areas, as already noted, it seems to lack the will and the vision to coordinate a consistent Europe-wide approach.

CHAPTER 8

MARKET-FRIENDLY DECARBONIZATION MEASURES

Previous chapters have looked at two main elements of the EU's decarbonization agenda:

1. The traditional approach by the Commission's energy directorate of **technology push**, based on support for renewables, encouragement of research and development, and a facilitative approach to nuclear. This approach has the advantage of being effective—the EU leads the world in many aspects of renewables development. However, as Chapters 5 and 6 discuss, the technology push approach also creates tensions within the single market, undermines the effectiveness of wholesale electricity markets, adds to costs, and offers no clear exit strategy—i.e. there is no real prospect of a sustainable energy system which can operate freely without constant government intervention.
2. **Energy efficiency**, which is at least nominally one of the cornerstones of the EU approach. Its limitations as a policy tool are examined in Chapter 7. A much more wide-ranging and integrated strategy for the demand side would need to be developed for this area to deliver its full potential in relation to decarbonization. At present, however, the prospects for such a comprehensive policy do not look promising; neither governments nor the EU institutions have progressed very far in their thinking, and national, rather than EU-wide, approaches predominate.

This chapter looks at alternative, more market-friendly approaches like the European Emissions Trading System (ETS), which was developed by economists in the Commission's environment directorate. Economic instruments like the ETS should, in principle, avoid many of the problems outlined above. They should be able to offer greater efficiency, lower costs, and fewer distortions while at the same time supporting rather than undermining the single European market. Should the EU therefore be stepping up its efforts in this area? Could it move towards an outcome where the ETS or some other economic instrument was the central measure in decarbonization and, for instance, renewables targets and all the distortions they introduce could gradually be phased out? This chapter examines the arguments.

Emissions Trading System

The main economic instrument within the EU in relation to climate change is of course the ETS, often described as the EU's 'flagship' policy. A fuller description of the ETS is given in Chapter 3. This chapter aims to discuss how far the scheme can play a central role in future EU decarbonization efforts.

The balance between the ETS and other EU decarbonization measures has always been a matter for discussion. The scheme was established by the Emissions Trading Directive of 2003 (2003/87/EC) and has been in force since 2005. Its establishment followed a lengthy process of policy-making, often pitting the environment directorate, which favoured economic instruments on efficiency grounds, against the energy directorate, which tended to favour regulatory approaches like renewables targets on grounds of effectiveness (Dreger 2014).

As Chapter 3 explains, the ETS is designed to cap total emissions from the sectors covered. In principle, it does three things:

- It creates entitlements to emit carbon and sets penalties for emissions not covered by entitlements.
- It rations these entitlements by setting overall limits to carbon emissions on a declining trajectory over time. The limits are intended to be below the business-as-usual level.
- It allows trading of the entitlements so that they can be used in areas where they have the highest value. The market sets the price of an allowance.

The system is designed to produce incentives to reduce carbon emissions in an efficient manner and at the lowest cost by placing a price on carbon. In the short term, this should encourage fuel switching and more efficient operation, and in the long term it should promote investment in low-carbon sources.

However, one of the most notable features of the scheme, as Chapter 3 noted, has been the extreme price volatility and generally low level of prices experienced in the first three phases; a number of measures have been introduced to help support the price. The proposals for the fourth phase (2021–30) also aim to boost ETS prices by a tightening of the overall cap via a higher 'linear reduction factor', that is, a reduction of 2.2 per cent a year as compared with that of 1.74 per cent a year during the current 2013–20 phase. The overall target is to reduce CO_2 emissions in the ETS sector by 43 per cent as compared to 2005

Whether these measures are enough to introduce greater stability in the market remains uncertain. There are of course many external causes of uncertainty, including (at the time of writing) the outcome of the Paris Conference of the UNFCCC, which will determine the future of the international climate regime generally. In addition, the difficulties of forecasting future emissions remain as great as ever and, given that it will not be until the 2020s that the new regime will be tested properly, it will inevitably take some considerable time before it can establish any clear track record.

But it can still be doubted whether the proposals are likely to prove any tighter in practice than the earlier phases of the ETS. They are aimed at enabling the EU to achieve its overall target of a 40 per cent reduction in emissions (from 1990 levels). But the two largest emitters in the EU—the UK and Germany—are aiming at higher targets: Germany has a target of a 40 per cent reduction by 2020 and 55 per cent by 2030; the UK is going for 50 per cent by the mid-2020s, and the independent Committee on Climate Change has recommended 60 per cent by 2030. Since both countries are more or less on target for their emissions reductions goals at present, and both have national systems of monitoring and enforcement, it seems likely that both will get well beyond the EU's 40 per cent target, even if they do not hit their national targets. Between them, the two states account for around 40 per cent of total EU emissions (and a number of other countries, like Denmark, also have ambitious targets, so in all about half of EU emissions are governed by tighter targets than the EU's own). Therefore, the likelihood is that the EU's 40 per cent goal will turn out to be relatively undemanding in terms of the contribution needed from other countries and that the ETS price will not necessarily go up that much.

Assessment

The ETS has had some considerable **successes**:

- Perhaps the most basic is that it **works at a technical level**. It is the first, and by far the largest, international scheme for trading greenhouse gas allowances. It embraces 31 countries (the countries of the EU plus Iceland, Norway, and Liechtenstein). Trading has grown, reaching 8bn tonnes and a value of over €50bn in 2012 (see **Figure 8.1**), though the value has fallen since then as prices have fluctuated between €5 and €10.

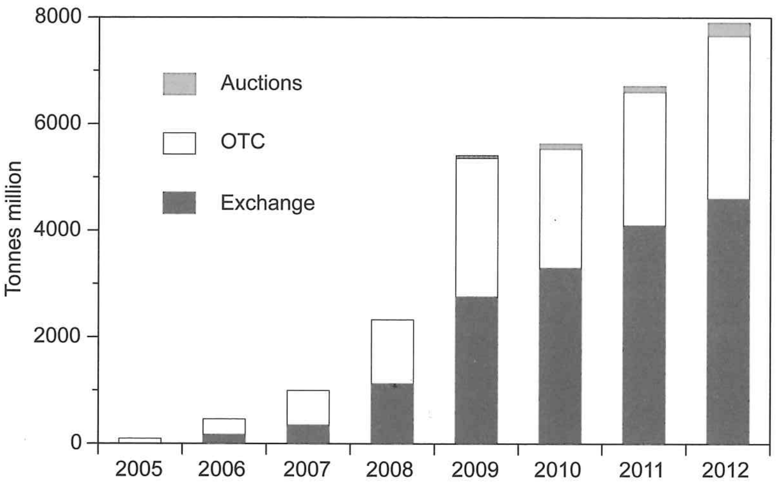

Figure 8.1: Trading volumes in EU emission allowances

Sources: Bloomberg New Energy Finance. Figures taken from Bloomberg, ICE, Bluenext, EEX, GreenX, Climex, CCX, Greenmarket, Nordpool. Other sources include UNFCC and Bloomberg New Energy Finance estimations.

- The ETS has also worked in the most straightforward sense—emissions have stayed within the cap (and are likely to go on doing so, at least up to 2020) though admittedly this is arguably due to overestimates of the need for allowances as much as any effect of the ETS.

Against that, there have been some problems with cyber-fraud and theft, but these have affected only relatively small volumes of trades. On the whole, the market can be said to have worked well.

- The ETS has probably also had a modest (but limited) effect on carbon **emissions**. A survey (Laing et al. 2013) of various studies of the issue points to savings of 40–80 $MtCO_2$/year—only 2–4 per cent of emissions but still a useful amount. However, the studies surveyed generally preceded the worst of the price collapses of 2011–12, so the abatement may not have persisted. In any event, it is difficult to disentangle the effect of the ETS from wider economic uncertainties, particularly in the more recent figures. For similar reasons, it is difficult to be sure about the impact of the ETS on **investment**, but the paper concludes that 'a major question mark hangs over the EU ETS regarding its ability to incentivise... investment in long-term, low carbon assets', mainly because of the volatility and low level of prices. (A more welcome corollary, however, is that there seems, at least so far, to have been only a limited impact on **competitiveness**, as discussed in Chapter 9.)
- The ETS is generating increasing amounts of **revenue** as auctions become the main method of allocation. Since this revenue is used, at least in part, for the promotion of climate change objectives, it may potentially become a major factor in future emissions reduction. To date, however, the low level of prices and the gradual introduction of auctioning mean that any impacts in this area have been relatively limited, though not negligible—about €3.6bn has been raised through this route.

Against that, the ETS has had a number of problems:

- As noted above, the volatility and low level of **prices** mean that the incentive effects and impacts have been very weak. For a scheme which is intended, in the Commission's own words, to be a 'cornerstone' of climate change policy, this is a disappointing outcome.

- **Price pass-through** and windfall profits. The evidence suggests that there has been a significant degree of price pass-through—that is, by firms increasing prices to consumers to offset their allowance costs (Laing et al. 2013). Price pass-through is not necessarily a bad thing of course—it ensures that consumers face appropriate price signals and incentives to move to lower-carbon sources. However, it can also affect the political acceptability of the ETS, which has been sold on the grounds of cost minimization and efficiency, but has been seen in practice to increase energy prices. In addition, when allowances were distributed free, as in the early stages of the scheme, pass-through generated windfall profits for the enterprises concerned. While this problem is reducing as the proportion of auctioning increases, it is nonetheless likely to have created a legacy of distrust among consumers.
- **Tensions** with other instruments. This is perhaps a more fundamental problem. When technology support and subsidy schemes are combined with market instruments like the ETS, the result is distortions and unintended consequences. For instance, the rate of penetration of renewable sources has a significant and not entirely predictable effect on carbon emissions from power generation and hence on the ETS price. That is, the faster renewables penetrate the electricity system, the lower are emissions from the sector, putting downward pressure on ETS prices; similarly, if energy efficiency programmes work more effectively than expected at reducing consumption, this will also tend to lower ETS prices. Therefore, to the various forecasting uncertainties already discussed there must be added the impact of EU renewables and energy efficiency programmes—perversely, perhaps, the more successful they are, the lower the ETS price and the less impact it will have. More generally, unless the results of both programmes are forecast accurately, this will tend to reinforce the unpredictability and volatility of ETS prices.
- Finally, although competitiveness has not proved a major issue in practice, **perceptions** of competitiveness problems have been an important driver of scheme architecture, leading to various exemptions and special treatment, as discussed in Chapter 9. This introduces potential distortions into the scheme and undermines its overall effectiveness as long as energy-intensive industry, on the one hand, and energy-using sectors like transport and residential heating, on the other, remain outside the scheme.

So there have been both achievements and failures, but on the face of it, this is a fairly balanced scorecard. The ETS has been a modest success and its most obvious deficiencies are being addressed. This leads to the question: could it perhaps be expanded to become the centre-piece of the EU's efforts in reality rather than just in terms of rhetoric?

Potential role

Unfortunately, analysis of the problem areas suggests that the difficulties may be fundamental. To achieve the EU's decarbonization objectives, it is clear that very significant amounts of low-carbon investment will be needed (about $3 trillion in the European power sector alone up to the mid-2030s, according to the IEA [WEO 2014]); short-term fuel switching and efficiency gains will not be enough to reach the 80 per cent target. The technology push measures described in Chapter 5 have had a huge and measurable impact on investment, of an order many times greater than the likely impact of the ETS, and it is difficult to see how the scheme could be reformed to have the capacity to underpin trillions of euros of investment.

There are many obstacles in the way of this objective. A key issue is **credibility**. The history of the ETS, the price volatility, and even the interventions aimed at supporting the ETS price, all work to undermine its long-term credibility. In particular, the interventions raise the question—what is the real target? If interventions take place when prices are too low, will they also happen when prices are too high? Is the real target an underlying price and if so at what level? Although the Commission does not issue price forecasts as such and argues that it has no price target, the overall effect is to create uncertainty—for instance the Commission has used an estimated price of €25 in the mid-2020s to calculate the likely size of the Innovation Fund at that date. This question mark as to whether there is a price target or not adds to the problems for low-carbon investments, particularly in electricity, which are very long term and capital intensive. Investors need to know if they will remain competitive in the market. Current electricity market prices, even with the existing ETS, are not sufficient to incentivize significant investment in **any** form of generation or demand response and, as noted in Chapter 4, governments have been resorting to special measures, like capacity payments, to ensure that investment is forthcoming.

The problem is even more acute for low-carbon sources, even leaving aside the problems of market design discussed in Chapter 6. Most are, for the moment, uncompetitive against an electricity price not incorporating the full cost of carbon externality, and investors would need to know whether and how that externality will be reflected in their prices to gauge whether investments will prove viable. Uncertainty on this point, which is likely to persist for some time given the history of the scheme, has the effect of increasing risk for investors and hence the cost of capital—a critical factor for such capital-intensive sources. This is why governments have turned to forms of direct intervention, such as FiTs; they have proved effective, and been widely used, in bringing forward investment and enabling it to be financed.

By contrast, government commitments to long-term EU caps or other general policies (as opposed to individual contracts) are not so readily 'bankable'—experience shows that such policies may change with circumstances. An example is the UK minimum carbon price, which was introduced in the 2011 budget to underpin investment in low-carbon sources. Because the ETS was not producing sufficiently strong incentives for investment, the UK government introduced a 'floor' below which the total level of the carbon price, including the ETS itself and UK specific taxes, would not fall. The aim was to create a steadily rising floor, reaching a level of £30 (in 2009 prices) in 2020 and

eventually climbing by 2030 to £70, a figure taken to represent the social cost of carbon. In this way, the carbon externality would be fully internalized over time. With a clear long-term price trajectory, investors could make their calculations accordingly. In the event, although the price floor was introduced in 2013, the very next year the Chancellor of the Exchequer announced a price freeze, capping the price at £18 up to 2020. A similar policy from the 1990s—the 'fuel duty accelerator' designed to signal an increasing rise in motor fuel costs and encourage greater vehicle efficiency—has also been honoured as much in the breach as the observance. Meanwhile, the history of the ETS itself suggests that governments will be happy to intervene whenever they think it is producing the 'wrong' results. The longer term a government commitment, the more difficult it is for investors to regard it as credible; yet without this long-term underpinning, long-term investment will not be forthcoming.

Price uncertainty. Furthermore, even if a credible commitment to a long-term quantity target could be achieved, the price outcome would remain highly uncertain. There is an inevitable degree of gaming in setting the targets—member states always want to reduce the impact on their industries and will use projections favourable to them, and, as history shows, the Commission will not always get its way (Dreger 2014). In any event, projections are always uncertain, as shown clearly in recent years: the ETS price will therefore be a function of forecasting accuracy and the gaming around the forecasts as much as of actual conditions. There is no guarantee that it will be at an appropriate level (from a policy maker's perspective) or at a sufficient level to outweigh the risks of low-carbon investment (from an investor's perspective). Nor is it likely to have the predictability and stability to underpin long-term investments or to be factored into the financial assessments of potential lenders. In short, it will not be 'bankable' even if the overall cap is adhered to.

Perceptions of risk to competitiveness are also important, at least in political terms. Although the actual impact on competitiveness from current ETS prices is low, that does not remove perceptions of a risk to competitiveness from potentially higher prices. The tighter the proposed caps, the greater these risks would appear to be, so the chances of negotiating rigorous long-term caps in a European context are low. Furthermore, political responses to high ETS prices have not really been tested yet. If, in the event, ETS prices turned out to be higher than expected, rather than lower as in the past, that might well prompt government intervention, further undermining the long-term credibility of the system. Even for those investors who are expecting a rise in ETS prices, the fear that this might happen could cause them to hold off from investment decisions, at least until enough experience has been gained of high ETS prices to enable them to be sure that governments will not intervene in the market.

The problem is exacerbated by the fact that the **price levels** needed for a trading scheme to substitute for other current measures in promoting investment are almost certainly not acceptable or negotiable. The implicit cost of carbon in renewables support, for instance, is generally well over €100 a tonne, though it varies between the different sources and in different countries (OECD 2013; Schuman 2014). Significantly higher prices would probably be needed to bring forward CCS. Even to encourage a wholesale shift from coal to gas in current circumstances would require a price of €30–40.[1] Such prices would raise the aforementioned problems so acutely that they seem inconceivable. In this sense, the fact that the ETS is a fully European policy can be seen as a problem—in the end, all member states face the same carbon price, yet some are more able to bear it than others. One reason for the 'technology push' approaches has been that they enable countries to move at a different pace if they choose to do so.

Electricity system effects. In any event, as discussed in Chapter 6, as electricity systems decarbonize, a carbon price would have less and less effect on electricity prices, reducing the revenue for generators. Most low-carbon sources, as well as most fossil generators, would be unable to remunerate themselves from the market. This has been obscured by the discussion of renewable sources reaching 'grid parity'. They may well do so, but they would still not be able to finance themselves from market revenues on wholesale markets as currently designed. So without special support, investment would not be forthcoming. In other words, it is very unlikely that the ETS, however high the price, could have the same effect in promoting renewables development as existing measures like FiTs, at least until major market reforms are introduced.

1 See Ondřich 2014 and Timera Energy 2013.

Finally, there are practical **limits to the coverage of the ETS**. It is difficult to see that the ETS could be extended to, for example, the transport and residential sectors in the short to medium term, except indirectly. (It could be done, for instance, via an obligation on motor fuel suppliers, which would then be reflected in prices to consumers—but of course motor fuel is already very highly taxed, at a rate equivalent to many times the current ETS price, so it is difficult to see how a level playing field could thereby be created in any meaningful way.) If the scope of the ETS is likely to be restricted to, say, around 50 per cent of the energy market, this will inevitably create distortions of various sorts. Perhaps the most serious is that it already applies to electricity but not to most other fuels for residential heating. That has the effect of further raising electricity prices as compared with the price of competing fuels, undermining the shift to low-carbon electricity which is desirable on policy grounds. It also impedes the growth of electricity in transport.

So there are many reasons to be sceptical about the ability of the ETS to play a central role in the EU's decarbonization efforts, despite its supposedly 'flagship' status.

Could other market-friendly approaches get round these problems? The main options are:

1. Carbon taxes

There is long history of discussion of carbon taxes in Europe; one was in fact proposed by the Commission over 20 years ago, in 1991 [SEC (91) 1744]. The proposal was rather complex: a combination of a tax on the carbon content of fossil fuels and a tax on all non-renewable forms of energy. Under it, fossil fuels would therefore have borne a tax with two separate elements, related to their energy and carbon components respectively, while other non-renewable energy sources (basically, nuclear) would be subject only to the energy component. The complications were designed to enable the tax to meet various political objectives via the same measure, and thus widen support, but in fact the proposals were resisted by most member states and ended up in only a shadow of the original, in the form of an EU minimum energy tax at such a low level that it has little impact. Arguably, however, the principle of EU taxation has been accepted and there is a framework here for further development.

The Commission has never entirely abandoned the idea of a carbon tax. In 2011, it proposed a revision of the minimum energy tax system in order to add in an element of carbon taxation in areas of the economy outside the scope of the ETS. Certainly, the idea of a carbon tax is not in itself unacceptable—several European countries have enacted a carbon tax in one form or another, including Finland, Ireland, the Netherlands, Slovenia, Sweden, Switzerland, and the UK, as already discussed. However, at least one of these countries—the UK—has an ideological objection to new taxes, of any kind, at the EU level, and tax measures at the EU level require unanimity.

A carbon tax would have many advantages: it would avoid distortions to the single market; it would produce greater certainty about the carbon price, making it a more secure basis for investment, provided the EU's measures appeared credible; and it would be significantly easier in a technical sense to extend to other sectors. For instance, a tax on all fuels for residential heating would remove the distortion referred to above and address some of the deficiencies in demand-side policy (discussed in Chapter 7) by providing incentives to switch to lower-carbon energy sources for home heating.

Against that, a carbon tax would have the same problems of long-term credibility as the ETS (as the examples given indicate) and might have even greater perceived impacts on competitiveness (because a tax which was clearly high enough to achieve environmental objectives would need to be much

higher than the current level of the ETS price, and that fact would be entirely visible).

But probably the most significant difficulty is that, as history shows, there is likely to be very strong resistance from member states to any encroachment on their fiscal autonomy. Even if, as proposed, the revenue from a tax accrued to member states, the idea that the level of tax on a socially sensitive product, and a significant element of member state fiscal revenue, could be determined at EU level is likely to be anathema.

Furthermore, the advantages of a carbon tax might actually be seen as disadvantages from a political perspective: for instance, the fact that it would be transparent and identical across the EU limits the scope for gaming, exemptions, burden-sharing, and special treatment which have been features of the ETS and so would be likely to raise concerns about competitiveness in even more acute form. Similarly, the fact that it could in principle be extended to other sectors, including the residential sector, would create fears about the wider social and political consequences and in particular the impact on fuel poverty. Residential energy prices are politically sensitive in the extreme and national governments will always be eager to retain control of policy in this area.

Overall, therefore, despite the theoretical advantages of an EU carbon tax, it does not seem likely to be acceptable as an alternative to the ETS as the main economic instrument in this area.

2. Carbon intensity targets

Carbon intensity targets are a relatively new idea and have not been a major policy instrument in Europe in the formal sense. Nonetheless, the general approach—of setting targets or portfolio requirements and making the obligation tradable—has an established track record, for instance in the tradable green certificates used in a number of EU member states.

The idea is described in more detail in Annex 2 of this volume. The basic structure is very similar to that of other tradable certificate schemes. Initially, at any rate, any scheme would apply only to electricity (which is, as discussed in Chapter 6, likely to be in the vanguard as regards decarbonization). A 'carbon intensity standard' would be set across the whole sector (probably in terms of gCO_2/kWh or $kgCO_2/MWh$) on a declining trajectory. The standard for each year and the related trajectory of decline could be different for different countries but would in all cases lead eventually to a more or less zero-carbon power sector (say, <50kg/MWh). The standard would then give rise to allowances tradable across the sector (and possibly outside) to ensure that it was met at the lowest cost and with the greatest efficiency.

This approach would get away from the distortions of 'picking winners' discussed in Chapter 5 by being technology neutral. It should offer greater credibility and transparency (both generators themselves and outside investors would have a clear target to aim at for the future carbon intensity of their generation fleets) and should be easier to integrate with an effective demand-side approach. In principle, it should overcome many of the problems with the ETS (for instance in relation to credibility and uncertainty), though it might still require to be backed up by electricity market reform in the longer term. It would be possible to phase it in across Europe in a way which provided for fair burden-sharing without undermining the single market (unlike a carbon tax). Annex 2 discusses the arguments in more detail.

Of course, intensity targets would not solve all problems. They would be difficult to extend directly beyond the power sector (though as the Annex discusses, they could be linked with the ETS; in the longer run, they could be supported by equivalent carbon intensity objectives for particular sectors). However, perhaps the main problem with this approach is that it is novel, at least as far as the EU is concerned. It would inevitably take considerable time to negotiate, and it is difficult, before any serious discussion, to see how far it might be acceptable to member states or to the European Commission, which seems wedded to its ETS model.

Conclusions

The ETS has been a modest success but with strictly limited effects. It is difficult to see a significant strengthening of the role of the ETS, much less to envisage it supplanting other decarbonization measures. Meanwhile, as long as it runs in tandem with those measures, the various other tensions discussed above will remain in play. The ETS is therefore always likely to play a relatively minor supporting role. It would be possible in principle to consider other market-friendly measures, but carbon taxes have consistently failed to gain traction in the EU, while carbon intensity targets would be a major departure and unlikely to be seriously on the table in the foreseeable future unless the Commission is prepared to start thinking outside the box.

CHAPTER 9

CLEAN ENERGY COSTS AND COMPETING WITH THE REST OF THE WORLD

Europe has long had energy costs that are high in comparison to much of the rest of the world, and as a result it has been a leader in the efficient use of energy. In recent years, however, there has been a growing controversy over the extent to which the rising cost of clean energy policies—saddling fossil fuels with a carbon price penalty and subsidizing renewable energy—handicaps Europe's international competitiveness. This is an issue that divides not only industry and green groups but also the EU's eastern and western member states along predictable lines, and how the issue is tackled will influence the degree of unity within any Energy Union of the EU-28.

Direct mention of competitiveness in the Energy Union plan itself only focuses on the positive potential of low-carbon innovation creating 'great opportunities for growth and jobs', commits Europe to 'becoming the world leader in renewable energy', and claims 'an efficient industrial strategy along these lines will enable the EU industry to benefit from the first-mover advantage' (COM 2015a: 17). The plan gives no detail about how this might come about, apart from a suggestion that EU governments might use their procurement policies to promote European low-carbon technology. There is also a suggestion that EU trade policy might be used to prise open foreign markets for this EU technology and at the same time to shelter it from unfair trade practices by others. However, unless the Energy Union develops fully-fledged industrial and trade policies to accompany it, the main competitiveness question for the EU is the negative one of whether (and how far) Europe's clean energy costs handicap it in global markets. The issue will not go away, and it is brought to the fore by developments in the oil market and climate diplomacy.

The 2014–15 fall in the oil price reduces import-dependent

Europe's energy bill, but it does nothing to help Europe in terms of international competitiveness. For the drop in the oil price not only benefits EU competitors as much as the EU itself but also increases the real cost to the European economy of its clean energy policies. It is therefore important to resist the temptation to treat the drop in the oil price as a welcome breathing space on Europe's long march up the hill of decarbonization. Instead, it must be seen as a spur to EU efforts to bring international climate policies nearer to Europe's level. The forthcoming Paris conference in December 2015 provides an opportunity to do this. The task will not be easy. Paris is not expected to do more than stitch together the 'Intended Nationally Determined Contributions' (INDCs) to be made by countries to the reduction of carbon emissions. Negotiators in Paris will try to align these INDCs, which are essentially voluntary, and to assess their comparability and global impact on CO_2 levels, but nothing like a uniform global price on carbon will emerge from Paris. Nonetheless, any spread of carbon pricing or regulation in the rest of the world would lessen Europe's sense of isolation on this issue. For instance, when the US administration welcomes the EU's Energy Union plan (which it does) and asks Brussels how can it help (which it has), the EU's answer has been that the best contribution Washington can make to a European Energy Union is to come to Paris with a strong US climate commitment.

The issue of rising energy costs in Europe is not just a social problem for those European households struggling with fuel poverty, or an economic problem for Europe's energy-intensive industries trying to stay competitive with commercial rivals in other regions of the world with lower energy prices and no carbon constraints. It is also a potential climate problem. If companies shift production out of Europe to countries with more carbon-intensive production processes, the climate suffers. The risk of such a shift is known as carbon leakage. The EU has developed mechanisms (discussed at length later in this chapter) to give some energy cost relief to sectors of European industry considered vulnerable to this risk. This involves drawing up a 'carbon leakage list' of vulnerable sectors—essentially energy-intensive industries involved in international trade.

In drawing up its latest list to cover the period from 2015 to 2019, the Commission said it had:

> analysed the extent to which third countries representing a decisive share of global production of products in sectors and subsectors on the carbon leakage list firmly commit to reducing greenhouse gas emissions in those relevant sectors, and whether those commitments are comparable with those of the [European] Union and are carried out within the same time-frame…The Commission concluded that no sufficient comparability can be established on the commitment to reduce greenhouse gas emissions. (Decision 2014a: 308/114)

Even with a Paris agreement, the EU will almost certainly have to face the fact that measures pledged by other countries will not be sufficiently comparable with the EU emissions targets and measures so as to completely remove the risk of carbon leakage.

This chapter discusses the nature of competitiveness and the role of energy prices, costs, and efficiency in it. It then focuses on what can, and what cannot, be done to make clean energy policy costs more tolerable to poorer households and to energy-intensive companies. It concludes with suggestions for a more harmonized system of carbon and renewable cost relief within an Energy Union of the EU's 28 member states.

Energy price trends. During the 2008–12 period retail prices have increased. For households, the rise was an average of 4 per cent a year for electricity and 3 per cent for gas, and for industry the average annual increase was 3.5 per cent for electricity and 1 per cent for gas (COM 2014a). This was despite the fact that while gas prices fluctuated, wholesale electricity prices have fallen in several major European markets, partly due to more cross-border trading and competition (see Chapter 4) but mainly due to the influx of zero marginal-cost renewable electricity.

Retail prices comprise three elements: the cost of the commodity or wholesale price, network costs, and government taxes and levies. The wholesale price is still generally the largest component of retail energy prices, but its share is diminishing. Taxes and levies have historically been the smallest element in retail energy prices, but they have now caught up with the network costs and transmission tariffs in many member states. EU countries generally tax electricity and gas more heavily than

their global competitors and more heavily even that some other economies with high energy prices, such as Japan. The burden falls particularly heavily on electricity, which is sometimes taxed to bring in revenue quite unrelated to energy; the collectability of such taxes lies in the fact no one likes to have their power cut off for non-payment. But the main reason for the rising tax burden on electricity is to fund renewable electricity subsidies. Sources at Eurelectric told the authors that these now account for 6 per cent of the average EU household electricity bill (as high as 15 per cent in Spain and 16 per cent in Germany, though less than 1 per cent in Ireland, Poland, and Sweden) and approximately 8 per cent of the average industrial electricity price (before taking exemptions into account). This policy cost of promoting clean energy will generally increase due to rising renewable energy shares in EU countries' energy portfolios. It may at times appear to be offset by surges of renewable electricity depressing wholesale prices, but in many current support schemes this widens the gap between the market price and the support price, thus increasing the subsidy payable.

This trend of rising policy costs has widened the energy price gap between the EU and its major economic partners. According to the Commission's 2014 report on energy prices, EU industry gas prices had become 'three to four times more expensive than comparable US, Indian and Russian prices, 12% more than China's, comparable to those of Brazil and less than those of Japan'. For electricity, wholesale prices in Europe have declined in the last few years to a level roughly comparable with wholesale electricity prices in the US. However, the Commission's report showed EU industrial retail electricity prices were 'more than twice those in the US and Russia, 20% more than China's but 20% less than those in Japan' (SWD 2014c: 11–12). The IEA has forecast, in its 2013 World Energy Outlook (WEO), that these regional differences will persist, with industrial electricity and gas prices in Europe (and in China and Japan) remaining at about twice the level of the US until around 2035 (IEA 2013). This prediction was based partly on the apparently correct assumption that the shale gas and oil revolution will persist in the US but will not spread to the same degree to the rest of the world. In presenting its 2013 WEO, the IEA made a further projection of the impact of these price differentials on the evolution of regional shares on the global export market for energy-intensive goods. This showed the EU's market share falling by 10 percentage points, and a smaller decline for Japan, in contrast to an increase for the US, China, the Middle East, and India, as shown in **Figure 9.1**.

Perhaps because of the element of conjecture in the chart, the IEA included it in the presentation of the WEO in November 2013 but not in the published WEO itself. It should be noted that the chart refers only to the export market for energy-intensive goods, not to total production of energy-intensive goods which the US and China manufacture in large quantities for their big domestic markets. It is also worth noting that even this projection shows the EU still having a slightly larger share of the global export market than those of the US, China, and Japan combined. Nonetheless, the IEA projection fed a growing concern among many industrialists and some politicians in the EU that rising energy costs are pushing Europe down a slippery slope to de-industrialization. To what extent is this concern justified?

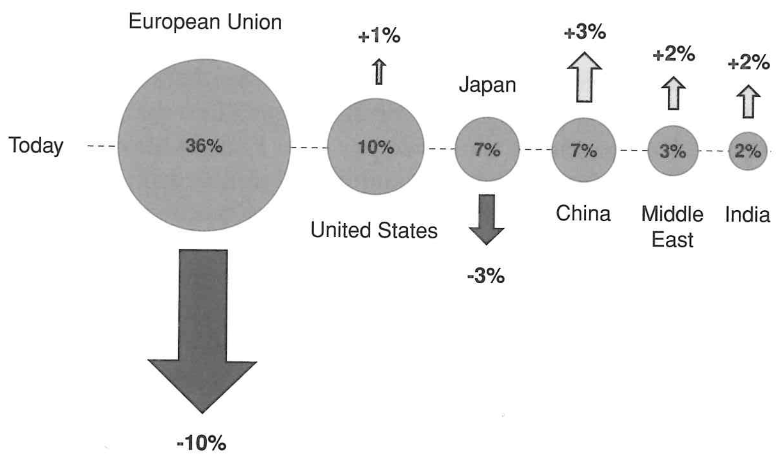

Figure 9.1: Evolution to 2035 of shares in the global market for energy-intensive goods

Source: IEA press presentation of its 2013 WEO

Energy costs in a global perspective. In the debate about the impact of Europe's climate policies on trade and investment patterns, it is important to distinguish between carbon leakage and industrial migration. While the former is the specific risk of Europe's self-imposed clean energy policies driving production and investment abroad, the latter is the tendency of industry to follow demand and to move investment from slow-growing Europe to more dynamic economies elsewhere (though some manufacturers opt for low production costs irrespective of the dynamism of the local economy—investing, for instance, in textiles in Bangladesh).

There are non-energy reasons why European industry's share of global output, and to some extent of global exports, should decline. Europe's economy is mature and its population is not growing, so demand there has been flat. By contrast, many emerging economies have been growing and industrializing fast. New investment, often by European multinational groups, has naturally been moving to these areas of strong demand, especially in Asia, just as investment (mainly from the US) was attracted to Europe during its long period of growth in the 1950s and 1960s. China's huge expansion in energy-intensive sectors such as glass-making, smelting of primary aluminium, and production of lime, iron, and steel has reduced everyone else's share of the world market, though not necessarily of exports. This trend is not immutable. There is some anecdotal evidence of companies bringing production back to Europe (and to the US) for reasons such as rising wages in emerging economies, poor quality control in China, or poor infrastructure in India. Energy-intensive sectors can also have a non-energy reason to remain in Europe, such as wanting to stay close to their customers in order to serve them better.

There are also energy reasons—unrelated to climate policies—that would lead Europe's energy-intensive industries to relocate production to countries naturally well-endowed with energy resources. Aluminium smelting will tend to locate in countries like Canada and Norway to tap their plentiful hydro-electricity, just as petrochemicals is an obvious specialization for Gulf countries boasting low-cost oil and gas. The advantages conferred by the energy resource endowments of these countries and regions is large and long-lasting. It would therefore be costly and fruitless for the EU to try to counter such resource advantages with any price subsidies of its own, especially when many Middle East countries artificially augment their energy advantage by subsidizing their retail oil and gas prices even more. In the past, there has been a good energy reason for industry not to move out of Europe, namely the high quality of European electricity in the form of minimal power interruptions and frequency variations compared to many developing economies. However, this may be a diminishing advantage as other countries improve the reliability of their power supply while EU countries struggle with the challenge of integrating intermittent renewables into their power systems.

Europe is unavoidably vulnerable to any rises in fossil fuel prices because of its declining production of oil, gas, and coal and its growing dependence on imports of all three of these commodities. Its total fossil fuel import bill now runs at around €500bn a year and accounts for a large part of its overall trade deficit. This is in contrast to the US, which in trade terms is in a position of surplus in coal, of self-sufficiency in gas, and of shrinking deficit in oil. However, because oil and coal carry a world price tag affecting all their users, changes in their price do not alter Europe's price competitiveness. In oil and coal, Europe is a price-taker, like all its industrial competitors. Gas is different. It is less easily transportable than oil and coal and is therefore priced regionally around the world. Europeans may pay less for gas than their Japanese counterparts, but they also pay much more than Americans.

Moreover, the EU has to face the fact that its climate policy is unilaterally raising its energy costs. Even if the EU were to maintain the trajectory of current policy—without raising the emissions reduction target to 40 per cent by 2030—the Commission has estimated that the increase in real average electricity prices, above inflation, would be over 30 per cent between 2011 and 2030 (SWD 2014d). More than half of this increase would not be due to fossil fuel prices but to new investment in generating capacity, grid extension, and energy efficiency, mostly arising from clean energy requirements. On top of this are the plans to accelerate the yearly reduction in ETS allowances after 2020 and to tighten liquidity within the ETS system (see Chapter 3 on the 'market stability reserve') from 2019 on; these moves will increase the price of carbon allowances. The Commission has never publicly set a target for the ETS price, but its working assumption, used to value ETS auction revenue, is that it will be around €25 a tonne in the 2020s, compared to around €8 a tonne at the time of writing.

In gauging the role of energy in competitiveness, it is important to bear in mind that energy costs are the result of the interaction between energy prices and energy intensity. Put another way, energy costs = energy prices x energy intensity. Europe's competitiveness would be in trouble if it were not for the fact that its high energy prices are partly offset by low and declining energy intensity. The price of energy and the intensity with which it is used are of course inversely related: the cheaper/dearer energy becomes, the more/less it is used. This relationship has been evident on both sides of the Atlantic in recent years. According to research by the European Commission, higher energy prices have not only spurred European industry into greater efficiency but also pushed it into specializing in sectors requiring less energy input and producing higher-value output (SWD 2014c). The same research showed that the opposite form of industrial restructuring has occurred in the US, with an expansion of the more energy-intensive sectors (such as refining and petrochemicals) that have undergone a reciprocal decline in Europe. This underscores a general point that while individual companies or sectors may become more or less competitive, economies as a whole do not; rather they respond to price changes in energy or any other input with shifts in production between sectors or companies.

The overall effect of energy prices on trade is relatively small. A study by the Grantham Research Institute on Climate Change and the Environment (Grantham 2015) measured the response of trade flows to differences in industrial energy prices across countries (see **Table 9.1**). It found that:

> Changes in relative energy prices have a statistically significant but very small impact on imports. On average, a 10 per cent increase in the energy price difference between two country-sectors increases imports by 0.2 per cent. The impact is larger for energy-intensive

sectors. Even in these sectors however, the magnitude of the effect is such that changes in energy price differences across time explain less than 0.01 per cent of the variation in trade flows.

The Grantham Institute's simulations predict that a €40–65 per tonne price of carbon in the ETS 'would increase Europe's imports from the rest of the world by less than 0.05 per cent and decrease exports by 0.2 per cent'. It concluded that 'the concerns around short-term impacts on carbon leakage and competitiveness are not entirely ungrounded, but that such concerns may have been overstated, so that concerns around carbon leakage and competitiveness need not dictate the design of carbon mitigation policy instruments'.

Table 9.1: Predicted impact of EU ETS carbon prices on EU imports and exports

Changes in EU energy prices	*Implied change in carbon price*	*Impact on imports*	*Impact on exports*
+10%	+ €25–50 per tonne of carbon	+0.04%	-0.2%
+30%	+ €50–100 per tonne of carbon	+0.07%	-0.5%

Source: Asymmetric industrial energy prices and international trade, Grantham Institute (2015)

Carbon leakage. While the impact of a higher carbon price across the whole EU economy may be small, there is still a risk that some sectors with high energy intensity and large exposure to foreign competition may suffer some carbon leakage. The most vulnerable cases are the aluminium industry, where electricity costs can amount to half of total production costs, and the ammonia sector, for which gas is a feedstock and energy source amounting to 70–90 per cent of total production costs. Other sectors at some risk include the glass, chemical, and steel industries.

The definition of which sectors are considered at risk and therefore eligible for carbon cost relief (in the form of free ETS allowances) is set out in legislation. Sectors are deemed at risk if their direct and indirect[1] costs add more than 5 per cent to their production costs *and* if their trade (exports and imports) with non-EU countries amounts to more than 10 per cent of the total EU market. In case these two metrics fail to embrace all subsectors considered worthy of carbon cost relief, there is a further either/or criterion to bring in subsectors with direct and indirect ETS costs adding 30 per cent to production costs *or* with exposure to non-EU trade of 30 per cent.

In calculating the degree of sectors' vulnerability to carbon leakage, the Commission has over-generously assumed European industry is subjected to a €30 per tonne carbon price, a level that last matched the real price on the ETS exchange in April 2006. In 2014, when it renewed the carbon leakage list for the 2015–19 period, the Commission admitted that the €30 per tonne carbon price assumption had been unrealistic in the past, but it claimed it was appropriate to maintain the assumed figure for the future in the light of the plans to tighten the ETS and of the more ambitious target of a 40 per cent emissions reduction that has been set for 2030. It is true that the €30 per tonne figure may prove more realistic, or less unrealistic, in the five years to come than in the past five years, in terms of its relationship to the future ETS price. If this assumed price of €30 does at last prove realistic in the years to come, in terms of matching or coming close to the actual ETS price, it will be well above the level of carbon price that other countries might institute as a result of any international agreement coming out of the Paris climate conference. This in turn underscores the difficulty of reaching a situation of internationally comparable carbon constraints that would allow the EU to forget about the risk of carbon leakage.

However, while using a sector's trade intensity with all countries outside the EU may be useful as an indicator of *possible* carbon leakage out of Europe, it is less useful as a measure of *actual* environmentally damaging carbon leakage that actually causes global emissions to rise. This is because some sectors in some countries are as energy-efficient as in the EU, or more so. In its 2013 World Energy Outlook, the IEA has shown that the energy intensity of production of iron, steel and petrochemicals

1 The indirect carbon cost is the price of ETS allowances which the electricity generator has had to pay and which it passes on in the price of power it sells to its customers.

is not much greater in the US than in the EU. So transferring (though not increasing) production in these sectors from Europe to the US could be almost carbon neutral. This is not surprising given the good US record in innovation and environmental regulation. More surprising is that there is some evidence that strong economic growth leading to modernization of industrial plants is greatly improving energy efficiency in some Asian countries—to the point that they are overhauling many EU countries and the US. A study by the Climate Strategies research group shows that India and China now use less energy in making a unit of cement clinker, and are nearer using the best available technology, than countries in Europe and North America (Climate Strategies 2014). This illustrates an awkward point for low-growth Europe—namely that growth can be good for energy efficiency through modernization and that the lack of growth, or of the prospect for growth, often leads to companies continuing to use older and less efficient plants.

Cost relief for energy-intensive companies. A precondition for considering such cost relief is an effort to minimize energy costs. Cost reduction is the aim of a number of EU and national energy policy initiatives, ranging from creation of a more competitive internal energy market to encouragement for customers to switch to cheaper suppliers. In parallel are the Commission moves to minimize energy policy costs through better design and management of national renewable and capacity schemes (as described in Chapter 4). But these efforts to reduce energy costs only achieve limited success.

Given that there is an irreducible minimum cost to EU clean energy policies, it is also worth asking whether the burden of these energy costs could not be made more tolerable by placing it on different shoulders—for instance on those of taxpayers rather than of energy consumers. In many ways, it would be easier and fairer to use the tax system to help poorer households and energy-intensive companies potentially vulnerable to carbon leakage. Tax codes make allowances for poorer people and money-losing companies in a way that energy bills do not. A modest portion of energy policy costs could be usefully shifted to taxation, where the rich would pay proportionately more and the poor proportionately less. It makes no sense to make the poor pay for policies designed to help them. This was the logic of the UK government decision to switch the funding for its Warm Home Discount, a payment to help people at risk of fuel poverty, to general taxation instead of a levy on energy bills.

However, shifting much more of the burden of clean energy policy costs on to taxation would defeat a key aim of the policy, which is to get European households and companies to save energy. Keeping a large portion of these costs on energy bills maintains the incentive for households and companies to change behaviour and to conserve energy. Moreover, it would be impossible to organize a harmonized EU-wide shift of energy costs on to taxation because there is no harmonized EU system of taxation. (A common tax system might eventually emerge if there were to be a complete economic as well as monetary union of the Eurozone countries, but not from a one-dimensional Energy Union of the EU-28.) Most EU member states are allergic to EU tax initiatives, which require unanimous approval that is nearly impossible to attain. All of the EU's 28 member states provide consumer-funded production subsidies for renewable energy, but many governments also supplement these production subsidies by offering renewable energy developers various exemptions or rebates on their national income, corporate, excise, property, or value added taxes. However, because no such EU-wide taxes exist, it is impossible to offer such tax concessions for renewable energy producers or energy-intensive industries.

Issuing free ETS allowances to energy-intensive companies to preserve their competitiveness and prevent carbon leakage is expensive, in terms of what these allowances would have fetched at auction and, therefore, of revenue lost to governments. Over the 2013–20 period, industry will be freely allocated some 6.6 billion allowances, which the Commission estimated (in mid-2015) to be worth around €50bn at the then prevailing ETS price (SWD 2015a: 29). The main case for providing such cost relief is political—to avoid the risk that powerful energy-intensive industrial lobbies, if not appeased with concessions, might succeed in using the carbon leakage argument to dilute the whole carbon reduction effort across Europe. The Commission has conceded this political need for such concessions.

In a discussion of national state aid for renewable energy, the Commission stated that 'in order to have a generally high contribution from electricity consumers to the financing of support to energy from renewable sources, some electricity consumers may need to be given a more favourable treatment in particular to prevent carbon leakage' (Draft Guidelines 2013: 50). While some, particularly environmental NGOs, would consider this giving in to blackmail, others, including EU governments, would accept it as adjustment assistance that those sectors losing out in Europe's restructuring towards a less energy-intensive (or at least less carbon-intensive) economy deserve to get. If some cost relief for energy-intensive industries is accepted as justifiable adjustment aid, then the questions are: how can this be provided in a fair manner that does not distort competition within Europe; and can the Energy Union plan help in this?

Direct carbon costs. This is the cost of buying ETS carbon allowances, and the way of offsetting these costs has been to give energy-intensive industries free allowances. (An alternative means of levelling the 'carbon playing field' internationally would be to calculate the carbon content of imports into the EU and to require importers to pay the equivalent of ETS allowances on these imported goods—a sort of border tax. But EU policy-makers have never seriously pursued this idea because of the impossibility of getting foreign countries to agree to it.) In the first eight years of the ETS (2005–12), the allocation of free allowances was in the hands of EU governments, which thoroughly misused it and gave companies virtually all the free ETS allowances they asked for.

Moreover, in this initial period, free allowances were useless as a tool to address the problem of international competitiveness, because they were provided to all sectors regardless of their ability to pass on carbon costs. Free allowances only provide protection against carbon leakage if companies do not pass on the 'opportunity cost' of the free allowances in the price of their exports to the rest of the world. This opportunity cost arises because companies have the opportunity to sell the allowances on the ETS instead of using them to produce. If companies forego the opportunity to sell the allowances and use them to produce, they should, in economic theory, add the cost of this foregone opportunity to the price of their products. In practice, however, if they can factor such opportunity costs into their sales prices without losing market share, they are not really exposed to carbon leakage and should therefore not have been awarded free allowances in the first place. It is unclear how this generous allocation of free allowances affected companies' pricing strategies, though it is likely that it provided many companies with a windfall profit. What seems clear is that in this first period of the ETS, from 2005 to 2012, no carbon leakage took place. A study of this period carried out for the Commission observed increasing imports and/or decreasing exports in some sectors, but it also found this was mainly due to changes in global demand and input price differences and that there was no evidence that climate policies had led to a re-direction of trade or re-location of investment (Öko-Institut 2013). Given the over-generous allocation of free allowances, and also the generally very low level of the ETS carbon price, the absence of any observable carbon leakage in the first eight years of the ETS is hardly surprising. Of course, it is possible to argue that this just proves the effectiveness of free allowances and cautions that the risk of carbon leakage may emerge if and when reforms to the ETS raise the carbon price in years to come.

With the start of the current 2013–20 phase of the ETS, the Commission took over from national governments the sharing out of free allowances and instituted a new method of allocation. Free allowances are now awarded according to an efficiency benchmark established for each product (or at least for each sector). The benchmark is based on a value reflecting the average greenhouse gas emissions performance of the 10 per cent best-performing installations in the EU producing that product or active in that sector. In theory, this means that the 90 per cent less energy-efficient, or more carbon-intensive, firms in the respective product line or sector would have to buy at least some ETS allowances at auction, thereby preserving an incentive for efficiency. In practice, few energy-intensive companies have so far had to buy many allowances, because they can still draw on surplus allowances accumulated in the past.

This system is by no means perfect. For instance, given that in some extra-European countries energy efficiency may have moved ahead of that in the EU, there is a case for revising the benchmark for free allowances in Europe to be in line with the 10 per cent of best performers at a global level, not just in Europe. However, the system of cost relief for direct carbon costs at least has the merit of being common across Europe; this is not the case for indirect carbon costs or for renewable energy costs.

Indirect carbon and renewable energy cost. 'Indirect carbon costs' refers to the fact that companies still have to bear an indirect cost of carbon via their electricity supply, which has been generated by utilities which themselves have had to buy ETS permits (even if these companies emit no carbon in their manufacturing processes and so have no need to for ETS allowances to cover their own carbon emissions). With a limited and declining exemption for power generators in Central and Eastern Europe, power generators now have to pay for all of their carbon allowances. EU climate policy is, rightly, based on early decarbonization of electricity, so that carbon-free electricity can then be used to reduce emissions in other areas, such as transport via electric cars. Decarbonizing the power sector is not only desirable but, because they trade very little electricity with non-EU countries, possible to do without exposing power utilities to carbon leakage. However, precisely because of their minimal exposure to non-EU competition, power utilities can, and do, pass the full cost of ETS allowances on to their customers. Some of these customers, especially big power users, can therefore be vulnerable to carbon leakage.

The question is how to compensate electricity-intensive companies for these indirect carbon costs embodied in the electricity price when there is no common EU system to do so. Indirect carbon costs are included in the calculations that add energy-intensive companies to the carbon leakage list, making such companies eligible for free allowances to cover some of their direct carbon costs—but there is no EU allocation of free allowances to cover indirect ETS costs. EU state aid guidelines allow member states to compensate their companies for indirect ETS costs, but not fully. In order to preserve some incentive

for efficiency, state aid compensation is limited to 85 per cent of costs in 2013–15, 80 per cent in 2016–18, and 75 per cent in 2019–20. However, only a very few member states—among them Germany, the UK, and the Netherlands—offset some of their companies' indirect carbon costs. (The French government helps electro-intensive companies operating in France in a different way, by giving them access to nuclear power at a special rate as a kind of dividend from the country's historic investment in nuclear generation.) It is not legally possible to force member states to pay state aid compensation, even if they could all afford to do so. As the Commission puts it:

> The complete discretion [about state aid] on the part of Member States is a fundamental difference compared to free allocations of EUAs [free allowances] aimed at preventing carbon leakage due to direct CO_2 costs. That free allocation is harmonised at the EU level, implying equal treatment of all eligible sectors and subsectors across Member States. (SWD 2012: 43)

This patchy compensation creates a potential distortion of competition within the EU. The same distortion of competition within the EU energy sector has arisen with renewable energy costs. These are not counted in any calculation of carbon leakage, but they are now more significant than carbon costs arising from ETS allowances. Until 2014, the Commission did not formally allow any state aid compensation to offset the cost to companies of renewable energy levies on their electricity bills. But one country, Germany, went ahead regardless and gave its energy-intensive companies a reduction on the renewable surcharge under its Renewable Energy Law (EEG). The reduction was huge, estimated at €5bn in 2014, because the EEG levy is now sizeable and because Germany, with a very large number of energy-intensive firms, had been offering the reduction to more than 2,000 companies. The size of this discount prompted complaints from companies outside Germany and from consumers, some of them German (because German households end up paying through their energy bills for this discount to their industry). As a result, the Commission's competition directorate announced an investigation in December 2013 because 'the reductions seem to give the beneficiaries a selective advantage that is likely to distort competition within the EU internal market' (COM Press 2013).

The upshot was a protracted negotiation between Brussels and Berlin that led to a pragmatic outcome. While still formally denying that its EEG exemptions constituted state aid, and therefore contesting the Commission's legal right to control it, the German government agreed to scale down its exemptions for its industry and to reform its renewable subsidy schemes in line with the EU-wide changes announced by the Commission in 2014. At the same time, while reining in Germany's compensation for renewable costs, the Commission announced new guidelines for state aid to the energy sector that allow all EU governments to offset some of the cost of renewable energy to their energy-intensive industries. At this stage it is not clear how many governments will join Germany in doing this.

In summary, the problems of carbon leakage and of Europe's go-it-alone clean energy policies leading to a loss of competitiveness have, so far, been exaggerated. To the extent that these are risks, they seem to have been adequately catered for. What was not realized at the outset, when the carbon leakage issue was first addressed, was how significant other clean energy costs (essentially renewable subsidies) would quickly become and how very patchy the compensation by national governments for these other costs would be. Thus the question of energy costs has become as much an issue of distortion in the internal EU market as of loss of competitiveness in the outside world.

Is there any way of avoiding distortions caused by leaving compensation for clean energy costs to individual member states? Are there any pan-European solutions that could be developed in an Energy Union? One partial solution might be to offset some indirect carbon costs in the same harmonized manner as direct carbon costs already are compensated for—with extra free allowances allocated according to sector efficiency benchmarks. Given that energy-intensive companies still have large surpluses of free allowances on their books, this would not be popular.

Another form of common cost compensation would be for EU governments all to dip into the ETS auction revenues, a common resource they now have, in order to partially offset the clean energy policy costs falling on their most energy-intensive companies. In preparing its July 2015 proposals for the revision of the ETS post-2020, the Commission considered this option to pay, out of a common pot of ETS auction revenues, a pan-European harmonized level of cost relief for indirect carbon costs (SWD 2015a: 37–38). However, it decided that such a blanket financial measure would dull the incentives for efficiency improvement among energy-intensive sectors. Instead, it decided that ETS auction money would be better spent financing a new innovation fund for low-carbon technology research, which energy-intensive companies could also benefit from.

In the end, what is important is that the palliatives to the problem of carbon leakage should not become worse than the problem itself.