing voluntary about it, merely the inevitable consequences of

communism's collapse. The new member states' counter to this was to point out that the 1990s – however termed – was a period of severe hardship for them, at a time when western EU states of almost comparable economic level, such as Spain, were booming and, under Kyoto, allowed to increase emissions.

This wrangle between old and new member states might have been safely left to the history books, were it not for new pressure on central and eastern Europeans which would deny them, as they see it, not only political credit, but also financial credit for their painful transformation. Kyoto gave the states of central and eastern Europe (as well as Russia and Ukraine) allowances (called Assigned Amount Units (AAUs)) to emit carbon up to their Kyoto targets. However, they do not now need anything like their total number of AAUs. The EU-10 states all regained their 1989–90 level of GDP by 2000–5, but have all reduced the energy intensity of their economies and their industrial sectors. They all therefore have surpluses of AAUs to spare, and to sell to others – such as western European countries, and Japan – who are in difficulty with Kyoto targets. Among the more active sellers of these credits are Hungary, the Czech Republic, Poland, and Romania. They have put, or promised to put, the proceeds of AAU sales into green investments.

Now, however, there is pressure on the EU-10 states from Brussels, and some quarters in western Europe, to cancel or scrap these AAUs, on the grounds that putting these allowances on the market just adds to the imbalance of supply over demand and depresses the carbon price. In its May 2010 communication, the European Commission said that it would prefer the new member states to be able to draw directly on EU funds for renewable energy, energy efficiency, and promotion of public transport 'as an alternative to the use of surplus AAUs as a source of funding, which undermines the environmental integrity of the carbon market'. At present, new member states feel more secure in hanging on to their Kyoto AAUs, to which they have a legal right, rather than in relying on the outcome of some future EU budget negotiation, in which getting money for non-farm purposes is notoriously difficult (see conclusions).

Concessions

The new member states were given a series of concessions in the 2008 energy/climate package. However, some of these concessions were less generous than they might appear:

a. The Emissions Trading Scheme This is the most centralized part of the EU programme, covering some 10,000 industrial emitters across the 27 countries, with a common cap or emission reduction applying to all. In the third phase (2013–20) of the ETS, the cap is supposed to bring emissions down to 21 per cent below the level in 2005, by 2020. The centralized nature of the ETS made it hard to differentiate in favour of the new member states. Moreover, most new member states still tend to have relatively larger industry shares in their GDP than older member states (see table below); only a couple of Baltic states have industry shares well below that of the most industrialized old member state, Germany. Therefore, relatively more of new member states' overall emissions is likely to be caught in this centralized system.

Table 1: Shares of industry & services in GDP in 2008

	Industry as % of GDP	Services as % of GDP
Bulgaria	30.5	62.2
Czech Republic	37.5	59.9
Estonia	29.1	68.0
Hungary	29.4	66.2
Latvia	22.7	74.2
Lithuania	32.8 (2007)	62.8 (2007)
Poland	30.8	64.6
Romania	35.3 (2007)	55.9 (2007)
Slovakia	38.0	58.9
Slovenia	34.4 (2007)	63.3 (2007)
France	20.4	77.6
Germany	30.2	69.0
Italy	27.0	71.0
Spain	28.9	68.3
United Kingdom	23.7	75.6

Source: World Development Indicators, http://data.worldbank.org/indicator

However, in the post-2012 ETS there are a couple of offsetting concessions to the new member states. First, their governments will collectively be given slightly more (12 per cent) carbon allowances to auction than their countries' share in overall EU emissions represents (and old member states correspondingly less). This will be a revenue boost to the EU-10. Second, new member states – defined as those with power sectors heavily reliant on a single fossil fuel and/or with relatively low income per head – have been granted the right to phase in the auctioning of carbon allowances for their power sectors gradually. This was the result of Poland's non-negotiable demand that its electricity generators – 95 per cent coal-dependent – could not afford to start paying for all their pollution permits. Since the actual

cost will end up on consumers' bills, Warsaw effectively said that it did not dare risk the impact of a big cost rise on the competitiveness of Polish industry, and on the incomes of ordinary Poles.

However, any free permits will be allocated administratively. After 2012 this allocation will be performed by the European Commission, not as now by national governments. The way in which the Commission will allocate free permits for the power sector – and for any other sector like steel (which might get free permits on the grounds that it faces foreign rivals without any carbon constraint) – is that permits will be free up to a technical threshold set by Europe's 10 per cent most efficient operators. Almost invariably these operators will be in western Europe. Therefore, even where companies in eastern Europe appear to be getting a free ride, the reality is that they will have to do some buying of allowances on the ETS. This will increase if the EU decides to go for that 30 per cent emission reduction.

b. Non-ETS sectors. In sectors outside the ETS – transport, agriculture, services – the new member states are to be allowed to continue increasing emissions, in contrast to the older member states which will have to cut. Therefore, by 2020, the poorest of the new member states, Bulgaria, will be allowed to increase emissions in non-ETS sectors by 20 per cent and Romania by 19 per cent, with smaller increases as new member states go up the income ranking, with Slovenia being allowed only a 4 per cent increase. However, as Table 1 above shows, these increases apply to services sectors that are relatively smaller than those in western Europe. Moreover, if the total emission cap is lowered via a 30 per cent reduction on 1990 levels, the new member states are then likely to find their non-ETS targets squeezed. This could be a particular problem in transport, because over the past 15 years the shift from public to private transport, from rail to road, and from bus to car has been more marked in the new member states than in the older ones (Section 3.4).

c. Renewables. The new member states were given less demanding stretch targets, from what their renewable share of energy was in 2005 and what it should be in 2020 than were older member states. This was in recognition of the extra cost of renewable energy. At the two extremes, Romania is asked to make only a 6.2 per cent point increase in its renewable share, and the UK a 13.2 per cent point increase. At the same time, if you were looking for the most cost effective increase in renewable energy across the EU, there is no doubt that you would look east, where new member states have made relatively little effort so far to 'go green', but

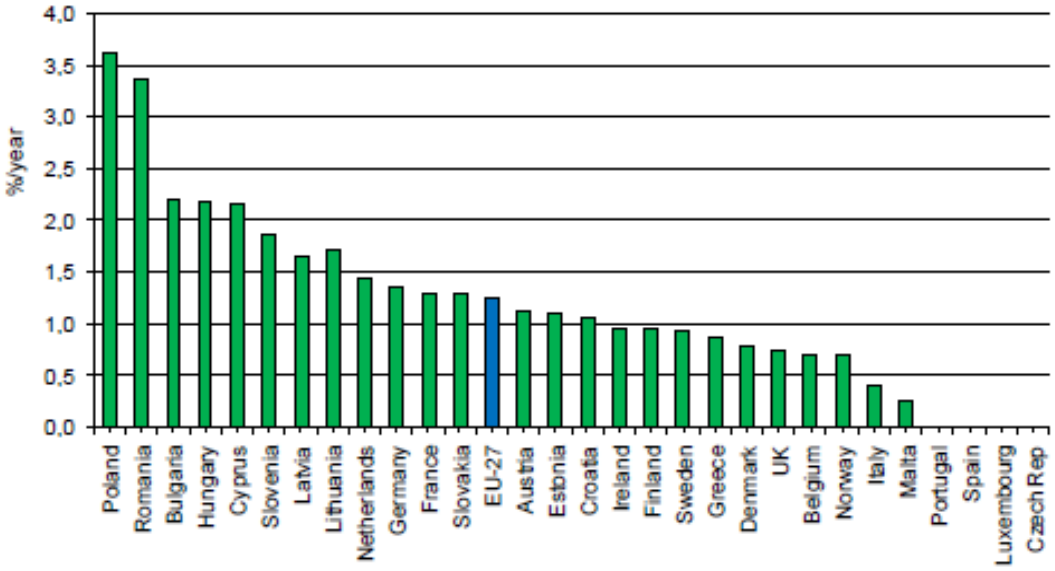
have the best potential (mainly biomass) to do so. Over and above what was agreed in 2008, new member states might be ready to make further increases in renewables to help meet a 30 per cent reduction goal. However, as a group they will not be enthusiastic. One advance – a surge in solar photovoltaic (PV) installation in the Czech Republic – has been made almost by accident, the result of setting a mistakenly high feed-in tariff some years ago, which regulators are now desperately seeking to cut (see Section 6.2). The EU-10 group also includes Latvia, the only country in the EU where the share of renewable power is actually falling (though from a high level), because a large amount of hydropower capacity was built before 1990, but none since.

3. The Current Situation

In the 20 years since they abandoned communist central planning, the 10 central and eastern European member states of the EU have made enormous strides in energy efficiency. They started, however, from a low point. The Soviet bloc economic system virtually guaranteed energy inefficiency. Marxist economics placed little value on natural resources (the factors of production that counted were capital and labour), and prices were set, not by the interplay of supply and demand, but by government fiat within, and between, Soviet bloc countries. The prices of Soviet oil and gas sold to central and eastern European allies were pegged to a formula that lagged world price movements, and were therefore generally well below those set by OPEC. Central and eastern European states often further subsidized prices, especially to households who paid low, flat rates for their energy. However, it is not easy to make up for lost time, for the 40 years of indifference to energy efficiency in central and eastern Europe. The new member states are certainly converging with the older member states, but closing the gap in energy efficiency/intensity is another matter. Merely hoping that the general application of capitalism – privatization, liberalization – will do the job is not sufficient.

As the EU-10 began to turn themselves into market economies, there was vast potential for improvement in energy efficiency, and for the most part it has been realized. Energy consumption has grown less fast than GDP, and this de-coupling of the input of energy and the output of national wealth is most marked among the new member states. This is clear from Figure 1 below (based on the ODEX index developed by the Odyssee programme and used by the European Commission and Eurostat).

Figure 1: Energy efficiency improvements by country (1996–2007)

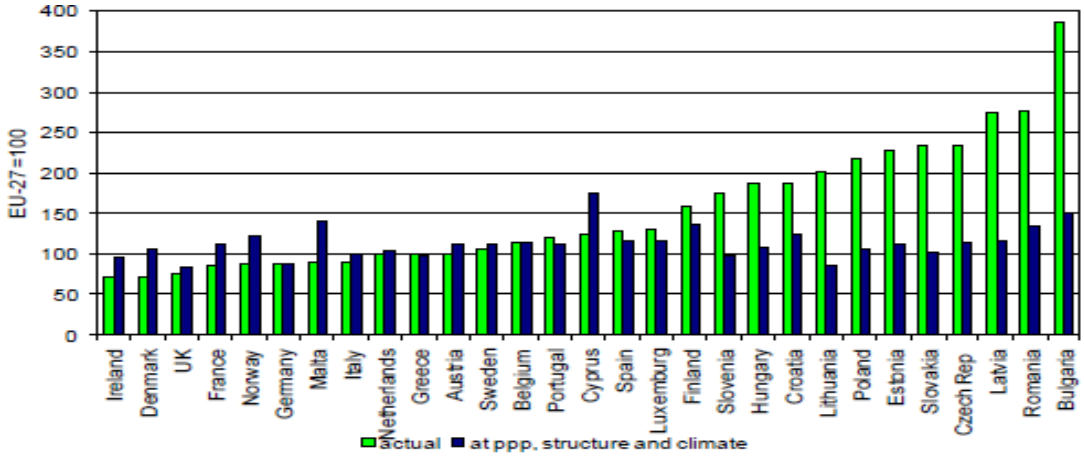


Source: Odyssee-Mure project 2009, www.odyssee-indicators.org/publications/PDF/publishable_report_final.pdf, page 25

The EU-10's efficiency improvements are, however, just relative – relative to their communist-era starting point, and relative to the performance of the western Europeans. What is significant for their ability to meet the challenge of EU energy/climate policies – the subject of this paper – is the actual level of energy intensity of their economies: the amount of energy need to generate a euro of GDP. As Figure 2 below shows, in absolute terms (the light colour bars) the newcomers still have energy intensities well above those of the older member states.

The gap between eastern and western European countries in Figure 2 can be made to virtually disappear if you make adjustments for the facts that eastern Europe generally has colder winters (being either more northerly or more land-locked), still has a slightly higher ratio of energy-intensive industry, and has lower prices and incomes. If you use purchasing power parity standards to level out the prices among the EU-27 – taking into account the fact that Euros 100 buys substantially more in Bulgaria than in Denmark and that Euros 100 worth of Bulgarian GDP counts for more, in Bulgaria, (and will have less wage cost in it) than Euros 100 worth of Danish GDP in Denmark – then Bulgaria no longer looks five times as wasteful as Denmark. It is these sorts of adjustments which produce a much more even result in the darker colour bars in Figure 2. Yet while this is, in a sense, a fairer way of comparing the relative energy efficiency *efforts* of the new member states with the older ones, what counts in a competitive world is *results*, the actual energy efficiency or intensity results of countries.

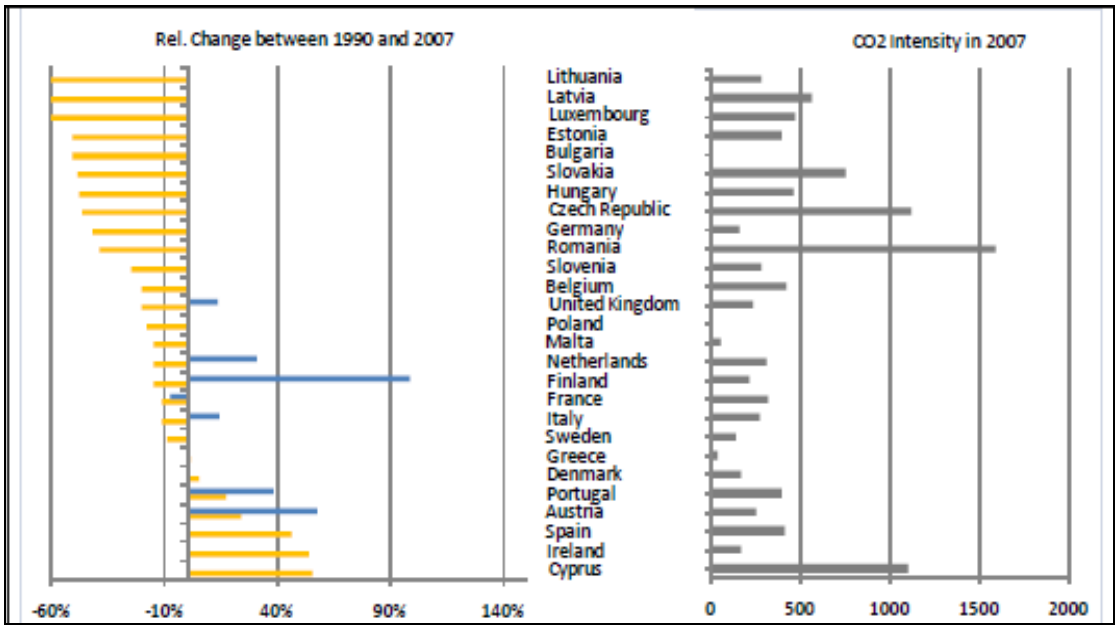
Figure 2: Adjusted final energy intensities (2007)



Source: Odyssee-Mure project 2009, http://www.odyssee-indicators.org/publications/PDF/brochures/macro.pdf

Moreover, for the EU-10 and their climate commitments, what matters even more than general energy intensity is the carbon intensity of their economies. A measure of this is provided in Figure 3, which charts changes in the energy-related CO_2 emissions of industry. It is no surprise that, among the EU-10, the smallest decrease in this category of CO_2 emissions between 1990 and 2007 has come in Poland, which is still 95 per cent dependent on coal-fired electricity (see Section 6.1).

Figure 3: Energy-related CO_2 intensity of industry per Euros 1m of output



Source: European Environment Agency, Greenhouse gas emission trends and projections in Europe 2009, Annex 6, page 110

3.1. Drivers of change

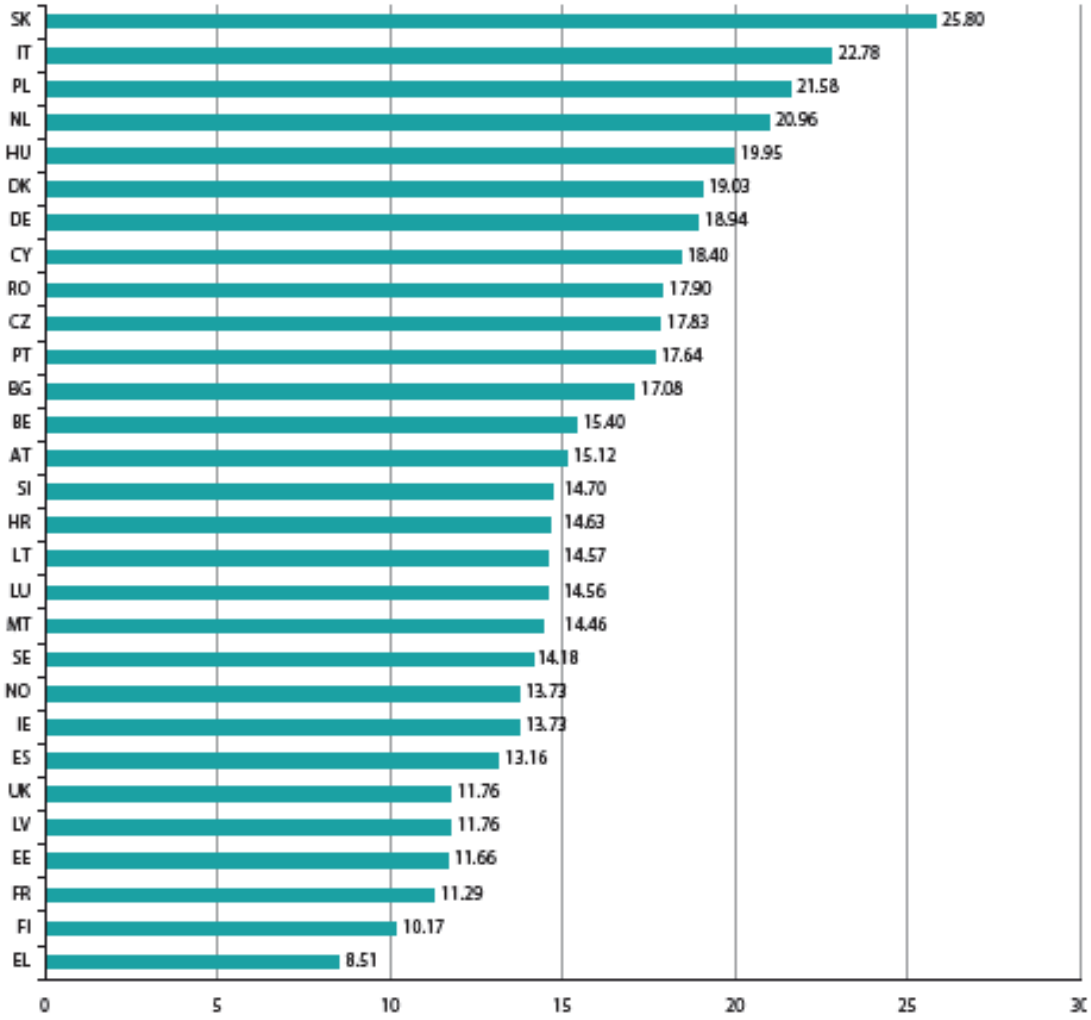
Prices

In general terms, the biggest jump in energy prices during the period under consideration was in Russian gas, and came in the 1990s as Moscow phased out the Soviet-era price subsidies. Some countries, such as Poland, were quick to raise prices. The Czech Republic also increased prices quite quickly. Slovakia kept its gas prices stable for almost the whole of the 1990s, and then increased the household gas price by 600 per cent between 2002 and 2006.[4] Hungary, also, was slow to adjust, and indeed is only in 2010 phasing out a gas price subsidy for households (see Section 6.3). Energy prices in the new member states are now generally slightly below the level in western Europe, in absolute terms. However, the gap is very small where markets between eastern and western Europe are well-connected, such as between the Czech Republic and Germany. If adjusted, through a purchasing power parity standard, to take account of lower incomes in the newer member states, electricity and gas prices can be said to take the same bite out of incomes in both eastern and western Europe. Petrol and diesel prices are also fairly equal in purchasing power terms because, roughly speaking, the richer the country, the higher the tax on transport fuels (as in states like Finland, Denmark, the Netherlands, Belgium, and the UK), and the poorer the country, the lower the tax (as in Bulgaria and Romania).

Higher prices have led to less waste. In electricity, the transmission losses in high voltage power are small in both eastern and western Europe. However, according to experts at the European Bank for Reconstruction and Development, the additional losses in low voltage electricity distribution amounted to a further 10–20 per cent in eastern Europe before privatization, compared to 7–8 per cent in western Europe. In Bulgaria, the average distribution loss before privatization was 22 per cent, and now is around 12–14 per cent, largely because private owners are less willing than public owners to tolerate commercial loss through theft, as distinct from technical losses of voltage leaking into the ether.

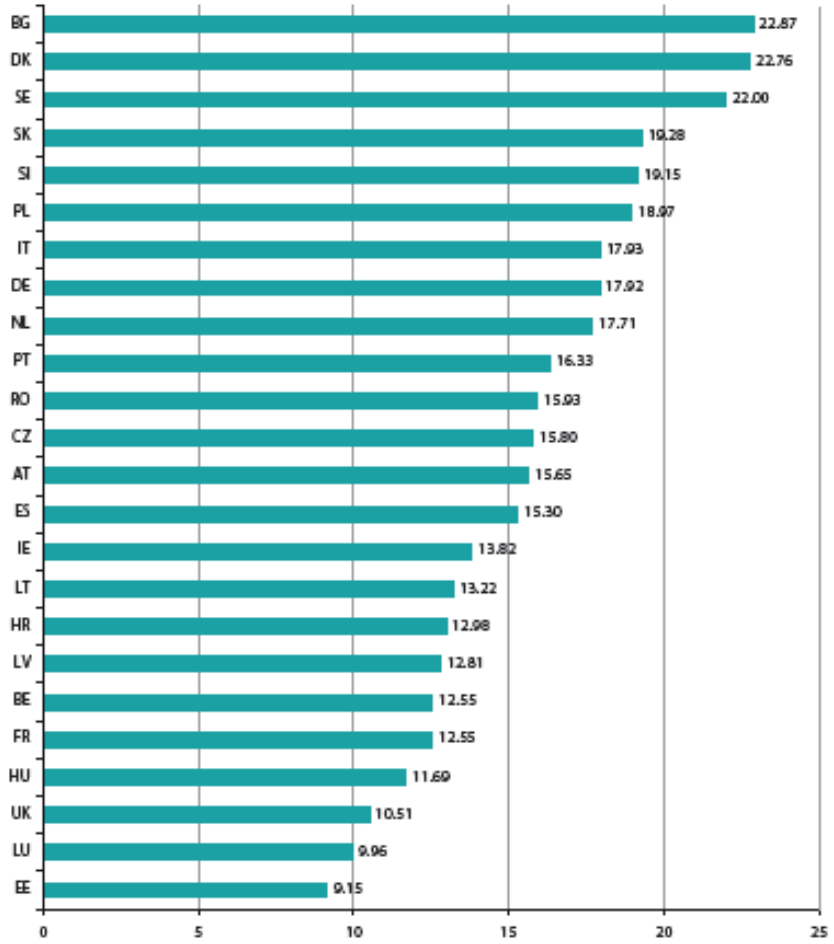
[4] Impact of the 2004 Enlargement on the EU Energy Sector, REKK (Regional Centre for Energy Policy Research), Budapest 2008, page 128.

Figure 4: electricity prices for household consumers on 1/1/2007



Source: Panorama of Energy, 2009, p.107 Eurostat
Note: Table of electricity prices in euros for household consumers on 1/1/2007, all taxes included, in purchasing power standards per 100 kWh. (based on a standard consumer using 3,500 kWhs a year). Shows that among the top 10 EU countries with the highest prices relative to incomes are Slovakia, Poland, Hungary, Romania, and the Czech Republic.

Figure 5: gas prices for household consumers on 1/1/2007



Source: Panorama of Energy, 2009, p.110, Eurostat
Note: Table of gas prices in euros for household consumers on 1/1/2007, all taxes included, in purchasing power standards per GJ (based on standard consumer using 83.7 GJ a year). Shows Bulgarians paying the highest effective price for their gas in the EU, and Slovaks the fourth highest. The two countries were also the hardest hit by the 2009 cut-off of Russian gas, because of their high dependence on Russian gas.

Fuel poverty

This cannot be ignored in the new member states. They are all relatively poor and have a legacy of particularly inefficient housing stock, while removal of communist-era subsidies has raised their energy prices faster than has been the case in western Europe. There is no universally accepted definition of fuel poverty, but a commonly-used financial measure, developed by Brenda Boardman in the UK context, is 'the inability to obtain adequate energy services for 10 per cent of a household's income', which in the UK is roughly twice the median share (5 per cent) of household expenditure on energy. Unfortunately, there seems to be no EU-wide survey using this financial benchmark. One of the few new member states to make such a measurement is Hungary, where the average household spending on energy in the period of 2000–7 was 9.7 per cent. This average is held below the 10 per cent mark because the country's 20 per cent richest households spend much less on energy. The result is

that, according to a study by researchers at the Central European University in Budapest, 'if the 10 per cent threshold currently in use in the UK is applied to Hungarian data, the average of all but the two highest deciles (i.e. 20 per cent) would be defined as fuel poor'.[5] Classing 80 per cent of Hungarians as fuel poor seems rather excessive, particularly in the light of other survey material coming from the regular Income and Living Standards surveys complied by Eurostat (see Table 2). This shows the percentage of the population who report themselves as unable to keep their homes adequately warm, as in arrears on their utility bill payments, and in accommodation with leaking roofs, damp walls and so on.

Table 2: Share (%) of population reporting energy-related household problems: 2008

	Inadequate heat	Energy bill arrears	Energy-related housing defects
Bulgaria	34	33	30
Czech Republic	6	3	14
Estonia	1	7	17
Hungary	10	14	31
Latvia	17	12	26
Lithuania	22	6	25
Poland	20	10	23
Romania	25	24	24
Slovenia	6	14	30
Slovakia	6	4	9
EU-27 average	9	8	17

Source: Survey on Incomes and Living Standards, Eurostat

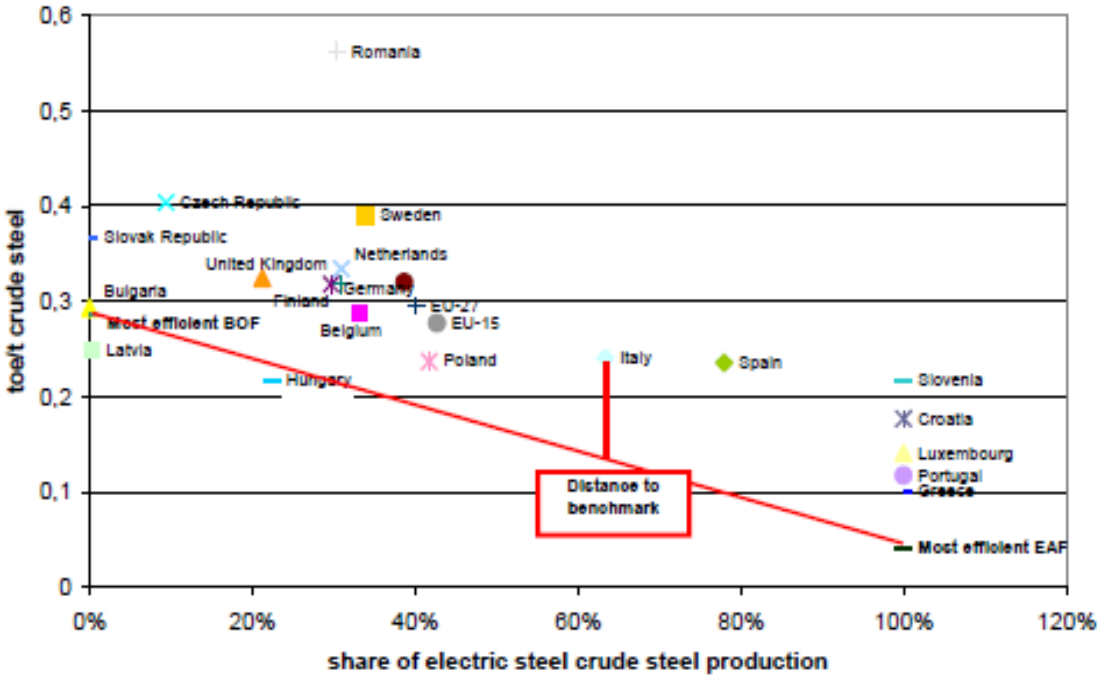
There is nothing very scientific about these surveys, in which another group of relatively poor EU states – the southern Europeans – also report problems on these energy issues. However, they do, in a general sense, confirm fuel poverty as a concern of the new member states. It is also a preoccupation of their national energy regulators, who would feel more comfortable raising energy tariffs to reflect real market costs if they knew that the poor were better protected from such increases. Dr Gabor Szorenyi is director of the Hungarian Energy Office, and is also president of the Energy Regulators Regional Association (ERRA), whose memberships stretches from central and eastern Europe into Russia and CIS states. 'All the ERRA regulators agree on the need for vulnerable customers to be defined and protected with remedies such as social tariffs, so as to make governments more comfortable with market pricing', he says.[6]

[5] *Fuel poverty in Hungary: a first assessment*, Sergio Tirado Herrero and Prof. Diana Urge-Vorsatz, CEU, 2010.
[6] Author interview. March 2010.

3.2. Technology – the case of steel

All the new member states have reduced the amount of energy going into, and the level of emissions coming out of, their steel industries, but progress has been uneven, depending on the level of foreign investment and the type of technology. Across all 27 EU countries, CO_2 emissions from iron and steel fell by 18.4 per cent between 1990 and 2007. This is largely due to the advance of the electric arc process, which essentially recycles scrap, at the expense of the traditional blast furnace method, which starts from scratch with the original ore. The former process is much less energy intensive than the latter, and as an industry average, the electric arc process generates about 600 kg of CO_2 per tonne of steel, compared to two tonnes of CO_2 (and more in some older eastern Europe plants) per tonne of steel forged in blast furnaces. Figure 6 shows the energy savings to be made, in terms of the ratio of oil equivalent tonnes to steel output, from adopting electric arc technology. Of the new member states only Poland and Slovenia have switched significantly to the electric process. Hungarian steel-making is efficient, despite its 80 per cent reliance on blast furnaces. Other central and east European states have stayed largely wedded to blast furnaces, leaving considerable scope for energy efficiencies in the case of Romania and the Czech Republic.

Figure 6: New EU members mostly stick to traditional ways of making steel



Source: Odyssee data base
Note BOF = blast furnace; EAF = electric arc furnace.

3.3. Structural shift

Across Europe, indeed throughout the industrialized world, the general trend in energy efficiency has been one of considerable improvement in industry, modest progress in households, and worsening in transport. This pattern is particularly marked in the new member states, for reasons related to their adaptation to market economics and to their re-orientation towards, and integration with, western Europe.

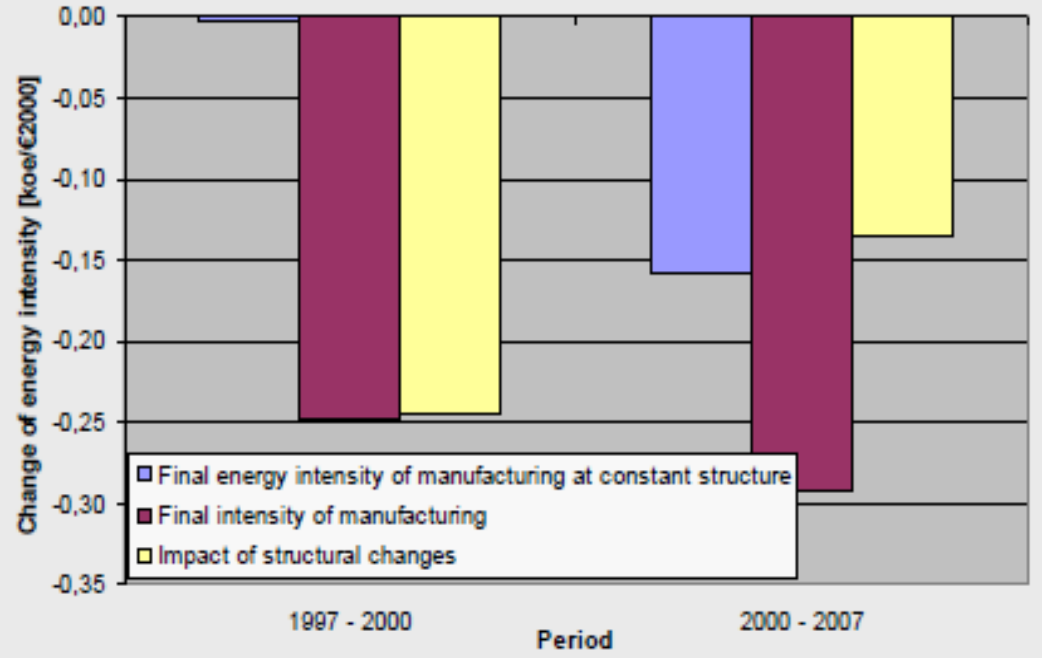
Quite a large part of the new member states' energy efficiency improvement is due to a switch of activity. They have abandoned, or reduced production in, sectors of industry such as the making of steel, heavy machinery, and chemicals, which had been built up on cheap Soviet energy that was no longer available – and shifted to less energy-intensive sectors. Hungary, for example, gave up making its own aluminium – a metal that consumes electricity in its fabrication – and shifted to the relatively energy-light activity of making or assembling, components for electronic companies, such as GE, Samsung, Philips, and car companies like Audi and Suzuki. However, this structural contribution to energy efficiency improvements in Hungary and other new member states has two important consequences for this study:

- Firstly, it flatters the energy efficiency improvement of the past 20 years, because abandoning energy-intensive activities has been the easy part of the improvement. It was not easy in a social sense – far from it, it has been miserable for hundreds of thousands of well-qualified people across central and eastern Europe, who were thrown out of jobs in the 1990s. However, it was relatively easy in the technical sense that the improvement in the country's overall energy efficiency required no change of technology or behaviour, just cessation of certain energy-gobbling activities.
- Secondly, precisely because it tends to flatter past improvement, it risks exaggerating the potential for further energy efficiency improvements. It would be a mistake to simply extrapolate past efficiency improvements into the future, because the structural changes in EU-10 countries' industry are most unlikely to continue at the pace experienced in the last 20 years for the next 20 years.

This structural contribution to energy efficiency can be gauged by estimating what the energy intensity would have been had the structure of industry stayed constant, and then comparing this estimate with the actual development of energy intensity. The structural contribution varies, according to the reports complied on the Odyssee database, from country to country.

In two countries, structural shifts accounted for a major part of energy efficiency improvements. In the Czech Republic, the structural contribution to higher efficiency in industry was dramatic. As Figure 7 shows, structural change (the very light colour bar) accounts for almost 100 per cent of the improvement in the energy intensity in Czech manufacturing (the dark colour bar) between 1997 and 2000, and for nearly half the improvement between 2000 and 2007.

Figure 7: Impact of Structural Changes in Industry



Source: Report on Czech energy efficiency 2008, Odyssee data base.

In Romania, structural shifts accounted for about half of energy intensity improvements in the Romanian economy over the whole period 1992–2007, as the country scaled down some of the megalomaniac industrial schemes of the Ceausescu era. However, in neighbouring, but less-industrialized, Bulgaria, structural shifts in manufacturing made little difference to the country's energy efficiency.

The part played by structural changes also varied over time. For Hungary, the structural contribution to lower energy intensity was bigger between 1992 and 2000 (when it was responsible for 30.9 per cent of improved energy efficiency) than it was between 2000 and 2007 (24.5 per cent). In Poland, structural shifts seem to have contributed more to efficiency in the 2000s rather than the 1990s, which may have something to do with the gathering pace of foreign direct investment bringing in more energy-efficient technology (see Section 6.1).

In other new member states, energy intensity – which measures how much physical energy is used to generate a euro of GDP – has been very much influenced by growth in GDP or in high value sectors. Latvia and Estonia showed big decreases in energy intensity when their GDP recorded double digit growth for a couple of years in the late 2000s, while Slovakia, largely because of its growth in high value car production, managed to reduce its energy intensity by 57 per cent between 1993 and 2007. Energy consumption by Slovak industry has

remained constant, but it has been used to produce higher value goods. In contrast to the post-communist Czech Republic (which if anything has de-industralized), Slovakia has been industrializing for the first time, especially in cars (its car production rose by 308 per cent between 2000 and 2007).

3.4. Lost Opportunities

A potentially valuable inheritance left by communism to the new member states was a pattern of collective energy consumption in transport and heating. If continued and developed, such collective consumption could have offered economies of scale in energy use. This, however, has not happened.

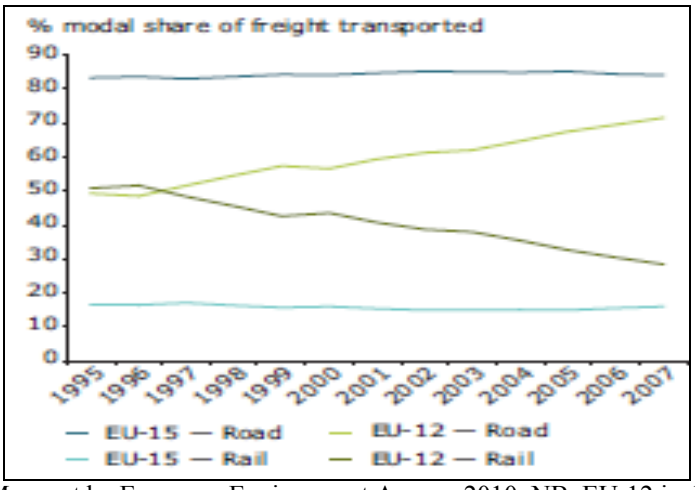
Transport

Changes in the new member states have been considerable. As central and eastern Europeans have become richer, they have tended to abandon the bus and the railway for the private car. This parallel growth of incomes and car ownership is part of a worldwide trend, but it has been accentuated in the EU-10 countries because of the desire of their citizens to visit many destinations in western Europe that were poorly linked with their Soviet-era rail system. More dramatic has been eastern Europe's abandonment of rail for freight transport, and its move to western Europe's longer-established habit of carrying almost all cargo by road. The two middle lines in Figure 8 show eastern Europe's progressive shift from a 50/50 split of road and rail freight towards western Europe's 85/15 split in favour of road (the top line) over rail (the bottom line). This change is partly due to the inadequacy of eastern Europe's rail links to western Europe and to the decision to supplement this with new roads, but it is also significantly related to the integration of central and eastern European industry into the organization and production methods of western multinationals.

Before 1990, Comecon, the Soviet bloc economic body, organized a broad division of labour between eastern European countries, so that Hungary, for instance, specialized in buses, Bulgaria in fork lift trucks, and so on (though the Soviet Union itself usually maintained some parallel production of every product). Nonetheless, in those days, Hungary's Ikarus bus company (once the fourth largest in the world, see Section 6.3) made most of its components in-house or within Hungary, just as Skoda made most of its components in Czechoslovakia. Now, however, companies like Skoda (part of Volkswagen) are part of the western multinational pattern of production, which involves making components in specialized

factories in several countries and then trucking them by road back and forth across borders for further elaboration or assembly.

Figure 8: Progressive preference for road over rail

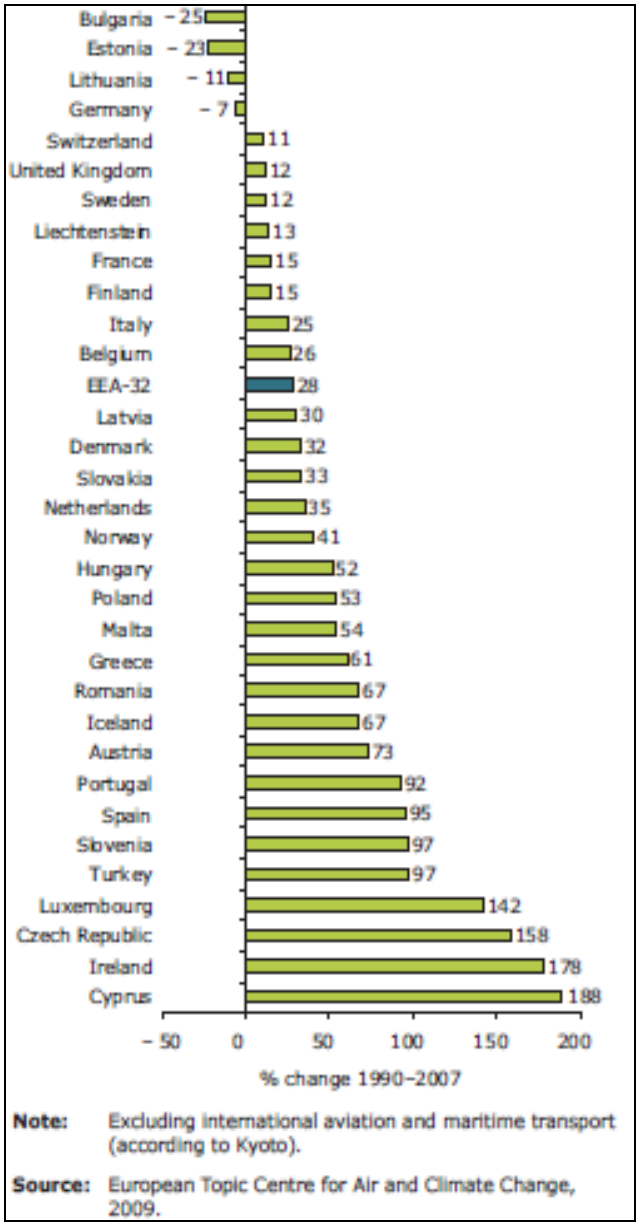


Source: Eurostat, TERM report by European Environment Agency 2010. NB: EU-12 includes Cyprus and Malta

Evidently, multinationals prize the superior flexibility offered by 'individual' truck transport above the lower unit cost in energy and emissions provided by the more 'collective' system of rail transport.[7] However, in terms of their EU climate commitments, the EU-10 countries, or most of them, are paying a price. The energy intensity of their manufacturing will have diminished, even if this is only due to the higher added value of their industrial output, but for most of them, their transport emissions are rising faster than the EU average, as Figure 9 shows. Part of the reason for the stability of the rail/road split shown for the older member states in the past 15 years (shown in Figure 8) is that western European industry has long adopted the pattern of intensive cross-border road transport logistics to which eastern Europe is still adapting.

[7] For insight into the transport shifts in central and eastern Europe, I am indebted to Dr Elek Laszlo of Energia Kozpont Nonprofit Kft, Budapest.

Figure 9: Trends in transport greenhouse gas emissions by country 1990–2007



Source: European Topic Centre for Air and Climate Change, 2009

District heating

This form of collective heating can be cheap and efficient, particularly when associated with combined heat and power (CHP) systems that make use of waste heat produced in the course of generating electricity. Such systems generally work well in Nordic countries, where the penetration of district heating (DH) is high (see Table 3). However, in much of post-war central and eastern Europe 'the Soviet era, when energy was considered a right and virtually cost-free, helped spoil DH systems and kept them pretty primitive', according to Alexander Lega, a DH specialist with the European Bank for Reconstruction and Development (EBRD).

The legacy DH systems in the EU-10 often have several problems – inefficient boilers, uninsulated pipes (compared to modern systems with pipes that are pre-insulated with a plastic coating), and a pipe lay-out that sometimes makes temperature control impossible. Sometimes there is just one pipe running through a building, with no parallel pipes going off to individual radiators or apartments. The only temperature control is therefore to shut off the entire hot water pipe system or, the usual remedy, to open the window.

Impracticable in rural areas, DH systems make sense in cities and towns, but precisely because they are embedded in urban planning and architecture, they are complicated to build or to renovate. However, they can be very effective in reducing emissions, either linked to CHP, which can have an energy conversion ratio of 80 per cent, or to solar panels (as the EBRD is discussing in Romania) or to geo-thermal energy (as the EBRD is discussing in Hungary). Wind power is generally less used in DH systems, because sources are usually remote from major cities. Some major renovations of existing DH systems are being carried out. In the Bulgarian capital, Sofia, a project by the EBRD and the World Bank has saved 30–35 per cent of heat consumption by installing thousands of control substations and better distribution pumps, by replacing 100 km of pipes, and by changing the billing system to paying for actual consumption. However, the process of turning a theoretical advantage of the EU-10's communist past – collective consumption of energy for heating – into one of practical benefit is proving to be a long haul.

Table 3: Some examples of district heating penetration

Country	Houses supplied by DH (2000) %
Iceland	95
Denmark	60 (2005)
Estonia	52
Poland	52
Sweden	50
Slovakia	40
Finland	49
Hungary	16
Austria	12.5
Germany	12
Netherlands	3
UK	1

Source: EBRD

4. The Way Ahead

This paper has laid the groundwork for an examination of the future energy and emission challenges facing the new member states in meeting their EU climate commitments, by painting a picture of the energy intensity gap that still remains between eastern and western Europe. It has highlighted the big relative improvements made by the new member states, especially in industry, but has also pointed out that some of this improvement is illusory. This is partly due to the abandonment of certain energy-intensive sectors such as metallurgy and chemicals by new member states rather than increased efficiency in these sectors. It has also underlined that improvements in industry have largely been offset by increased energy use and emissions in transport. We now turn to the new member states' prospects for moving towards a low carbon energy system in general, and for meeting their 2020 commitments in particular.

4.1. Renewable energy

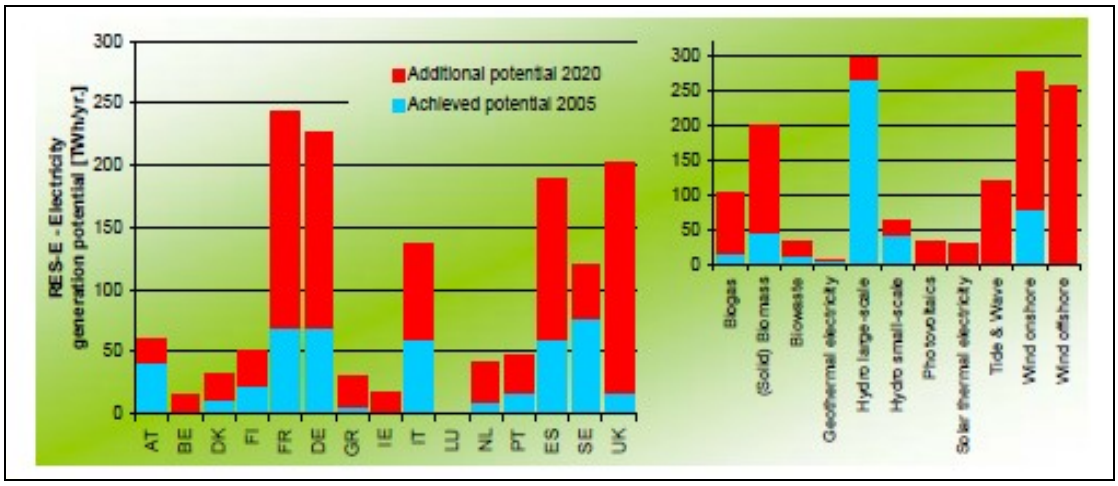
In the current economic recession, all EU targets for reducing emissions and boosting low carbon energy have become easier to achieve. The recession has had significant consequences for the Emissions Trading Scheme, as the supply of carbon allowances is outstripping demand and has depressed the price of allowances. Less affected by the recession than the ETS has been the 2020 target of a 20 per cent renewable share of overall energy consumption – although 20 per cent of lower overall energy consumption is obviously an easier renewable target to hit. The likely result is that renewable energy targets will play a more important part in reducing total emissions in the European economy than was predicted when it was thought, pre-recession, that the ETS would be more effective.

In view of the higher cost of renewables, the new member states were all given easier renewable targets than their richer western European counterparts. Of the EU-10 states, the Czech Republic, Hungary, Latvia, Romania, and Slovenia predict that they will meet their 2020 targets. The other five – Bulgaria, Estonia, Lithuania, Poland, and Slovakia – forecast that they will exceed their 2020 targets, giving them a surplus of green energy to sell to western European states like Italy and Luxembourg, which expect to fall short of their 2020 targets.

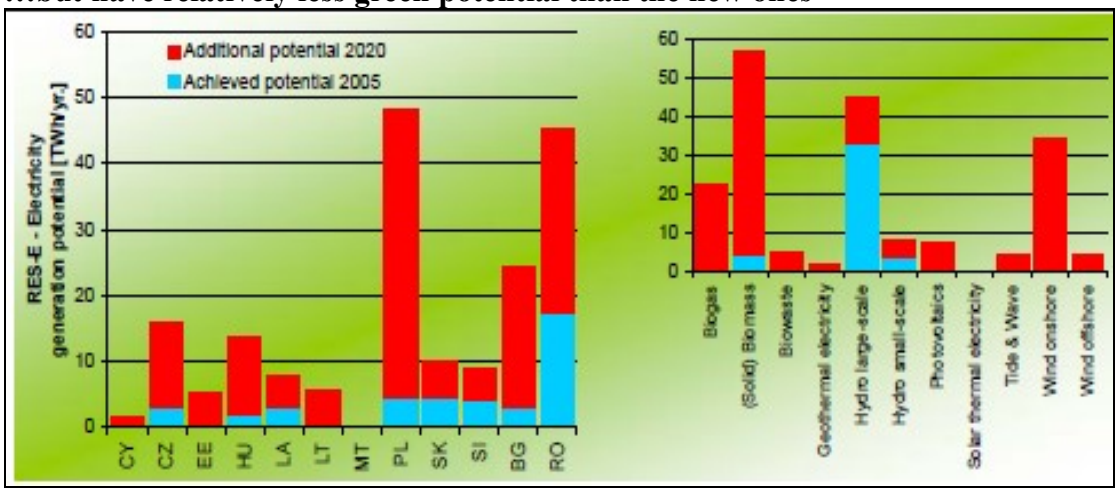
However, this comfortable position for the new member states will not survive the ratcheting up – which is likely to come sooner or later – of the EU climate programme from an overall cut of 20 per cent (on 1990 levels) to 30 per cent. The Commission's claim that the potential for further emission reductions is 'proportionally higher' in the new member states is based on the analysis shown in Figure 10. These charts measure (in the light colour bars) what had been achieved by 2005, and what more (in the dark colour bars) could be achieved by 2020, in renewable electricity generation. (There is some uncertainty about how much biomass would go into electricity, because it can also be used for heat and transport in the form of bio-fuels. This calculation also assumes some restraint, for environmental reasons, on EU cultivation of biomass, made up with some imports from outside the EU.)

Given the smaller economies and populations of the new member states, the charts show their 'proportionally' greater potential in renewables. Up to now, they have done little. Most of the existing renewable electricity in central and eastern Europe is large-scale hydropower, mostly in Romania, but also with some in Latvia, the Czech Republic, Slovakia, and Slovenia. Since large-scale hydro possibilities are mostly exhausted, new renewable power will be concentrated in biomass, biogas and onshore wind, and mainly in the region's two largest economies – Poland and Romania. Little is expected from the maritime renewable energy sources of offshore wind, tidal, and wave power, because many new member states are land-locked, because offshore wind is more expensive than onshore wind, and because tidal and wave power are still experimental.

Figure 10: The older member states can still do more in renewable energy….



…but have relatively less green potential than the new ones



Source: Futures-e project, 20% RES by 2020, by Energy Economics Group, Vienna University of Technology and others, 2008

In the early 1990s there was a statistical jump upwards in the renewable share of energy in central and eastern Europe. In the big 'transition recession' of the early 1990s heavy industry collapsed, total energy consumption dropped, and conventional fossil fuelled energy production decreased, but renewables with low running costs – such as hydro-electricity generation and wood-burning for heat – stayed constant. This caused the new member states' renewable share to rise from 2 per cent in 1991 to 4.5 per cent in 1994.[8] However, nothing was done to add to these traditional forms of renewables. Governments were slow to take even the basic step of defining, and endorsing, what is renewable by issuing so-called 'guarantees of origin'. In 2004 eight of the 10 central and eastern European countries joined the EU, but by late 2006 none of the eight had put a guarantee of origin system in place, despite a directive requiring them to have done so by 2003. Only once they had a guarantee of origin system in place could they introduce renewable investment support schemes. Biomass and wind power only begin to show up in national statistics as measurable sources of electricity after 2005.

Not surprisingly, renewable energy progress has been modest. The new member states started off with easy national targets for their non-ETS (i.e. non-industrial) emissions; to varying degrees they are all allowed to increase emissions in non-industrial areas such as transport, agriculture, and services. There is then the impact of the recession, depressing emissions

[8] See REKK study cited above, page 181. Here the new member states include Cyprus and Malta, but exclude Romania and Bulgaria.

further. As the Commission said in its May 2010 communication, 'several poorer member states are projected to overachieve their 2020 targets for emissions from the non-ETS sectors without additional efforts beyond business as usual'. Hardly, therefore, a sense of urgency to pursue crash renewable energy programmes.

Very occasionally, a new member state's efforts to stimulate renewables have produced too much of a good thing. Czech scepticism about climate change – personified in Vaclav Klaus, the country's famously climate-sceptic president – and Czech doubts about the feasibility of alternatives to fossil fuels, have been reinforced by an ill-judged solar PV scheme with very high tariffs and little legal scope for tariff reduction (see Section 6.2). At least 40 per cent of total Czech renewable support is currently being spent on a project that so far only provides about 7 per cent of renewable power. This scheme has brought about a surge of solar PV investment in the country, but has added significantly to Czech electricity bills. Czech regulators are now cutting the tariffs as fast as they can, and little new solar investment is expected after 2010.

4.2. Nuclear

The countries of central and eastern Europe are generally well-placed for nuclear power to contribute to emissions reduction. The one big exception is Poland, the country that most needs nuclear power to dilute the carbon intensity of its coal-dominated energy supply, but which is only now going ahead with its first reactors, due for completion at some time after 2020. (A initial decision to build a nuclear reactor was taken by the martial law government of General Jaruzelski, but this was thwarted by the first Solidarity government – see Section 6.1). The new member states are also well-disposed to nuclear power, their public opinion being generally in favour of it, according to polling surveys. The Czech and Slovak governments competed with each other to host the European Nuclear Energy Forum – set up by the Commission in 2007 as a talking shop to revive interest in nuclear energy issues – and in the end they agreed that the forum should alternate between Prague and Bratislava.

Indeed, just as they feel pushed forward by the EU into renewable energy, some new member states feel held back by the EU on nuclear power. In particular, there is lingering resentment in Bulgaria, Slovakia, and Lithuania that the EU – more precisely a combination of some western European governments and many members of the European Parliament – forced them to close some of their older Russian-designed reactors as a condition of joining the EU. Though some efforts were made in the 1990s to improve these reactors' safety measures and

design, these reactors were deemed by the EU to be unsafe, largely because, like the Chernobyl reactor, they lacked an outer containment shell. This resentment flared up again in Bulgaria and Slovakia at the time of the cut-off of Russian gas through the Ukraine in January 2009, because these two countries, having no other source of gas, had been hit the hardest of all EU states by the cut-off of Russian gas. The Bulgarian and Slovak governments both threatened to try to re-start their shut-down reactors, but were told by Brussels that this was impossible because their reactors' closure was written into their accession treaties, one of the most embedded forms of EU law.

With some help from other international bodies, the EU has provided a total of Euros 2.83bn in compensation, and in help with reactor decommissioning, energy efficiency, and alternative energy, to the three countries. Bulgaria has found it slightly harder to get the money out of the EU than have Slovakia and Lithuania. Bulgarian officials put this difficulty down to what they see as their country's 'tactical mistake' of closing down its Kozloduy reactors in 2006, the year before Bulgaria joined the EU, when it would have been able to bargain as a full member – in contrast to Slovakia and Lithuania whose reactor closures came after EU accession. Nonetheless, on the basic issue of closure, Brussels was ultimately no less inflexible with Slovakia and Lithuania. Two years after its EU accession, in 2006 Slovakia was forced to close down two of its six reactors at Bohunice. Lithuania long appeared to believe that Brussels was bluffing in insisting on the shutting down of the Ignalina reactors on which the country was highly dependent (see Table 4), but it was finally forced to close its last remaining reactor at Ignalina in December 2009, more than four years after it joined the EU.

Table 4: Nuclear power as % of domestically generated electricity

	1999	**2009**
Bulgaria	47.1	35.9
Czech Republic	20.8	33.8
Hungary	38.3	43.0
Lithuania *	73.1	76.2 (0% in 2010)
Romania	10.7	20.6
Slovakia	47.0	53.5
Slovenia	37.2	37.9
Estonia	-	-
Poland	-	-
Latvia	-	-

* Last reactor closed end-2009
Source: World Nuclear Association

Money is a major problem for any country wanting to build reactors. Nuclear costs are rising fast, as Finland has found with its Olkiluoto reactor being constructed by the French. In the current financial climate, credit is scarce. One reason for EU hesitance in providing compensation money to Bulgaria is that Bulgaria may again opt for a Russian-designed reactor, because it is cheaper and comes with an offer of credit. (EU concern relates to the safety of Russian technology, even though it has been re-designed since Chernobyl.) Lithuania is likely to draw Latvia and Estonia (and possibly Poland) in as partners in a new 'Baltic reactor' at Visaginas to replace Ignalina, but Lithuania is still finding it hard to attract outside funding, partly because several other countries have similar plans to increase nuclear power in its region and therefore there is some possibility of over-supply. In addition to Finland's Olkiluoto reactor underway, Poland is planning at least two reactors of its own, and Russia is also planning a new reactor in its Baltic enclave of Kaliningrad.

Over the long term, nuclear power is set to generate a larger share of electricity across central and eastern Europe, where the Czech Republic and Romania also plan new units on existing reactor sites at, respectively, Temelin and Cernavoda, and where Hungary is extending the life of its Paks reactor. However, in the medium term to 2020 – the time horizon of the EU's current energy/climate programme – it does not look as though there will be much extra nuclear capacity to reduce the carbon content of the region's energy systems.

4.3. Gas

As the least polluting of the three main fossil fuels, gas could play an important part in the new member states' energy and climate strategy. Gas would play a more important part, but for the fact that the most sensitive energy security concerns of central and eastern European states relate to reliance on gas, and on Russian gas specifically. There is no surprise about this concern in the light of a) the region's high and inflexible dependence on Russian gas delivered through fixed pipelines, and b) the cut-off of Russian gas through Ukraine in 2006 and 2009.

This study will not rehearse the entire debate about Europe's gas security and the role of Russia in it. This debate has been exhaustively analysed elsewhere[9] and, moreover, energy security is relevant to this paper only to the extent that it is an obstacle to, or distraction from,

[9] See *The Russo-Ukrainian gas dispute of January 2009: a comprehensive assessment*, OIES, February 2009, and *The April 2010 Russo-Ukrainian gas agreement and its implications for Europe*, OIES May 2010.

progress toward low carbon energy systems. There is certainly evidence that energy security is a distraction for central and eastern Europeans, who feel it has a higher priority than dealing with climate change. In the consultation undertaken by the European Commission in 2008 prior to publishing its Second Strategic Energy Review (the first being on the internal energy market, the second on energy security), people were asked what they thought constituted 'major threats' to EU energy security over the next 20 years. Over half the respondents from the new member states selected 'impact of EU climate strategy' as a threat to energy security, compared to only 13 per cent from the older member states.

Equally telling were the differing priorities on ways of strengthening energy security in the gas market; respondents from new member states stressed supply-side hardware, such as new import pipelines and LNG terminals, which respondents from older member states thought were less important than measures to curb gas demand. In a sense, the eastern Europe supply-side focus on energy security is rather primitive, in that it fails to appreciate the whole EU energy and climate package as a long-term way of replacing imported fossil fuels. However, it is also realistic about solutions to what is perceived to be an immediate problem of energy insecurity; it is quicker to build a new gas pipeline than to reduce gas demand.

Many eastern Europeans had hoped that EU membership would wrap them in an energy security blanket, but they found the EU blanket nothing like as warm as they had hoped. Indeed, after the first interruption of Ukrainian gas in 2006, Poland first took its proposal for an 'energy solidarity' commitment to NATO, before eventually throwing it into the EU negotiations in 2007 that resulted in the new Lisbon treaty. The Lisbon treaty contains, for the first time in a EU treaty, some comforting words on energy security and solidarity. However, it took the serious interruption of January 2009, during which the EU temporarily lost 20 per cent of its gas (30 per cent of its imports), to galvanize the EU into some kind of action.

Table 5: Gas security is a matter of volume as well as of source

	Gas as % of primary fuel (2007)	gas coming from Russia (2008) * as % of total gas consumption
Bulgaria	15	99
Czech rep.	15	82
Estonia	13	100
Hungary	40	83
Latvia	29	85
Lithuania	32	96
Poland	13	58
Romania	32	31
Slovakia	28	117 (some re-export)
Slovenia	12	51

* Includes some central Asian gas via Russia
Source: Commission document SEC(2009)979 final; IEA Natural Gas Information

In total, 12 countries were affected by the 2009 cut-off. Within the EU, Bulgaria was the worst hit, having no storage or domestic production, and lacking any alternative source of imports by pipe or LNG. Its prime minister was reduced to going to Moscow to beg for Gazprom to turn the tap back on. The other chief casualty inside the EU was Slovakia which, frustratingly, had gas in store in the western part of the country, but lacked the technical ability to reverse the usual east-to-west flow in order to pipe the gas to its gas-starved eastern half. However, energy security issues and concerns do not stop at the EU border. Several non-EU countries had their gas supplies hit in 2009, notably Serbia and Croatia. Quite apart from the physical fact that these countries are part of the same interconnected pipeline system as EU states, the EU is politically obliged to take their energy security into account because the EU has persuaded them to join the EU-sponsored Energy Community. Originally set up by Brussels to facilitate reconstruction of Balkan energy grids after the Yugoslav wars of the 1990s, the Energy Community has become a sort of pre-accession waiting room for countries likely to join the EU. Its members are supposed to adopt the rules and procedures of the EU internal energy market, in return for which the EU implicitly underwrites their energy security.

Measures to improve gas security, which started after 2006 and accelerated in 2009, include:

- **Storage**. Countries with the greatest need for storage are those with the largest consumption. As Table 5 shows, Hungary is an exceptionally heavy user of gas; across the EU it is only matched in terms of gas use by the UK and the Netherlands, which are both much bigger gas producers. In 2006–9 Hungary increased its gas storage from 3.2 to 5.5 bn cubic metres (bcm), equal to 40 per cent of its annual consumption. Other new member states have also increased storage.
- **Cross-border interconnectors**. The big goal is to create a North–South corridor, running up and down central Europe, of linked pipelines and storage. Feeding into this would be gas from many sources. From the north, Danish gas, via the Skanled pipeline to Poland; Russian gas via the new Nord Stream pipeline from Russia to Germany, as well as the existing Yamal pipeline across Poland; and gas coming from various sources to Poland's planned LNG terminal at Swinoujscie on the Baltic. From the east, Russian gas via the existing Bratsvo pipeline across Ukraine. From the south, Caspian/central Asian/Middle East gas coming via the possible Nabucco pipeline across Turkey to Bulgaria; more Russian gas coming through the putative South Stream pipeline across the Black Sea and into the Balkans; and gas coming from various sources to Croatia's LNG terminal on the Adriatic. In order to make this at all possible, the new member states need to improve the interconnections between themselves. Bulgaria is therefore working on new links with Romania and Greece; Hungary on new connections with Romania (due for completion 2010), with Croatia (completion due 2011) and with Slovakia (2012 or later); and Slovakia on its end of the new Slovakia–Hungarian pipeline, on its own two-way gas transport system inside Slovakia, on improved connections with the Czech Republic, and a possible pipeline link to Poland. The one hitch in this seems to be Slovak indecision between going for a long new pipeline north to the Yamal pipeline in Poland and maybe the Baltic, or relying on improved connections with the Czech Republic to Germany. Much of Germany's gas, of course, comes from Russia, but there is a new tendency (see Section 6.2) in central Europe to believe that the most reliable way of getting Russian gas is via Germany, on the grounds that Germany would be the last European

customer that Russia would ever dare cut off. The idea is that central and eastern Europe can rely on Germany, and Germany can rely on Russia.

- **EU funding and legislation**. Under the European Economic Recovery Plan, Euros 1bn is being spent in 2009–10 to help finance gas interconnections (and another Euros 700m on electricity connections). This money has been spread all too thinly across the EU (the usual unfortunate result of having to rely on agreement by consensus), but a good portion of it has ended up where it was most needed: central and eastern Europe. At the same time, the EU has set about revising its complacent Gas Security Directive of 2004, which was conceived before central and eastern Europe joined the EU and at a time when people thought energy insecurity was more an issue for oil than for gas. When finalized, this legislation is likely to require more stringent national contingency plans and more coordinated EU responses, in the event of gas emergencies.

In an effort to maintain the momentum of these measures, some of the new member states held their own energy security summit in Budapest in February 2010. The summit was convened by Hungary as holder, in 2009–10, of the rotating presidency of the Visegrad group, to which Poland, the Czech Republic, and Slovakia also belong. The summit also included Austria, Romania, Bulgaria, and the non-EU trio of Serbia, Croatia, and Bosnia. (Significantly, the three Baltic members of the EU were not invited because their energy security position is so different – being dependent on Russia for virtually all their primary fuel, and still linked to the Russian electricity grid. This last fact creates a special climate policy problem – see Section 5 Conclusions.)

The summit produced a Budapest declaration that endorsed all of the measures outlined above. It, went on to say that the participants (even those outside the EU) would push for more EU energy funding of infrastructure of common interest to the region, would come up with their own ideas for projects, and would encourage closer cooperation between their energy companies. According to Ambassdor Mihaly Bayer, Hungary's ambassador for energy security, 'the message to Brussels was that "we are helping ourselves" and the message to Moscow was that "we cannot be blackmailed" '.[10] He goes on to say that: 'if we can settle energy security, then we can deal with climate change more calmly'.

[10] Author interview, March 2010.

Have the new member states settled energy security in a way that lets them deal with climate change more calmly, and possibly more effectively? With more gas security measures in place, it might be sensible for most of them to make more use of gas, the least polluting of the three fossils fuels, as a transition to a lower carbon economy. Increasing gas in the energy mix would not be rational for Hungary (which uses too much already), but it would make eminent sense for Poland to increase the paltry 12 per cent gas share in its final energy balance (to reduce the 60 per cent share of coal). This is particularly true if Poland finds any sizeable quantity of unconventional gas of its own. However, unconventional gas in Europe is unlikely to be the bonanza it has proved to be in north America. Prospects for a more relaxed view to gas use therefore turn on two factors in particular – the reliable supply, and the price of gas from Russia, which is still by far the predominant supplier to the region.

- Reliability. Ukraine is still the conduit for 80 per cent of Russian gas reaching Europe. The Russia–Ukraine agreement of April 2010 could create some stability in the rocky gas transit relations between the two countries. On gas going to Ukraine it removes the 30 per cent general Russian duty on gas exports, thereby effectively giving Ukraine a 30 per cent cut in the price of Russian gas. In return, Ukraine has extended Russia's lease on Sebastopol for its Black Sea fleet. It is hard to see that Moscow is getting much value for its money. However, if – and it is a purely political factor wholly out of the realm of energy policy – the Russian state considers the loss of gas export duty worth around $3bn a year a price worth paying for Sebastopol, then Ukraine will at last get gas at a price that its shaky economy can afford, removing the previous temptation to steal or divert transit gas bound for Europe.
- Prices. Gazprom is currently struggling to keep its gas pricing's traditional link with oil or oil product prices, despite the fact that the spot price of gas, pushed down by recession and current oversupply, has sunk to nearly half the oil-indexed price of long-term Russian gas. For its very best customers, such as its long-time partners, Eon of Germany, Gazprom has been willing to relent to the extent of pricing up to 15 per cent of gas volumes at the spot market rate. Such concessions are essential where a spot market exists, otherwise gas consumers will go straight to the spot market instead of to Gazprom's partners like Eon. However, Gazprom is only making concessions where it has to. Sergei Komlev, head of Gazprom Export's contract and pricing division, says that Gazprom logically 'cannot, and will not, offer spot pricing to

countries that don't have a local spot price'.[11] Unfortunately, such countries include those in central and eastern Europe. Their markets are in the process of becoming better connected, but the gas flowing through them is almost entirely under long-term contract. Therefore, despite their best efforts to create a wider, more diversified gas market, the new member states do not seem to have diluted Gazprom's pricing power.

[11] Author interview, May 2010.

5. Conclusion

Central and eastern Europe has come a long way in the past 20 years. The 10 new member states of the EU have improved their energy efficiency vastly, and are narrowing the gap with the older member states. However, part of that improvement was due to a one-off event, the abandonment of Soviet-era heavy industry. Further reductions in energy intensity are harder, and, as with development of renewable energy, will require upfront money which is currently scarce in a region hard hit by the financial crisis. The new member states have shed that indifference to energy waste which was a hallmark of their 40 years under communism. They now have cost-reflective energy prices, but they have also failed to exploit, or maintain, certain scale economies inherent in communism's collective energy consumption habits in transport and heating. At the request of the new member states, much of the EU's structural aid to the region has been spent on roads, and their railways have been neglected, while little EU financing has gone to improve energy efficiency. On the supply side, the prospects for a substantial increase in low carbon energy in the new member states by 2020 are good in renewables, but poor in nuclear (essentially because of the need to rebuild safer reactors at a time of scarcity of public cash and private credit), and still uncertain in gas.

Yet, given eastern Europe's considerable remaining potential in emissions reduction, it would be most surprising if the region were not asked to contribute proportionately more to the fight against climate change than it has so far. It is also obvious that an increase in the EU's emission reduction target to, say, 30 per cent would pose problems for the new member states.

A tightening of the emissions cap in the ETS would have a greater effect on the new member states as it would require their less efficient companies to buy more allowances than cleaner industries in the older member states. In 2009, the new member states won some temporary concessions, but the 2009 energy and climate package might be unhelpful to them in the longer term. The reformed post-2012 ETS will create a pan-European allocation of carbon allowances by auction or benchmarking according to technology. Either way, eastern European companies will find themselves up against the richer treasuries and cleaner technologies of western European companies in the competition for emission allowances. At the same time, the 2009 package left the current system of purely national subsidy schemes

for renewables largely untouched, and failed to create the sort of pan-European system in which money could freely flow from the richest region (western Europe) to be invested in the region with the most potential (eastern Europe).

A higher emission reduction target would create a very specific problem in the three Baltic EU states. Increasing the carbon costs of Baltic electricity generators would expose these power companies to severe competition from Russian energy companies, which will not be burdened with any such carbon costs. This exposure exists because the three Baltic states are still synchronized with the Russian grid, not the UCTE (Union for the Co-ordination of Electricity Transmission) grid of the rest of Europe. More generally, too, higher energy costs in the new member states could lead to some displacement of jobs or market share to Russia or to Ukraine.

Central and eastern Europe was never going to be able to compete, on the basis of cheap energy, with Russia which will always have lower costs for energy, raw materials, and labour. As for Ukraine, the new member states of the EU should regard it less as a competitive threat than as a policy warning. Ukraine is as energy-inefficient as Russia, but lacks Russia's virtually inexhaustible natural resources. It stands as a cautionary tale to the new member states of what they might have been, had they stayed outside the EU. The new member states' long-term self-interest lies in having the EU set a framework for their energy adjustment.

At the same time, the EU cannot force the pace of this adjustment. In the negotiations on the 2009 energy and climate deal, the central and eastern European states showed that they could form themselves into a blocking minority to obtain concessions. If the new member states are to be required to increase their contribution to emission reduction, they are perfectly entitled to expect commensurate extra financial aid from western Europe through the EU budget or by other means. This could be done in two ways:

EU structural funds

There is no chance, in the current fiscal climate, of funding a big increase in energy saving and low carbon energy in the EU-10 through an increase in the overall EU budget. However, there ought to be every chance of funding such an increase through a re-direction of EU structural funds. These stand at a projected Euros 344bn for the 2007–13 period, or nearly a

third of the entire EU budget, and most of it goes to the new member states. Very little of the total, however, will be spent on energy – only Euros 10.8bn. For instance, Poland, the most populous of the poorer states, is due to get Euros 65bn in 2007–13, but only Euros 2.2bn of that will be spent on energy efficiency and renewable energy.

Why so little? Part of the reason is the traditional emphasis of the structural funds on helping poorer countries to participate in the single market – by improving cross-border infrastructure, some of it in energy but mainly in transport and telecommunications – rather than in funding areas seen as purely national – such as house insulation or green electricity. In 2009 it was counted a minor triumph that the share of EU structural fund available for energy efficiency and renewable energy in housing was doubled, but only from 2 to 4 per cent! However, new member states are also culpable. They are seriously slow in absorbing what EU money is earmarked for energy projects. Their politicians' passivity is partly to blame. They seem to feel that they get a better political return in using EU funds on road transport rather than energy efficiency, on constructing, say, a new highway, on which they can erect a sign proclaiming their success in getting pork barrel money from Brussels, rather than on installing invisible insulation.

This must change., and a good opportunity to start will come in 2011. As it happens, the rotating presidency of the EU will be held by Hungary in the first half of 2011 and by Poland in the second half. Coincidentally, the EU will soon have to begin preliminary negotiations on its next financial settlement for 2014–20. Budapest and Warsaw should take the initiative, a rarity for new member states, to say that if the EU is stick to its declared priority for climate change policies, its budget should reflect this by giving more help to the new member states on energy. Having willed the ends, Europe must will the means.

Europeanizing national renewable energy subsidies

This was the aim of the European Commission in 2008, when it proposed a system of pan-European trading of guarantees of origin for renewable energy, akin to the pan-European system of trading carbon allowances which the Commission created in the form of the ETS. The trade was to be in the guarantees, the pieces of paper certifying the renewable energy, not in the renewable energy (mainly electricity) itself, because there is no way of checking the precise flows of electrons across Europe's borders. The idea was that, for instance, a Romanian producer of solar power could present a guarantee of origin in Germany and get

the German feed-in tariff on solar power, without the Romanian solar power necessarily ever entering the German grid. However, the Commission proposal foundered in 2008 on the opposition of member states which feared losing control of the operation and cost of their national subsidy schemes. EU governments therefore agreed a very restrictive form of cross-border trade in green energy, with any inflow and outflow kept tightly in their hands. States falling short of their renewable target can buy a 'statistical transfer' of renewable energy from states in excess of their national target. On current projections, this will produce a very modest transfer of renewable energy subsidy money – with about four of the old member states (plus energy-deficient Malta) buying small statistical slices of renewable energy from sellers which could be western European as well as eastern European states. Older eastern Europeans will recognize this kind of government-controlled trade as something that they had under Comecon. Like Comecon, it deserves to be abandoned.

In the interest of developing economies of scale in renewable energy across Europe, of encouraging wider competition for available subsidy, and of giving the market a role in deciding where the best return on renewable investment lies – which will often be in the new member states – the EU should reconsider the Commission's original plan. There is now less substance to fears that energy consumers in states with the highest feed-in tariffs would be asked to write blank subsidy cheques to renewable producers in other states. Some of the highest feed-in tariffs for solar power – in Germany, Spain, and Italy – are being cut to reflect technical progress and falling production costs. Western Europe would not find itself presented with an avalanche of renewable certificates from eastern Europe to subsidize, because a gradual de facto harmonization of renewable support schemes is taking place across Europe. There would be some transfer of renewable energy subsidy from west to east, but this would increase eastern European demand for the wind turbines and solar panels of the big western European renewable technology companies. It is unlikely that many jobs would move east with the subsidy. Western Europe would tend to keep the skills and manpower needed to design and manufacture wind turbines and solar panels, whose assembly in eastern Europe requires relatively little labour; indeed that is precisely the complaint in some new member states. Any new wave of green jobs in eastern Europe would be more in improving energy efficiency in buildings.

Clearly a pan-European system of tradeable renewable energy certificates would be as incompatible with any precise system of enforceable national renewable targets as carbon

permit trading in the pan-European ETS would be with national industrial emission targets. It would be the market, not governments or the European Commission, which would primarily decide where renewable generation, as well as emission reductions, would take place. However, is the precision of the current national renewable targets so important? For instance, in purely economic terms, it is obvious that the new member states' targets have been set too low, and how, in the end, are national targets going to be enforced? Surely not with the standard EU infringement proceedings and threat of fines in the European Court of Justice. The one renewable target, on which Europe's credibility will be judged in the court of international opinion, is its collective goal to raise the renewable share in Europe's overall energy use to an average of 20 per cent by 2020. The best way to deliver that would be through a Europe-wide green energy system, marrying western Europe's financial resources with eastern Europe's natural resources.

6. Annexe – country studies of Poland, Czech Republic, and Hungary

6.1. Poland – trapped by its coal

Summary

Coal, for so long seen by Poles as the bedrock of their energy security, now ensnares their country's energy future. Of the 10 new central and eastern European member states of the European Union, Poland has the biggest problem in meeting its climate change commitments – not because it is so profligate in using energy, but because it relies so heavily on carbon-rich energy. Coal makes up around 60 per cent of the country's final energy balance. In 2007 hard coal accounted for 59.89 per cent, and lignite (soft or brown coal) a further 32.05 per cent of Poland's electricity generation. With the minor exception of small Estonia, Poland's energy dependence on coal is unmatched in Europe or the world.

In relying on its large coal reserves, Poland has deliberately limited its alternative options. It is the only sizeable new EU member state without a nuclear power plant, though it now intends to build two or three by 2020. Gas accounts for only 12 per cent of Poland's final energy balance. This is one of the lowest ratios of gas use in Europe, and Polish governments have wanted to keep it that way. Poland is planning new gas interconnectors and an LNG terminal, with the aim of diversifying gas imports away from Russia for political reasons, rather than of increasing overall gas use. Nor, again partly due to coal complacency, has Poland felt the need to exploit its renewable energy potential.

Clearly, policies centred on rationing or taxing carbon emissions were never going to suit Poland, and some Poles have long realized that. Indeed in discussions in the United Nations Framework Convention on Climate Change – in the early 1990s, a decade before Poland joined the EU – Poland played a part in arguing against subjecting 'industrial' countries such as itself to binding cuts in emissions. Nonetheless, there is a widespread feeling in Polish political and industrial circles that the European Commission sprung its January 2008 energy/emissions proposals on Poland and other new member states, without taking into account the region's fossil fuel dependence, relative poverty, and energy insecurity. 'We are caught between the rock of [western Europe's] carbon obsession and the hard place of [our] energy security', commented a senior Polish minister in November 2009.[12] Not surprisingly,

[12] Author interview on research trip to Poland November 2009.

Poland took the lead in arguing for, and winning, concessions for the new member states (the EU-10) in the EU energy and climate package setting out how Europe intends to cut emissions up to 2020. The main concession, for most of the EU-10, was permission to phase in, gradually between 2013 and 2020, the obligation for electricity generators to buy all their carbon allowances at auction. (This is in contrast to power generators in all western European EU states, which will have to buy 100 per cent of their allowances from 2013 on.)

- **Carbon leakage**. These concessions will, unfortunately, not end the argument for Poland, which has a unique 'carbon leakage' problem. The energy-intensive industries of all 27 EU countries face the risk of carbon leakage – loss of market share to companies and countries unconstrained by ETS-type carbon costs – unless and until there is a global carbon regime equalizing competition between all. Poland therefore, like other EU states, faces a risk of carbon leakage to, for instance, Ukraine, which is not likely to come under any ETS-type system soon. (In Poland's case the loss of market share to Ukraine may be the more plausible because the two countries are neighbours.) However, Poland is probably alone in also facing the risk of losing some market share to partners inside the EU – for as long as Poland's electricity mix remains so much more carbon-rich than theirs. Most of Poland's fellow central and eastern Europeans have been given the same flexibility to hand out some free allowances up to 2020, but none of them need this relief on carbon costs as much as Poland, because they all have some nuclear or gas power generation. 'We are not willing to be priced out of markets', warns a Polish minister. Moreover, changing or cleaning up Poland's energy mix will take time. Having never built nuclear power plants before, Poland can expect to take longer than most countries to construct reactors. Clean coal technology could transform Poland's carbon prospects, but it is still at various experimental stages (see Section 6.1.3).
- **Electrification**. One of the ways in which emissions can be cut is to accelerate the electrification of energy systems, particularly in the transport sector with the introduction of electric cars. However, this should only be done in tandem with progress in de-carbonizing the electricity supply. Such de-carbonization will take a long time in Poland. There could therefore be positive harm in using dirtier coal (in electricity generation) to displace petrol in powering Polish cars. Electrification of transport will be a long process, but it has started. RWE, the German utility company,

opened its first car battery charging station in Warsaw in November 2009. However, clean coal plants (see Section 6.1.3) could produce, as a by-product, large quantities of hydrogen that might one day be useable in fuel cells for vehicles.

6.1.1. Polish energy – supply

Coal

The Polish coal industry is substantially smaller than it once was, but it is still Europe's largest by far. Although Poland's energy intensity (see Section 6.1.2) has steadily declined since the end of communism in 1989 – with Poland using less energy to produce more goods – coal is still the kingpin of the energy system.

Table 1a: Number of miners in Poland

	1990	1998	2000	2008
Number of miners	391,000	208,000	155,000	120,000

Source: OECD paper 2002, update

Table 2a: Coal and Lignite in million tonnes of oil equivalent

	1990	1997	1998	2006
Coal and lignite in millions tonnes of oil equiv.	94.46	92.07	79.92	67.58

Source:Eurostat 2008

The shrinking of the Polish coal industry has been due partly to difficulty in competing with imports, and partly to deliberate social policy. Miners have been given generous redundancy packages, while miners' wages have fallen, in relative terms, from the communist era, when miners were a favoured (and feared) elite with wages twice the national average. Partly because the coal sector has been shrinking, the European Commission has not objected to the remaining state aid for the sector. Are Polish governments still 'captive' to the coal industry? The current government, or at least the finance ministry, claims not, pointing to the fact that in 2010 (the last year of state aid to the coal industry) the government will be paying out only 400m zlotys, while Brussels had authorized possible state aid of up to 2bn zlotys.

Gas

Drilling in search of unconventional gas or shale gas has started in Poland, but in the absence of any confirmed find, Poland's gas strategy is one of reliance on imports, with an obsession on diversification away from Russia. As the Energy Regulatory Office (URE) said in its 2008

report, p.60 'a priority objective for Polish gas security strategy is to gain independence from supply from the east'. The January 2009 cut-off of Russian gas has reinforced this priority, though in October 2009 Poland signed a preliminary agreement for a small increase in the gas it buys under long term contract from Gazprom, up to 2037. Poland hopes to change its gas sourcing mix, as set out in the Regulatory Office's 2009 report (see Table 3a):

Table 3a: Diversifying away from Russia

Gas sources	Domestic output	Russian	Non-Russian
2008 (actual)	28%	66%	6%
2015 (plan)	30%	40%	30%

Source: Annual report 2009, page 61, www.ure.gov.pl

Nuclear

Paradoxically, it was partly because of the Solidarity political independence movement that Poland lacks the nuclear generation now considered an important part of the country's future energy independence and security. This is, however, not surprising, since environmentalists, many of them against communist governments' imposition of nuclear plants on local communities, were an important element of anti-communist dissidence across eastern Europe before 1989.

Poland first discussed building a nuclear reactor in the 1970s, but the decision to build one at Zarnowiec near Gdansk on the Baltic coast was only taken by the Jaruzelski regime under martial law in 1982. Doubts began after the Chernobyl accident in 1986, partly within the environmentalist wing of Solidarity, whose leader Lech Walesa was against Zarnowiec. During the Round Table talks of 1989 which paved the way for free elections and the Solidarity government, the Communists argued for keeping Zarnowiec on track and for adding another reactor. 'It was the only disagreement we had with them in the economic portion of the [Round Table] negotiations', according to Andrzej Kassenberg,[13] today head of Poland's Institute of Sustainable Development and in 1989 involved on the Solidarity side of the negotiations. Once elected, the Solidarity government suspended work on Zarnowiec, pending a local referendum in 1990 that finally sunk the project. Zarnowiec was abandoned, about 30 per cent built. It is one of several sites where Poland's new National Nuclear Energy Agency would like to see two reactors built by 2020. However, sticking to such timetables will be even harder for a country like Poland – which has no nuclear-industrial track record - than it would be for countries with previous nuclear experience.

[13] Author interview.

Renewable energies

Along with other new member states, the EU has given Poland a fairly easy stretch target for renewable energy – to increase its share to 15 per cent of overall energy consumption by 2020 from a 2005 base of 7.2 per cent. Few doubt Poland's ability to double its renewable share in overall energy in the next decade, but there is some debate about which renewable energy on which to focus growth. Grzegorz Wisniewski, president of the Institute for Renewable Energy, is critical of the tortured progress of biomass, which constitutes 90 per cent of Polish renewables so far (the rest is hydro and, increasingly, wind). Before EU entry, Poland concentrated on developing bio-energy, especially green heat (burning wood in communal boilers for district heating). Once in the EU, Poland found itself steered by the Common Agricultural Policy back into increased food production, and pressured by Brussels into burning wood with coal (co-firing) in power generation. Available biomass has therefore been sucked into big power plants – whose emissions are controlled – and away from local district heating boilers –whose emissions are not currently controlled – that are now having to burn more coal instead of wood. Wisniewski believes that, despite its agri-fuel potential, Poland 'should save photosynthesis for food production, and develop more renewables than just bio-mass',[14] of which the most promising is wind.

However, the economics ministry is wary of wind, in particular about the need to balance its intermittency with some complementary form of quick-start energy. In most other countries, the logic would be to expand gas generation. This, however, in Poland is geo-politically taboo. The very flatness of most of Poland which makes it a good wind prospect rules out further hydro capacity as a complement to wind, though some run-of-the-river projects are possible on the lower Vistula.

6.1.2. Polish energy – demand

The good news, in terms of energy use and carbon emissions, is that Polish industry has, over the past 20 years, increased output by around 70 per cent and cut emissions by 30 per cent. The bad news is that Poland's heavy dependence on coal for electricity generation drags the climate performance of the whole country down.

[14] Author interview.

Poland sees itself as a developing country that is still industrializing and adding to its basic infrastructure. 'We still have roads, railways, and bridges to build', says a minister. The non-energy industrial sector, however, has made considerable improvements in energy efficiency, so that while final energy consumption has been fairly static for the past 20 years, energy consumption by industry has declined while that of other sectors has risen (see Table 4a).

Table 4a: Energy consumption in millions of tonnes of oil equivalent

	1990	1996	2000	2006
Industry	25.26	24.19	18.89	17.35
Transport	7.36	9.28	9.20	13.43
Households	18.13	22.90	17.52	19.18
Agriculture	3.12	4.93	4.68	4.30
Services	5.78	4.63	5.03	6.57

Source: Eurostat Energy pocketbook 2009

Energy-saving foreign technology

An important reason for the energy efficiencies across Polish industry is that much of it is now owned by big multinationals which have introduced the latest technology into Polish plants, much of whose output is exported. For instance, Arcelor Mittal owns 75 per cent of the Polish steel industry, St. Gobain is a big player in the glass sector, the cement industry has been largely shared out between French and German companies, while more foreign companies have entered the Polish car market. A simple example of technical change reducing energy consumption lies in the cement industry, which has two processes for turning clinker into cement – a more traditional 'wet' one which makes it easier to grind the clinker into powder but which requires more energy to dry the powder, and an energy-saving 'dry' process. In 1990 60 per cent of the Polish cement industry used the 'wet' method; today only 2 per cent does.

Prices

Before the foreign investors arrived, the main driver of energy saving, not just in industry but across the economy, was the increases in energy prices. These were initially dramatic (see Table 5a). Particularly painful was the impact, on incomes that were barely rising, of the removal of the Russian gas subsidy to former allies like Poland, and of the removal of the domestic subsidy to urban district heating.

Table 5a: Household incomes & energy tariffs (1990=100,CPI adjusted)

	Income	Electricity	Gas	District heat
1990	100	100	100	100
1991	106	147	323	176
1992	105	151	474	352
1993	104	161	483	488
1994	108	170	487	597

Source: World Bank 2002, World Bank Advice and Government Response.

Nothing like that has happened since. Electricity prices have levelled out in recent years. This is shown in Table 6a. It is in nominal prices and not adjusted for inflation, and some of the price rises are just the effect of inflation, which soared in the first half of the 1990s but steadied thereafter.

Table 6a: Average prices paid by final consumers in zlotys per MWhour

	1990	1995	2000	2006	2007
High voltage	20.2	86.5	144.3	199.3	202.6
Medium voltage	27.1	109.1	177.5	231.7	234.8
Low voltage	18.4	149.6	247.0	336.9	340.3
Households	10.3	140.8	233.7	334.2	341.5

Source: the Energy Market Agency, www.stat.gov.pl

Since 2001 Poland has had an Energy Regulatory Office. In 2001 the URE (to give the ERO its Polish initials) freed electricity prices at the wholesale level to be set by the market. In 2007 it freed final prices to industry, but it still controls the electricity tariffs charged to household customers. Since 2007 electricity prices to industry have risen sharply. The problem is a lack of any real competition between the four electricity generators which dominate the market and which, as a result of their government-sponsored takeovers of distributors, tend to trade almost entirely with their own distributors. According to the URE's 2008 report, 98 per cent of all electricity is sold in bilateral deals and only 2 per cent on exchanges. In 2007 the European Commission ordered PSE, the electricity transmission system operator, to put an end to the long term Power Purchasing Agreements that it had with generators. These PPAs contractually locked up around 60 per cent of PSE's transmission capacity, acting as an effective barrier to new entrants. However, the ERO has complained that the ending of the PPAs has not increased competition, liquidity or transparency in the electricity market. In these uncompetitive circumstances it is scarcely surprising that the government does not want to remove controls on prices to households. Even more out of the question is decontrolling gas prices. Some 98 per cent of the market is in the hands of Polish Oil and Gas company, PGNiG, which controls domestic production, imports, almost all distribution, and storage.

The result of all this is inefficiencies in the Polish electricity and gas market. These inefficiencies provide a shaky foundation for the inevitable price increases from the general costs of the EU climate programme, and carbon allowances in particular.

Is there any inclination to repeat the price hikes of the early 1990s in the interest of forcing greater energy savings and increasing investment incentives for low carbon energy? Not at all, says Professor Krzysztof Zmijewski of Warsaw Technical University and a chief architect and proselytizer of the Polish position on EU climate policy. 'The pre-1989 energy prices were not based on economics, but Soviet subsidies. For gas we had the internal Soviet gas price. So in the 1990s we were normalizing something that was artificial, and this could be explained to people. Now, with the climate change programme, we are being asked to make what was natural, making use of our coal, more artificial [by putting penalties on carbon]. This is hard or impossible to explain to people.'[15]

6.1.3. Poland and the EU climate programme

The EU climate programme has three main prongs in its campaign to achieve its target of an emission reduction by 2020 of 20 per cent compared to 1990, or of 14 per cent compared to 2005:

- An across-the-board 21 per cent emission reduction applying to all industrial sectors covered by the ETS in all 27 member states.
- A differentiated cut in emissions in sectors outside the ETS (viz. transport, services, agriculture) with richer countries having to cut, and poorer ones allowed to expand, emissions. Poland is allowed to increase non-ETS emissions by 14 per cent.
- Differentiated national targets to increase renewable energy, with poorer member states making less demanding increases than richer ones. Poland is to double the renewable share of its energy from 7.2 per cent (in 2005) to 15 per cent. This 15 per cent target happens to be the same finishing point as the UK, but the UK starting point is 1.3 per cent (in 2005).

However, concessions on the second and third prongs were irrelevant to Poland compared to its one essential complaint about the first – being asked to pay the same price for carbon

[15] Author interview.

allowances traded on the ETS as countries with far lower carbon content to their electricity (see Table 7a).

Table 7a: Carbon content of electricity in kgs per MWh

Sweden (nearly 100% hydro & nuclear)	17
France (80% nuclear, some hydro)	70
Poland (93% coal)	950

Source: Professor Zmijewski, 2009.

Poland therefore fought for, and won, the right for itself and for most of the rest of the EU-10 to transfer up to 70 per cent of the ETS allowances for free to its power generators in 2013, when the ETS reforms kick in. The quantity of free allowances will have to decrease over the period between 2014 and 2019, so that by 2020 power generators in Poland and the rest of the EU-10 will have to buy all their allowances at auction as their fellow generators in western Europe will have had to do since 2013.

No one knows what the value, in terms of avoided purchases, of these allowances will be in 2013; it will certainly be less than the Euros 4bn a year that the Commission estimates, using an ETS carbon price of Euros 39 a tonne of CO_2. However, whatever the value turns out to be, it does not constitute 'a free lunch' for the generators or for the Polish state. Out of political sensitivity to price rises or to charges of windfall profits for generators, the Warsaw government has decided to prevent the generators selling any of the allowances on the ETS market. At the same time, Poland will have to show, in yearly national plans presented to the European Commission, that it is investing in cleaner energy, and that this investment should, according to the EU legislation, be 'to the extent possible equivalent to the market value of the free allocations'.

Inescapable investment

The EU climate programme, plus the imminent constraints of the EU Large Combustion Plant directive that bears on non-greenhouse gas pollutants, give legal urgency to a re-investment programme that would, in any case, be largely inevitable because of the age of Polish generating plant (see Table 8a). The average age of generation units is a little over 30 years. This average is not geriatric in a sector where plant can operate much longer, but some Polish units are very old indeed – two still operating were built during the first world war, and the last new turbine they received was in the 1970s. Generally too, the energy efficiency

or conversion ratio of Polish units is very low, around 30 per cent, and the need to raise this ratio to above 40 per cent, so as to offset power losses in clean coal technologies (see below), is urgent.

Table 8a: Age of power generation units in Poland

0–5 years	8%
5–10 years	7%
10–20 years	11%
20–30 years	34%
30 years and older	40%

Source: Polish Energy Market Agency

Where will the necessary funds for investment come from? Certainly it will not all come from the cash flow of the Polish generators, unless Polish governments are ready to take the political risk of fully decontrolling electricity prices. Partial privatization of this state-dominated sector can provide a partial solution – the biggest generator, PGE, raised the equivalent of Euros 1.5bn in a capital increase in October 2009, but the Polish state still holds nearly 80 per cent of the company. However, one area where Poland will get some EU money is clean coal technology, for which Poland is going to be an important testing ground.

Clean coal options

- **Carbon capture and storage**. The main demonstration of this is at PGE's Belchatow generation plant, which is fed by the largest lignite mine in Europe, and which is itself the biggest emitter of CO_2 in Europe. Alstom of France is providing capture technology of the post-combustion variety, which is the most suitable for a country like Poland so deeply embedded in coal generation, because it can be retrofitted. Alstom is fitting the capture technology to a new 858 MW unit which it has built. This efficiency of this unit will be 45 per cent but, in terms of final electricity output, this will be reduced to 35 per cent because of diversion of some power to run the capture equipment. Fortuitously, Belchatow sits on top of the largest potential onshore geological storage site for CO_2 in Europe, which according to Andrzej Siemaszko, the coordinator of EU-funded research into CCS in Poland, could store up to 90 billion tonnes of CO_2.
- **Above-ground coal gasification**. At Kedzierzyn, a Polish utility, Tauron, has built an Integrated Gas Combined Cycle unit to turn coal into synthetic gas that can then be separated into pure CO_2 (for storage or industrial use) and hydrogen (usable in gas

turbines or, one day, in hydrogen fuel cells for cars). A chemical company, ZAK, plans to use some of the CO_2 from Kedzierzyn to make plastics and polymers.

- **Underground coal gasification**. This is only at the discussion stage in Poland, particularly by a Polish-American company called PLRT (for Polish Laboratory for Radical Technologies), though other coal-using countries such as China, Australia, South Africa, and the UK (where the Underground Coal Gasification Partnership is based) are said to be interested. The idea is to burn coal underground, particularly where seams are too deep or thin to be easily minable, to produce syngas.

'Don't store it, use it'

General Polish concern about climate change is low, which is not surprising in a country that still sees its priority as development. There is therefore irritation/resistance in Poland to the idea of just storing CO_2 as a kind of landfill, and interest in trying to use it industrially. This is why there is support for coal gasification:

- to produce syngas as a substitute for natural gas, and a partial solution to energy security concerns. Siemaszko points out that 20 Integrated Gasification Combined Cycle (IGCC) units would provide enough syngas to enable it to do without natural gas imports.
- to provide CO_2 for enhanced recovery of natural gas (of which Poland has some reserves).
- To provide CO_2 for plastics (pretty permanent sequestration!) and fertilizer.

As Siemaszko says, 'it is much better to justify the new technology in Poland as promoting energy security and bringing industrial benefit'.

6.2. The Czech Republic – Decisive on energy security, but hesitant on climate change

Introduction

The Czech Republic is part of the 'coal coalition' of new member states complaining about EU climate policies. It is in the same difficult situation as Poland. It generates a smaller proportion (around 57 per cent) of its electricity from coal and lignite than Poland (around 95 per cent). It therefore has lower carbon intensity in its energy supply. However, with a long manufacturing tradition dating back to the start of the industrial revolution, the Czechs use relatively more energy, and have a relatively more energy-intensive industry, than the Poles. The Czech Republic therefore has higher energy intensity than Poland (see Table 9a), which means that CO_2 emissions per head of population are nearly 50 per cent higher in the Czech Republic than in Poland.

Table 9a: Coal coalition compared and contrasted

Figures for 2007	Czech Republic	Poland
Energy intensity (toe/M euros '00)	553	400
Carbon intensity (tCO_2/toe)	2.83	3.37
Energy per capita (kg oil equiv./ capita)	4480	2571
CO_2 per capita (kg/capita)	12694	8667

Source: Eurostat

Czech energy policy has, in recent years, been characterized by decisiveness on issues relating to security of energy supply, such as the building of oil and gas pipelines to reduce dependence on Russia and the completion of nuclear power plants (which are generally considered a matter of energy security). However, precisely because domestic sources of coal and lignite are seen as an important element in the country's energy security, there has been hesitation and delay in reducing the use of coal and lignite. Czech scepticism about climate change, personified in Vaclav Klaus, the country's famously climate-sceptic president, and Czech doubts about the feasibility of alternatives to fossil fuels, have been reinforced by an ill-judged solar PV scheme. This scheme has brought a surge of solar PV investment into the country, but has added significantly to Czech electricity bills.

6.2.1. Energy supply and security

Well before its entry into the EU, and well before other new member states, the Czech Republic began to take steps to secure its energy supplies.

Gas

In the 1990s the Czech Republic started to diversify away from Russia by contracting for supplies of Norwegian gas. This Norwegian gas is notionally deliverable directly through the RWE Transgas network from Germany into the Czech Republic. For practical reasons, the Norwegian gas is delivered in northern Germany and swapped for an equivalent amount of Russian gas routed via Germany into the Czech Republic. Prague appears to draw a double assurance that a) Germany will never deny this supply of Russian gas to the Czech Republic because it is getting Norwegian gas in return, and that b) Russian gas via Germany is a safer source than Russian gas via any other route because Russia would never jeopardize its market and relationship with Germany. 'Russia will never play with Germany, which is the biggest market for Russian gas', says Vaclav Bartuska, the Czech ambassador for energy security.[16] In practice therefore, the Czech Republic continues to get about 100 per cent of its gas from Russia, although only 80 per cent of this comes along the traditional east–west route through Slovakia. By establishing an alternative German route for some of this gas (and conceivably for Norwegian gas), the Czech Republic feels itself less at Gazprom's mercy. In these circumstances, it has been happy for RWE–Transgas, the Czech subsidiary of RWE, to extend its long-term import contract with Gazprom for the Czech Republic until 2035.

RWE–Transgas has also increased its ability to reverse the normal east–west flow on the main transit pipeline carrying Russian gas from Slovakia, across the Czech Republic, and into Germany. This prudent step paid off in January 2009, when the Czech Republic was able to increase imports from Germany, both for Czech use and for storage in western Slovakia. (When Slovakia had its supply of Russian gas cut off at its eastern frontier bordering Ukraine, it found itself unable to pipe the gas from its western storage sites to eastern Slovakia. As a result the Slovaks are now constructing the same two-way gas transport system as the Czechs have done.) Since January 2009, there has been considerable work in the Czech Republic on creating new gas connections to Austria – and there is even more work underway in Slovakia on links to Hungary, Austria, and possible plans for a link to Poland.

Oil

Another example of where the Czech authorities have acted on energy security – rather than, like some of their neighbours, just complaining about it – is the Ingolstadt–Kralupy–Litvinov

[16] Author interview on research trip to Czech Republic April 2010.

(IKL) oil pipeline built in the 1990s to Germany. When the European Commission wrote its 2008 Green Paper on energy security, it chose to highlight the IKL pipeline as 'a striking example [to all EU countries] of public financing of a pipeline for security of supply, when the market does not see the need'. Ambassador Bartuska admits that the IKL pipeline, which cost $400m out of the Czech government budget, is far from used to capacity; it hardly could be, given that the IKL's capacity is 10m tonnes a year compared to total Czech oil imports of 8m tonnes. He says, however, that the Czech Republic reaped the benefit of the pipeline in summer 2008. Shortly after the Czech Republic and the USA signed a missile defence agreement that Russia disliked, supplies of Russian oil to Czech customers through the Druzhba oil pipeline were cut off 'for technical reasons'. The Czechs were, however, able to get replacement supplies through the IKL pipeline.

Nuclear

This accounts for around 40 per cent of Czech electricity. The Czechs are probably the most pro-nuclear nation in the EU and they are the most recent country in Europe to complete a nuclear power plant (Temelin started operation 10 years ago). The country seems generally content to see new reactors built on the site of the two nuclear sites at Temelin and Dukovany. The operating costs of these plants are low. CEZ, the dominant (and state-controlled) Czech utility which owns and operates these nuclear plants, describes them as 'the winning ticket'. CEZ calculates that, thanks to its sizeable nuclear power generation, the CO_2 intensity of its operations stands at 0.66 tonnes of CO_2/MWh – less than what it estimates (based on the German market) is the European average of 0.80 tonnes of CO_2/MWh. This therefore is a rare case of a central or eastern European energy company with lower carbon intensity than its western European counterparts.

Coal/lignite

This is still the most important fuel for power generation, accounting for over 50 per cent of electricity, and in view of climate change, the most controversial. CEZ says that it has taken notice of climate change concerns and of EU policies to scale down its coal operations. 'We had a 2005 plan to maintain, by rebuilding, as much as 6.5 Gigawatts (6,500 MWs) of coal plants, but we cut this in half and are only continuing with 3 GWs of coal plant, and beyond 2020 it will be 2.5 GWs with just three projects', says Alan Svoboda, CEZ's commercial

director.[17] Moreover, apart from a coal investment in Germany and Poland, the foreign expansion of CEZ – which has become the biggest multinational among the new member states' utilities – is in gas or renewables. It is planning gas-fired plants in Bulgaria, Poland, and (in alliance with Hungary's MOL) Hungary and Slovakia, while in Romania it has bought into a big wind farm and taken a share in a nuclear plant.

In the Czech Republic, however, CEZ is pursuing its scaled-down coal plans in hard-headed ways that dismay many environmentalists. For a start, on economic grounds, CEZ favours lignite, which emits more carbon per unit of energy than does hard coal. The latter is expensive to mine or buy, says a CEZ executive, 'because you pay a high price for the coal and also a high price for the CO_2 permit, whereas if you use lignite the only high price is for the CO_2 permit'. As a result of of its low energy content, lignite is not considered worth transporting, so the criterion for new lignite investments – and crucially the level of technology in them – is how much lignite can be strip mined in the plants' immediate surroundings. Therefore CEZ has decided to upgrade the lignite plant at Ledvice with the latest 'supercritical' boiler and turbines that will raise efficiency to the level of 42 per cent, because the company judges that there is sufficient strip-mineable lignite (40 years' worth) in the vicinity to warrant the extra investment cost. However, in the case of another upgrade at Prunerov, CEZ was only willing to pay for equipment that will take efficiency up from around 36 per cent to 39–40 per cent, on the ground that the Prunerov lignite reserve is too short-lived to justify any higher investment.

CEZ's cautious investment logic on coal technology also extends to carbon capture and storage. In contrast to Polish power companies, CEZ has declined to take part in any early commercial demonstration of CCS technology, even though it is being subsidized by the EU and some national governments. Though the Czech Republic has a couple of sites suitable for carbon storage, a CEZ executive says: 'we see slower progress in CCS development than many others are predicting'.[18] In its refusal not to be pushed out of coal mining or into spending more on coal technology, CEZ knows that it has the backing of the country's political establishment and of many allies in the country's coal lobby. This lobby includes all the heating companies that burn coal in their boilers.

[17] Comments made at a conference on energy security, organized by the Institute for Public Discussion, Prague, April 2010.
[18] Author interview.

One person did object to CEZ's refusal to put the best available technology into Prunerov, which is one of the country's largest sources of greenhouse gases. This was Jan Dusik, who was the Green party nominee as environment minister in a caretaker government until he resigned in spring 2010, in protest at the rest of the government taking CEZ's side on the Prunerov investment issue.

Renewables

The Czech Republic has never been seen as the most fertile ground for renewables. A 2005 study on the Czech Republic by the International Energy Agency remarked that 'historically and geographically the Czech Republic has greater scope for energy efficiency than for renewables'. By 'historically', the IEA meant the legacy of command-and-control communism and waste of energy, and by 'geographically', the fact that a relatively cloudy land-locked country in central Europe is not a natural zone for solar and wind power.

The Czech Republic's traditional renewable resources are hydroelectricity – which accounts for just over half (54 per cent in 2008) of all renewable electricity – and biomass – which accounts for over a quarter of all green electricity. As elsewhere in Europe, the Czech Republic has exhausted most of the good potential for hydro, going further would create further damage to the environment. Nor can biomass be much expanded. Czech forests are already well exploited, with most biomass (70 per cent) going to produce heat, which is the most efficient way of converting biomass into energy.

The search is therefore on for new forms of renewable power. Wind power is on the increase, but there are environmental objections and planning problems to putting more wind turbines on Czech mountain tops. The government's own report of November 2009 was pessimistic about wind. 'From the perspective of technical and energy efficiency, wind power plants in continental conditions are more a source of problems than a competitive source of energy. Their construction leads to an increase in the need for reserve sources, to the origin of bottlenecks in the transmission system and to local overloading of lines.'

Proof, however, that you can have too much of a good thing has come in the astonishing story of the Czech solar PV bubble. The most climate-sceptic of the new member states has found itself writing a blank cheque to investors who have rushed in to exploit a 2005 law. This law

set the feed-in tariff for solar PV at no less than Czech crowns (CZK) 14,080 (Euros 522) per MWh, guaranteed for 15 years, with the Czech regulator (ERU) left with the power to reduce that tariff by a maximum of only 5 per cent a year.

Table 10a: Scaling down solar incentives

Date of commissioning	Feed-in tariffs CZK/MWh (Eur/MWh)	Green bonuses CZK/MWh (Eur/MWh)
Solar PV after Jan 2009 below 30kW	12,890 (477)	11,910 (441)
Solar PV after Jan 2009 above 30kW	12,790 (474)	11,810 (438)
Solar PV in 2008	13,730 (509)	12,750 (472)
Solar PV in 2006–7	14,080 (522)	13, 100 (485)
Solar PV before Jan 2006	6,710 (249)	5,730 (212)

Source: Czech Energy Regulators Office

The 2005 law was intended to give a boost to renewables, which indeed it did. Czech regulators say that the rate chosen to apply after January 2006 was rational, given the then prevailing price of silicon and solar panels. What they could not have foreseen was the collapse in the price of solar panels, partly due to Spain's cut in its big solar subsidy, which left excess Chinese production on the market. The effect of this was to reduce the payback period on solar PV investments to around 6–7 years in a scheme with a tariff guaranteed for 15 or 20 years. Not surprisingly, there was a surge of investment. Banks marketed Czech solar PV projects to investors as sure-fire 'financial products' regardless of other considerations such as the difficulties faced by the Czech grid in connecting all these solar generators. Table 10a clearly shows how the regulators repeatedly cut the tariff by the full amount allowed to them – 5 per cent a year – and in 2009 they split the tariff between big and small generators so as to apply a slightly bigger cut to bigger projects. Table 10a also gives an idea of how low the electricity market price has been in comparison to the huge subsidy. Solar PV investors could choose to get either the feed-in tariff or the green bonus which is aimed at bringing the market price up to the level of the feed-in tariff, so the market price is just the small difference between the green bonus and the feed-in tariff.

Not surprisingly, the investors have kept coming – installing 65MW of new solar PV capacity in 2008, 462MW in 2009, and anywhere from 1,600 to 3,000 MW in 2010. Moreover, in contrast to Slovakia – which set high feed-in tariffs but limited the quantity of investment on which the tariffs were payable – Czech PV subsidies have been unlimited. A blank cheque

indeed. Eventually, the Prague government overcame its fear of upsetting investors and amended the law to allow regulators, from 2011 on, to cut tariffs by more than 5 per cent in cases where the payback period is shorter than 11 years (11–15 years being the normal payback period for other renewables, according to the regulators). This is expected to slow the increase in investment.

What, therefore is the upshot of all this? On one hand, the artificial solar PV boom has produced some modest industrial spin-offs. One is Fitcraft, a Czech company making silicon wafers and PV panels. This is a relatively rare example of a company in one of the new member states succeeding in green technology; another Czech example of this is Wikov, which makes gears for wind turbines. On the other hand, solar support tariffs/bonuses have added 4 per cent to electricity bills in 2010, and probably double that amount in 2011. At least 40 per cent of total renewable support is being spent on something that only provides about 7 per cent of renewable power so far. This discrepancy, and popular discontent about rising electricity prices, threatens to confirm many Czechs in their scepticism about climate change and its supposed remedies. Zuzana Musilova of the CZEPHO trade association of some 70 solar companies and investors operating in the Czech Republic, recognizes the boom in her sector may have been counter-productive. 'We want durable development of the sector with stable growth, so we could accept a lower tariff so as to reduce the impact on end-users and their electricity bills.'[19] There is thus a general consensus that Czech consumers would have gained far more energy for the extra crowns on their energy bills if the money had been spread more evenly across the range of renewables, on biogas and biomass as well as on wind and solar power.

Energy efficiency and demand. The Czech economy has, as the IEA noted, considerable scope for energy-saving. Efficiency has increased in households and industry, though much of the improvement in industry is the result of structural changes – the shift since 1990 from energy-intensive branches of manufacturing to less intensive ones. The biggest change came in metallurgy. The industrial city of Ostrava now has one blast furnace (owned by ArcelorMittal) where once it had four. Sectors such as textiles, machinery, china, and glass also shrank. According to the Odyssee energy efficiency index, structural changes accounted

[19] Author interview.

for 46 per cent of the general energy efficiency improvement between 1997 and 2000, and for around 28 per cent in the period 2000–7.

However, efficiency improvements in households and industry have been effectively cancelled out by a big increase in the energy intensity of transport. There has been a shift for passengers and freight from rail to road, from public transport (buses) to private cars, from smaller cars to bigger cars with higher fuel consumption, and a massive import of second-hand cars from western Europe. To help its car industry through the 2008–10 recession, Germany, like many other countries, introduced a scheme giving those people handing in old cars some money towards buying new cars. However, due to the lack of any enforced requirement in the German scheme that old cars be scrapped, many of these older cars ended up in central and eastern Europe.

On the other hand, among the new member states, the Czech republic has been one of the most successful sellers of Kyoto 'hot air' credits. It has a surplus of 150m EUAs for the 2008–12 period, of which it planned to sell 100m and carry the rest forward. By spring 2010, it had sold 71m credits, mainly to the Japanese government and Japanese companies, and also to Austria and Spain, raising around Czech crowns 18bn. This money has gone into a Green Investment Scheme, to be chiefly used to fund residential insulation and to encourage renewables at the household level (solar heating, biomass boilers, and heat pumps).

6.3. Hungary – a clear policy on gas, but on little else

Introduction

Hungary is more concerned than many fellow new member states about security of energy supply, because it uses a lot of gas, mostly imports and mostly Russian. Its reliance on gas (45 per cent of total energy consumption) is second in Europe only to the Netherlands, which is still a major gas producer and exporter, with far more than Hungary's dwindling gas output and reserves.

As it generates more than a third of its electricity with gas – a relatively clean fossil fuel –, and another third of its electricity with nuclear power, Hungary has less reason to panic than, say, coal-burning Poland and the Czech Republic, about the carbon constraints of the new EU climate programme. The result is an imbalance in Hungarian policy:

- a clear policy on gas (mainly on the external supply side).
- but no coherent vision to accelerate renewables or energy efficiency.

It is therefore not surprising that Hungary has sought to avoid being pushed into faster movement towards a low carbon economy. Like several other eastern European countries, it is still legally contesting its national allocation in phase Two (2008–10) of the ETS as being too low. It is also in the forefront of resistance to calls for the EU to increase its overall emission reduction from 20 per cent to 30 per cent by 2020.

For a country that, almost alone in the Soviet bloc, had embarked on some market reform before 1990, Hungary's subsequent adjustment to a fully market-based economy and energy system has proved relatively slow and sporadic. Post-1990 Hungary followed the usual pattern of economic depression (GDP falling by 10 per cent between 1990 and 1992). Heavy industry led the collapse, as Soviet bloc markets, and the Soviet subsidy on gas prices disappeared. One notable example was the Ikarus bus group. Aptly, in a country where the English word 'coach' derives from carriages first built in Kocs, Ikarus was once the fourth largest bus-maker in the world (turning out 100,000 buses in 1973), on the basis of product specialization within the Soviet bloc. However, it declined after 1990, and was eventually declared insolvent in 2007. When economic growth resumed in Hungary in the 1990s, it came in different sectors requiring less energy – for instance, light engineering, cars (not

buses), and services. As a result the energy consumption in the industrial sector declined by 35 per cent over the period 1990–2004.[20].

Energy consumption, however, has risen in the rest of the economy, the main reason being that price subsidies on gas have continued for households. Some 80 per cent of households use gas, and half of these households get price rebates amounting to 18–25 per cent of their gas bills. Owing to the breadth of these subsidies, successive governments have found it politically very difficult to phase them out. As in other new member states, fuel poverty is a concern in Hungary, where the average Hungarian household spent 9.7 per cent of its income on energy over the period 2000–7, which is close to the generally-defined threshold of 10 per cent of income regarded as fuel poverty [see also discussion of fuel poverty in Section 3.1].

Direct gas prices subsidies are due to end in 2010, coupled with a 10 per cent rise in the gas price. This should partially reduce demand for gas. However, there is still a high feed-in tariff for electricity co-generation, or combined heat and power (CHP), which in Hungary operates almost entirely on natural gas. Indirect incentives to use gas thus still exist in Hungary, even if the direct price subsidy is being cancelled. Moreover, these feed-in tariff price supports for CHP are estimated by some experts to be twice the value of support going to renewables.

Security of supply

Hungary feels insecure about gas, because gas makes up 45 per cent of its total energy consumption, and more than 80 per cent of that comes from one source, Russia. Compounding the problem internally is the fact that most Hungarian gas-users are householders who, in a supply emergency, cannot be cut off as easily as businesses.

Hungary briefly lost 60 per cent of its gas supply in January 2006 when the flow of Russian gas through Ukraine was interrupted. Hungary took immediate measures:

- Within a month it passed a law creating new underground strategic gas storage of 1.2 bn cubic metres. Commercial companies also added to their stockpile. The result was that Hungary was able to supply itself, and to some extent others, when the deeper and longer cut-off of Russian gas flow through Ukraine occurred in January 2009. Hungary now has storage capacity of 5.5bcm (compared to 3.2bcm in 2006).

[20] International Energy Agency study of Hungary, 2006.

This 5.5bcm amounts to 40 per cent of annual consumption, or about 70 days of consumption even in extreme cold.

- The other approach to the gas security problem has been to increase diversity of gas routes, and eventually sources of gas, by building a more complete web of cross-border pipelines across central and eastern Europe. The three main interconnectors on which Hungary is working are to Romania (to be completed in 2010), to Croatia (due for completion in 2011) to link up with the planned Croatian LNG terminal, and to Slovakia (2012 or later). Extra storage capacity and cross-border pipelines might allow Hungary to become a regional hub for gas. According to Ambassador Mihaly Bayer, Hungary's chief energy security diplomat, the bigger picture is that Hungary's link south to Croatia and its link north to Slovakia should form part of a new North–South gas corridor that would be completed by links from Slovakia to the Czech Republic, or possibly to Poland and its planned LNG terminal near Gdansk on the Baltic. New non-Russian pipelines like the mooted Nabucco project, or new Russian pipelines like the proposed South Stream, could feed into this corridor. 'Part of the point too of the North–South corridor', Ambassador Bayer also notes, 'is to link up storage tanks as well as pipelines across the region'.[21] By ending the segmentation of different national gas markets, and creating a more common gas market among the new member states, the goal is to try to deter Gazprom from playing its central European customers off against each other, and to push for 'a common Russian gas price at the EU border with Ukraine' [see also Gazprom's comments in Section 4.3].

Energy market

The money which Hungary spends on gas supply precautions such as storage and infrastructure, and the money that it wastes on gas subsidies, add significant costs to the country's energy bill. In its 2006 country report on Hungary, the IEA put the subsidy cost at Euros 500m a year. Moreover, moves to a low-carbon energy system – the main focus of this study – will add even more costs to the country's basic energy system. Just how cost-efficient is this basic system as the foundation on which to build future low-carbon energy?

The Hungarian energy industry is largely privatized. Private sector companies – Hungary's MOL and Germany's Eon – dominate gas, while in electricity, the biggest company MVM –

[21] Author interview on research trip to Hungary, March 2010.

which operates the Paks nuclear reactors – is state-owned, and the rest private. These, however, are big companies which, in a small pond, can exercise significant market power. Dr Gabor Szorenyi, director of the Hungarian Energy Office (HEO), and also chairman of ERRA, the regional grouping of eastern European and CIS energy regulators, recognizes the problem. He claims that the Hungarian system of regulation is basically 'pro-competition'.[22] His HEO has the power to intervene where it detects that a company might have 'significant market power', and to set compensating obligations on the company in question. It has obliged MVM and MOL to auction some of its electricity and gas to rivals, but Mr Szorenyi admits wholesale prices of both gas and power on the Hungarian market are high. 'We would be happy to pay as little as the west Europeans … central and east European countries have had to pay a Euros 10–15 per MWh premium over average EU prices because of, among other things, perceptions of country risk and lack of competition.'

Dr Szorenyi's HEO predecessor, Peter Kaderjak, who now runs Budapest's Regional Centre for Energy Policy Research (REKK), comments that 'we would expect [wholesale] prices in central and eastern Europe to be, if anything, cheaper than in Germany'.[23] Part of the problem, Mr Kaderjak says, is the market power of the big regional players – Hungary's MVM, as well as CEZ of the Czech Republic. Another aspect of the problem, he says, is misguided subsidies for renewables whose cost is added to electricity bills. 'Feed in tariffs provide a very strong incentive to investors, but you need political strength to put a stop to them [the tariffs], otherwise they become a playground for rent-seekers.'

Renewables

For a country that is, in general, unenthusiastic about renewables, Hungary has agreed a demanding target with the EU – to increase the renewable share of energy consumption from a base of 4.3 per cent in 2005 to 13 per cent by 2020. Biomass, in the form of wood burnt as fuel for heating and electricity, is by far the most important renewable (around 80 per cent of total renewables). It provides a fair number of jobs in the countryside, and unlike wind and solar power, is an area where Hungary can use some home-produced equipment such as boilers and turbines. Karoly Gerse, vice president of MVM, the state electricity company, says 'we are investigating a lot of biomass projects, though the main problem is that regional

[22] Author interview.
[23] Author interview.

authorities restrict the size of biomass plants and the tariff is not high enough'.[24] Biomass, however, is probably approaching its environmental and logistical limits in Hungary.

As the many visitors to thermal baths in Budapest and elsewhere in the country will attest, Hungary has geothermal resources in the form of naturally warm or hot water. Dr Szorenyi the HEO regulator, is however, like many others, dubious about the prospects of geothermal energy making any sizeable contribution to Hungary's required renewable increase. 'Geothermal requires deep drilling and the water needs cleaning of brine which then has to be disposed of', he says. A better source of increased renewables, therefore, looks likely to be wind, although the average wind speeds across Hungary are not high. Wind has been the first renewable investment of MVM, which has bought the Hungarowind wind farm from foreign investors, and is negotiating to buy a second wind farm. However, the degree to which Hungary can accommodate intermittent energy such as wind is, for the moment at least, limited by the inflexibility of its base load. Much of this base load consists of inherently inflexible nuclear power, and quite a lot of gas-fired CHP, which (because of its relatively high conversion efficiency) already gets priority dispatch to the grid, and cannot contractually be scaled back if wind power surges.

'What we basically lack is a clear vision on renewables, and how the issues of employment, cost and security of supply should be factored into decisions about renewables', says Mr Kaderjak. Hungary has shown itself ready to pay a high price for gas security. According to Ambassador Bayer, the cost of gas storage and infrastructure adds as much as 50 per cent to ordinary Hungarians' gas bills. However, there is doubt about whether Hungary is getting a good return in either better energy security or increased employment on the high feed-in tariffs – amounting to 2.5 times the market power price – that Hungary is offering for gas-fired co-generation and for wind. Some Hungarian officials note that promoting wind power amounts to promoting German manufacture, and that it provides only a few 'screwdriver jobs' for Hungarians in the assembly of German turbines. In the view of MOL, Hungary would do better to put money and effort into energy efficiency (especially in housing) rather than renewables. It is not surprising that MOL, predominantly an oil and gas company whose only renewable investment is in biofuels, should argue this; this view is currently common in the oil industry. What is more surprising is how many Hungarians agree with MOL.

[24] Author interview.

Energy efficiency

Hungary could help itself to reach its 13 per cent renewable energy ratio by reducing the amount of energy it uses overall (thereby making renewables a higher share of a lower total), but its performance on energy efficiency has also been less than stellar. There is no general problem of energy intensity in the Hungarian economy, partly because of the big reduction in industry's energy use. Hungary, however, has a particular problem with the age or nature of its housing stock, mostly pre-1939 or communist-era prefabricated panel housing. Its buildings contribute around 50 per cent of the country's energy-related CO_2 emissions. Hungary has a lower (16 per cent) portion of its population served by district heating than many other new EU member states – and as elsewhere the inherent benefits and economies of scale in collective heating schemes are reduced by the lack of metering and of individual control over temperatures. Heat and water leakage through uninsulated pipes and ill-fitting windows are common, but there are also design flaws that, according to Ada Amon of Energia Klub, an NGO specializing in the unglamorous world of energy efficiency, should require buildings to be completely re-engineered. 'You often have a building where it is 27 °C at the top, and 17 °C at the bottom, and if all you do is better insulation, then you have 35 °C at the top and 25 °C at the bottom', she says.[25] Improving the housing stock would also create far more lasting employment than piecing German wind turbines together.

Emissions

The Emission Trading Scheme, so far, has had almost no direct effect in getting Hungarian companies to change the way or the amount of energy they use.

- In the first phase of the ETS, 2005–7, the Hungarian state (through Assigned Amount Units under Kyoto) and Hungarian companies both had surplus of 'free' allowances to sell. Dora Fazekas of Climate Strategies has studied Hungarian companies' behaviour in the first phase and concluded 'most Hungarian companies made no emissions reductions consciously as a result of ETS constraints – some made a fortune by selling permits early [before the first phase carbon price collapse in mid-2006], but most of them just kept the permits in the drawer'.[26] Almost none of them recognized the idea that there was an opportunity cost attached to allowances (even when allocated free) if, for instance, companies decided to forego the opportunity of using them to expand

[25] Author interview.
[26] Author interview.

production, or to just sell them. Equally Ms Fazekas said that companies 'did not recognize that they could generate revenues by reducing emissions [and therefore having more allowances to sell], as long as doing so was less costly to them than the market price of the allowances'.[27]

- In the second phase (2008–12), most Hungarian companies have had a surplus of allowances. This is partly because of a generous initial allocation, although the European Commission reduced Hungary's original allowances request by 12 per cent (which Hungary is contesting), and partly because of the recession. The recession caused CO_2 emissions to fall by 11 per cent across the European Union in 2009. Only the power sector has been short of allowances. MOL is forecasting that it will run a deficit in the second phase to cover its gas transmission business, upstream gas production in Hungary, and its two domestic oil refineries. MVM said that it was 3m tonnes short in 2008 – it had allowances to cover only 15m tonnes out of its 18m tonnes of CO_2 emissions for that year. However, the carbon price is not high enough to actually change companies' behaviour or investment decisions, particularly when the recession has caused so much uncertainty about future demand. Mr Gerse of MVM therefore says 'we are taking decisions to shut older plants, but because demand looks so poor we are delaying decisions on constructing new plants. In the meantime, in 2009, for instance, we imported 18 per cent of our electricity from abroad because it was cheaper'. By importing, of course, the company can postpone the dread day of having to commit money to new generation at home.
- In the third phase, 2013–20, the concept of being 'short' or 'long' on free allowances is supposed to disappear, because free allowances are, in theory, supposed to disappear. The general rule, in theory again, will be that companies would have to bid at auction for all their allowances. Reality will, however, be different. Hungary, along with other new member states, achieved a concession in the 2008 EU climate package that it could maintain some free allowances for its power sector, only gradually phasing in total auctioning by 2020. Moreover, Hungary might have some factories and plants which are able to get free allowances, on the grounds that they are exposed to trade competition from outside the EU. However, the level of free allowances will only be up to a certain benchmark of the EU's 10 per cent best-performing factories in emission terms. What is certain is that virtually none of Hungary's companies will be

[27] Dissertation_Fazekas_Dora_2009.pdf, page 188.

in this 10 per cent, and virtually all will produce emissions above the threshold. They will therefore have to go into the carbon market to buy allowances to cover the gap between the threshold and their own emission total.

Credit and discredit

The Kyoto protocol gave all the new EU member states emission reduction targets that they could meet easily (because of their post-communist economic transformation, mainly in the 1990s). They all therefore have allowances (called Assigned Amount Units or AAUs) to sell to those western European countries, such as Spain and Ireland, that are far in excess of their Kyoto targets. Hungary has been one of the more active sellers of these allowances or credits. The proceeds from these sales came to 50bn forints in 2009, according to government officials. This is not enormous, compared to the total of nearly 1,000 bn forints that Hungary received in EU funding in 2009. However, in the hard economic times which Hungary has been undergoing, 50bn forints is very useful outside assistance.

Of course Hungary does not see this as assistance in any way, but as rightful compensation for the economic and social hammering it took in the 1990s. In the first part of the 1990s GDP sank like a stone, and between 1990 and 1998 Hungary suffered a net loss of a million jobs. Carbon emissions declined in Hungary, as in other new member states, and this is why the EU collectively is in a position to meet its Kyoto target. What annoys Hungarians is that its economic hardship of the 1990s goes largely unrecognized in western Europe, which tends to disparage the 'hot air' credits of the new member states as unfair and unjustified.

Now, with the recession increasing the oversupply of credits on the ETS, pressure has increased on the new member states to cancel their carbon credits, or at least not to carry any remaining credits over into the ETS's third phase. 'This is simply unfair', say Hungarian officials who intend to stand on their Kyoto legal rights, and rightly point out that the real problem of credit over-supply lies in the much larger 'hot air' surpluses of Russia and Ukraine which are hanging over the market. 'Only if [cancelling credits] was going to be part of a package to save the planet, Hungary could concede', a senior government official admitted.[28]

[28] Author interview.

However, Hungary has created a rod for its own back with its 2008 commitment, made to buyers of its credits, that money from the credit sales would all be put into a Green Investment Scheme (GIS). Hungary was the first new member state to make this commitment, but it appears that the finance ministry in Budapest has been very slow to honour this commitment, and that it may take law suits from Hungarian green groups to get money put into the GIS.

Growth

Hungary's overall worry about its EU climate commitments is similar to that of other new member states. It is that the extra cost of the climate programme will prevent them from achieving the extra rate of economic growth they need in order to catch up with the older EU states. Gordon Bajnai, while he was Hungary's technocrat prime minister between 2009 and 2010, quantified the problem. New member states need, he said, to grow consistently by 2 percentage points faster than the EU average to achieve this catch-up.(this is not a direct quote) In practice this means countries like Hungary growing as fast as 4 per cent a year. A tall order, even without extra climate costs.