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The European framework for energy and climate policies

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HIGHLIGHTS

- The design of the internal energy market.
- The design of the climate change package.
- The interaction between the internal energy market and the climate change package.
- Required reforms.

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ABSTRACT

European energy and climate change policy rests on two main pillars: the internal energy market (IEM), and the climate change package (CCP). The IEM aimed at third party access and unbundling, neglecting the physical infrastructure and the basis for asset valuations and hence the harmonisation of network charges. The Commission plans to complete the IEM by 2014—almost a quarter of a century after embarking on the policy. Yet even if all the IEM directives are implemented, the EU will remain far from a single competitive market. The CCP was grounded on short term targets (the 2020-20-20 programme) on the assumption that fossil fuel prices would rise, making renewables competitive, and hence yielding a competitive advantage to the EU. The EUETS was intended to lead the way to a global trading system and an international agreement at Copenhagen. The EU has reduced the production of carbon emissions, but only as a result of de-industrialisation and slow growth, and at the expense of rising carbon consumption. Renewables have not led to green growth, but rather to a further eroding of competitiveness. The EUETS price has collapsed. In order for the EU to put the IEM and the CCP back on track, both need to be radically reconsidered. The IEM requires a refocusing on physical infrastructure, common accounting rules and an EU-wide approach to capacity markets and renewables trading. The CCP requires a refocusing on carbon consumption, on limiting the dash-for-coal, and on future rather than current renewables.

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1. Introduction

As the European Commission considers what to do next on both energy and climate change policy, it is a good time to take stock of what has been achieved so far. The European Union came to energy policy late in its history. Energy was treated as a national competence in the Treaty of Rome, and even with the Lisbon Treaty it remains national. The valiant efforts by the Commission

to get it included in the framework of the single market, by creating an internal energy market (IEM)², have had some success, but even here the market will not be completed in terms of the implementation of the directives before 2014, and the reality is anything but a single market.

When it comes to climate change policy the EU has tried to be ahead of the game. It set out to lead the world towards a comprehensive global climate change agreement, by setting what it thought would be an example of the economic benefits of decarbonisation. The 2020-20-20 climate change package sought to demonstrate that a fast track programme of investing in current renewables complemented by the world's first large scale emissions

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² There have been 3 sets of directives (European Parliament, 1996, 1998, 2003a, 2003b, 2003c, 2009a, 2009b, 2009c).

trading scheme (EUETS), would provide a template for others to follow.

For very different reasons both projects have had very limited success. Europe now finds itself with expensive energy in a world where the Europeans' assumptions about rising fossil fuel prices driven by scarcity have been turned on their heads. Peak oil has turned out to be nonsense: global reserves keep coming, especially from unconventional. Technical progress has transformed the fossil fuel outlook, with the US moving towards energy independence and with much cheaper energy supplies, especially gas. Europe faces an enormous competitiveness challenge, exacerbated by the costs it has self-imposed by putting so much priority on a short-term renewables target.

This paper explains how Europe got itself into such an energy mess and how it might get out of it. The structure of the paper is as follows. Section 2 describes the IEM project, setting out how it has evolved, where it has failed and what the main challenges are in the coming decade. Section 3 looks at the climate change package. Section 4 sets out how to design a coherent energy and Climate change policy for the EU which could address the new energy world. Finally, Section 5 concludes.

2. The internal energy market—Why has it not materialized?

The IEM is a deceptively simple idea. There would be one unified European energy market. Energy would flow freely across borders, so that customers would be indifferent as to the source of their supplies, and suppliers would compete across the entire European market for customers, and source their electricity and gas from competing generators and upstream gas providers, including liquefied natural gas (LNG), pipeline supplies and indigenous producers.

Such a European market would be much more efficient than the patchwork quilt of national and regional companies. There would be at least three core advantages: competition would drive efficiency; there would be greater diversity of supplies and hence greater security of supply; and a single electricity network would reduce the need for capacity margins, and hence a given level of security of supply would require a significantly reduced installed electricity generation capacity.

These core advantages would be augmented by other gains. The market power of external gas suppliers would be much reduced, as the resilience of a single market would make the threat of interruptions less credible. Mutual support would be a physical reality. Competition would lead to price differentials only on the basis of transmission costs, thereby increasing competition in other product markets. New ideas, innovation and technologies would spread more quickly through the market.

The prize of the IEM is therefore potentially very large. It is quite remarkable that the Commission has never seriously attempted to estimate this potential, so that the lobbying of the losers (and competition always produces losers) could be muted by the scale of the upside.

But the ideal of the IEM was – and still is – very far from the reality. Indeed that is the point of pursuing the IEM—to close up this gap. The obvious starting point in creating the IEM is the physical interconnection of the markets. Without pipelines and transmission lines there can be little real competition. Yet the remarkable characteristic of the Commission's approach to the IEM has been to focus on virtual competition, and largely neglect the physical interconnections. As a result, for over two decades, it has put the cart before the horse.

Physical interconnections are a fundamental challenge to incumbents with market power. Competition comes down the pipes and the wires. It exposes hidden subsidies and monopoly

profits. Since all the main energy systems in Europe have been developed on a local or national level, and are designed to provide national security of supply, the resulting national champions were understandably hostile to the IEM, and indeed companies like Ruhrgas and EDF lobbied hard in the 1990s to try to kill off the project. With Ruhrgas' monopoly gas pipeline in Germany and EDF's eventually over 50 nuclear power stations in France, there was much to lose by letting competitors enter the German and French markets. Other incumbents, like RWE, lent their support to this resistance. The result was delay, the watering down of the early directives and a continuation of bilateral connections and contracts, between dominant companies and on a closed basis.

The map of Europe with an interconnected electricity and gas market – with a European energy system – would be very different from the current nationally driven connections. But in order to create the IEM, it is just such a map that is needed. When France and the UK created their national electricity transmission systems in the middle of the twentieth century, they superimposed the national upon the regional and local. The result was well-designed and efficient systems. Many other European countries allowed the local municipalities to maintain their control, and too often the result was weak networks. The analogy with moving from a national to a European system applies very well. The difference is that nobody appears to have even tried to set out the Europe-wide map to provide a top-down guide rather than an incremental bottom-up approach. It is for this reason that the Commission repeatedly focuses on specific projects and specific lines and pipes – on a bottom-up, national-to-national basis.

A European grid and gas pipeline system is a necessary condition for a European IEM. What is also required is access to these networks on a common basis. The early battles were all about third party access, and there was an intense debate about the relative merits of negotiated and regulated third party access. A moment's reflection reveals that negotiated access is what monopolists want, and competition can only follow the regulated route. This battle was eventually won by the Commission, and in order to identify the separate costs of transmission from electricity generation and the separate gas transmission costs, it was obviously important to have separate – unbundled – companies for these assets. Otherwise generators could distort competition by distorting transmission charges, and gas monopolies could lock out rivals through price discrimination.

The unbundling debate was, like the regulated third party access debate, also eventually won by the Commission. However the main driver turned out to be capital markets, which recognized that regulated utility assets like transmission networks could be largely debt financed, and were different financially from generation and upstream gas fields. Infrastructure funds moved into these regulated utilities armed with typically highly levered debt structures.

There remained one final step in the Commission's plans. Customers had to be able to switch suppliers, so that they could be the driving force of competition. Instead of a generators dictating to customers what energy supplies they would have, and at what cost, the IEM took the altogether more radical approach of putting the customers in charge. Gradually industrial and eventually retail customers were liberalized. This had a potentially radical impact: the old model in which investors sunk capital into upstream gas fields and power stations, and financed them by imposing long term take-or-pay contracts, would be replaced by spot markets and short-term trading. Sunk costs were no longer protected: customers could switch away any time to a cheaper technology or supply if available. The impact of this destruction of long term contracts took time to be fully understood, disguised at it was by the widespread excess supplies, especially in the 1990s. But as we shall see it would eventually wreak havoc with the incentives to invest.

Third party access, unbundling and liberalization were supposed to deliver the IEM. Yet when it comes to the tests of a competitive market – notably the leveling of prices net of transmission costs – the results have been poor. Part of the reason is attributed to the failure of countries to implement the directives, and indeed the target date for completing the IEM has repeatedly been put back, and is now 2014. Yet this cannot be a sufficient explanation. If the Commission really wants a genuine IEM then it has to come to terms with just how radical such a policy would have to be.

The problem of a lack of interconnections and a failure to push ahead at the outset with a plan for European networks was always going to limit the benefits. It is of course right to point out the political and practical difficulties. They are very real. But the consequences of not having a European energy system will not go away just because it is recognized to be difficult. This should remain the main priority.

Even with a European network, the terms of access to the networks are fraught with distortions and complexities. For a gas pipeline or a transmission network, the marginal costs are typically very low except at congestion points, whilst the average costs are relatively high. A transmission line or a pipeline is overwhelmingly comprised of large fixed and sunk costs. These have to be recovered, and hence all network pricing regimes are a mix of marginal and average costs. The crucial bit is that every country in Europe has its own approach to valuing the assets—and in particular the way the sunk and fixed costs are translated into accounting numbers and depreciated. Some use historic cost, with historic cost depreciation—and hence networks to be connected will be at different stages of depreciation. Some use current costs. There are many different treatments of locational costs and congestion nodes within national systems. The consequence is that the flows of energy are typically as dependent on the accounting rules as they are on the basic underlying economics.

A fully functioning IEM would require a common basis for the valuation of assets and a common approach to network pricing across the whole of the EU.³ It is a truly daunting challenge, given that the assets are owned and have regulated returns on which investors rely. Changing the terms of each and every utility's asset base and returns would be all but impossible. It is indeed no accident that effective national grids such as those created in mid-century in the UK and France were created through nationalized industries, where there were no private interests that could be expropriated.

The problems of upstream competition are similarly daunting. It is far from obvious that a privately-owned gas and electricity generation industry could invest efficiently without long-term contracts. The essential bargain has been that investors sink costs in lumpy upstream capital projects in return for a commitment from customers that they will pay back these sunk costs. Take away that commitment, and the incentive to invest is compromised. It can of course still be done, but with the possibility that the asset can be stranded by customer switching, the cost of capital goes up accordingly. A higher cost of capital increases final prices, makes everyone worse off, and biases investments to the short-term. It is no accident that investment is falling short of what is required, and that all sorts of interventions are being brought in an attempt to re-incentivize investment. The UK, as an example, has done a spectacular U-turn and introduced a central buyer model.⁴ Across the whole of the EU, direct intervention and enforced contracts – through variations of feed-in tariffs (FiTs) – have been required for renewables.

This raises a core dilemma for the IEM. The only way the markets can be structured without any direct contractual commitment from customers to these sunk costs is for some other commitment to investors to be made. Either it can be reimposed upon customers through levies, or taxpayers can provide an underpinning. In the twentieth century, nationalized industries allowed for such impositions. Now governments have to work primarily with private companies, and it is no accident that government guarantees and supports are becoming ever more widespread. The result is that state aids are on the rise.

There are a number of conclusions that can be drawn from the first two decades of trying to develop the IEM. The physical networks remain a core priority, much neglected to date. The gradual opening up of the networks to common asset valuation, accounting and common cost bases for network pricing remains in its infancy. But at least both have been started even if the results are so far disappointing. The key bit of the architecture of the IEM that remains on the drawing board is the design of contracts and commitments in the presence of liberalization—how to so organize the market that investors can have confidence that their costs will be recovered and hence that their assets will not be stranded.

This is not an insuperable barrier, but it has been thrown into sharp relief by a parallel and largely separate strand—the EU's Climate change policies. These have been developed for very different reasons to the IEM, but now the tensions between the two have become very apparent. Before considering these tensions in Section 4, the first step is to look at the Climate change policy framework.

3. The climate change package—Why has it not done anything to address climate change?

The EU discovered climate change policy in an era of optimism and comparative economic success. The great boom of the late twentieth century rolled on into the early years of the twenty first century, and brought with it a renewed drive to realize the European integrationists' dream. European Monetary Union, grafted on top of the common internal market across all goods and services, seemed a real possibility. The collapse of the Berlin Wall in 1989, the enlargement of the EU in 2004, and the successful launch of the Euro built up a hubristic confidence. It was in this context that the EU decided to lead the world on Climate change and to craft a new international environmental order.

In the aftermath of the failures of the Copenhagen and Durban Conferences of the Parties (COP) to the Kyoto Protocol, it is sometimes hard to recall what the narrative of this major political initiative was. It went roughly like this. European leaders “knew” that oil and gas prices would go ever upwards. Many of them believed in the “peak oil” theory. Europe would unilaterally take on the task of decarbonising, and would show not only that it could be done, but also that it would create new “green” industries and “green” jobs and that as a result Europe would have a competitive advantage. Indeed countries blighted by ever-rising fossil fuel costs and with high fossil fuel dependencies like the US would face a serious competitive threat from this new “green” Europe. Presumably energy intensive industries would flock to locate in Europe with what would turn out to be its cheap renewable energy, deserting high cost fossil fuel-dependent countries like the US.

So convinced were the Europeans of this narrative – and it is to be found in the speeches of the main players, from Blair to Barosso to Hedegaard – that they readily imagined that once the Europeans had led the way, the US and China would sign up in Copenhagen to Kyoto carbon caps, and that they would want to join the EUETS.⁵

³ Limited progress has been made by ACER, the Agency for the Cooperation of Energy Regulators.

⁴ See Department of Energy and Climate Change (2011) and Energy Bill (2012–13).

⁵ See Helm (2012) Sections 4, 8.

The Europeans might be opposed by Bush, but in due course a more amenable Democrat would come along – like Obama – and join.

The Europeans not only “knew” that fossil fuels would be scarce and expensive, but they also knew which “winners” to back. The architecture of the climate change package had at its core the idea that current renewables – wind turbines and rooftop solar – would be those winners and Europe would create world beating industries around them. These technologies fitted another European political imperative—at least in Germany. They were not nuclear, a technology that the green NGOs and green political parties hated. They argued that Europe could be non-nuclear *and* competitive on a diet of wind farms and solar panels, complemented by energy efficiency measures, all to be put in place on a fast track by 2020. This formed a core component of the 2020-20-20 package, based on the idea that the right answers all magically added up to the number 20.⁶

So certain was the European Commission about its chosen policy instruments and its international leadership role that core design faults were either ignored or glossed over. There were several detailed mistakes. The EUETS set an overall cap, and if the renewables reduced emissions, then there was more room to burn coal and other fossil fuels inside the cap.⁷ Indeed coal offset the renewables rather neatly, undermining the benefits. Then there was the problem of costs. The advocates of the current renewables, keen for the subsidies, claimed that costs would fall. In the case of offshore wind, they went up. In the case of rooftop solar, they fell from a very great height, but only because the Chinese dumped their panels on the European market, in the process bankrupting European solar companies (and indeed some Chinese companies too).

Europe did at least have one thing going for it. The Kyoto targets were peculiarly easy for Europe to achieve. Whilst China was busy industrializing, Europe was deindustrializing, shedding its energy-intensive industries. Add in the collapse of the rust-bucket industries of the former Soviet Union East European countries, which followed the convenient collapse of the Berlin Wall just when the Kyoto reference date kicked in (1990), and Europe would *in any case* have reduced its production of carbon. Of course, reducing carbon production did not reduce its carbon footprint. Carbon consumption was maintained by importing the energy (and carbon) intensive goods that Europe used to produce. In the UK case, for example, whilst carbon production fell by 15% between 1990 and 2005, carbon consumption went up 19%.⁸ Kyoto made Europe look good, but it did nothing to address global warming. Indeed it may have made it worse.

It took one final exogenous factor to turn soft Kyoto targets into a walk-in-the-park. The economic crisis from 2008 onwards kicked in almost exactly when the EU climate change package began to be implemented. The Eurozone crisis in particular meant that the expected European GDP growth when the package was agreed failed to materialize. Europe had at least discovered one way to reduce emissions—by reducing GDP.

The internal contradictions and confusions at the heart of European policy would probably have undermined its Climate change framework on their own. Indeed they did: the EUETS price collapsed, resulting in the Commission trying to fix both the price and the quantity; the renewables emissions gains were offset in the EUETS; and the coal burn went up. But three external developments finished off the job of undermining the rationale. Fukushima led to the *energiewende* in Germany and the retreat from nuclear across many European countries; the Copenhagen

and Durban Conferences put paid to the idea that the world would follow Europe's lead; and shale gas punctured the faith in peak oil and peak gas, and in the process exposed Europe, not the US, to a massive energy competitive disadvantage.

Fukushima was one of the world's most serious nuclear accidents, second only to Chernobyl. It killed a small number of people directly and its radiation leaks will have longer-term impacts. Compared with the 5000 deaths in China's coalmines each and every year, the impacts may be slight, but the political reactions drew on deeper emotive fears. Japan shut down its nuclear power stations, and Germany decided to exit, closing some plants immediately and planning closure of all the rest in around a decade. Switzerland, Belgium and Italy followed suit.

The German case is perhaps the most understandable. Germans had been on the front line of the Cold War, and faced the very real prospect of nuclear annihilation. Yet the reaction to Fukushima was driven more by short-term political calculation than by any rational plan. The regional elections in Baden-Württemberg were imminent, and the German Chancellor Merkel wanted to keep open the option of a Black-Green coalition after the elections in 2013. So the theoretical risk of a tsunami reaching as far as Munich led her to the decision to close a number of nuclear power stations immediately, some in the crucial part of the electricity network in southern Germany.

The result of this hasty decision was to commit Germany to more coal. Remarkably, Germany squeezed out gas and nuclear, to rely on coal, wind farms and solar panels. The results were not a new cheap energy base to which world energy intensive industries would flock. On the contrary, Germany now combines the building of new lignite-based coal power stations, higher coal burn in its existing coal power stations, and some of the most expensive electricity in the developed world. The competitive effect on its energy intensive industries has been so great that they have had to be excused from the costs of the renewables and the associated subsidies. In the meantime, the famous Mittelstand companies are squeezed and have as a result filed formal complaints to Brussels. There is no single electricity price in Germany as the IEM might have intended. Instead the government tries to parcel out the costs. Worse still, Germany's carbon production is actually rising—an extraordinary achievement for a country that claims to lead Europe on climate change, in support of Europe leading the world.

That leadership is in tatters. At Copenhagen, the European Commission offered to raise its carbon production reduction target from 20% to 30%—safe in the knowledge that the economic crisis and the deindustrialization made this much easier to achieve. This was the inducement that was supposed to lead the new US President and the Chinese leader to join the capped countries. It spectacularly backfired. In a major foreign policy setback, Obama and the Chinese leader cut a deal, supported by a number of other developing countries, *outside* the Kyoto framework. This was the Copenhagen Accord, and incorporated pledges from many countries eventually which however in total did not add up to enough to meet the overarching 2 degrees target.

Whilst this might have been a good moment to reflect on the merits and demerits of the overall strategy, the European Commission ploughed on with its Kyoto-based leadership ambitions. These were further dashed at the summit in Durban in late 2011. The first commitment period under Kyoto expired in 2012, so in theory Durban was a last chance to rescue the framework. What was actually agreed was that the parties would *try* to agree (the form of such an agreement to be decided) by 2015 what they might do *after* 2020. To explain what this means, if China and India continue to grow at around 7% per annum, their economies would double in size *before anything happens*. This would mean around 400–600 GWs of new coal-fired generation will have been added to these two countries' energy systems.

⁶ See Commission of the European Communities (2008).

⁷ See Simm (2012).

⁸ See Helm et al. (2007), Helm (2012) Section 3.

But Europe still got its Kyoto continuation. There would be a further commitment period, and this in turn kept the EUETS alive with its cap. But if there were any doubts about the potential scope of Kyoto, Russia, Canada and Japan opted out after Durban, leaving the EU plus just two other countries on board. Very apparent was that the US-Chinese axis so evident at Copenhagen would be the necessary basis for any 2015 agreement—and that Europe would be on the sidelines.

Without nuclear for Germany and several other European countries, with the Kyoto leadership role having no visible impact (or indeed ever likely to), the EU's Climate change strategy was holed beneath the water line. But these considerations pale into insignificance when compared with the central error in Europe's policies. As noted above, it assumed that fossil fuel prices would go ever up, and hence that building current renewables would give it competitive advantage and hence provide the basis for growth. Just as the ink was drying on the 2020-20-20 Package, shale gas was beginning to effect a remarkable transformation of US energy markets. The Europeans seem not to have noticed that the energy world around them was being turned on its head, and their assumptions based upon peak oil and fossil fuel scarcity were turning out to be very wrong. The US shale gas story played out across to shale oil and other unconventional, whilst its conventional oil production increased. By 2012, the US had the fastest growing oil production in the world, could contemplate exporting gas (rather than very large scale importing), and over the coming decades could even image Nixon's 1970 goal of energy independence becoming a reality—or at least for the north American continent.

These new developments were not only confined to the US. Unconventionals turn out to be widely distributed, including in Argentina, China, Russia, Australia, Algeria, and the Ukraine—indeed almost anywhere where there are shale rocks. The world turns out not to be running out of fossil fuels as the peak oil theorists imagined. On the contrary, there is enough to fry the planet several times over. Australia could potentially export more coal-bed methane than Qatar's natural gas by 2020. Then there were a string of conventional finds—notably off East Africa, the eastern Mediterranean and yet more conventional finds in the North Sea. All this is before the Arctic opens up.

Europe's response was first to deny that shale gas in America would have anything other than a local effect, and then to effectively ban it in a number of key European countries. But the competitive exposure of Europe and Europe's industries could not be denied. Gas is four times more expensive in Europe, and the US has lots of ethane too as a feedstock to its petro-chemical industries. Europe's energy intensive industries now have somewhere else to go. The choice is no longer Europe or China, but the much less demanding one of Europe or the US. Whilst Europe has invested heavily in some of the most expensive energy technologies in the world, America now has some of the cheapest. The final irony is that in the US the gas has squeezed out coal so much, that it has amongst the fastest falling CO₂ emissions in the world, whilst Germany's are actually going up.

These three external developments have finally begun to register in Europe. Key steel and chemical companies are considering the exit route, and with mass unemployment in Europe and very low growth, the politics of energy prices is beginning to be felt. The Bulgarian government was the first to fall in a context in which electricity prices have played a key role. Others are feeling the voters and industries ire, and cutting back on the wind and solar subsidies.⁹

4. How could it be turned around? What should Europe do now?

Europe has built up two separate pillars in energy policy. The IEM is driven by a desire to improve Europe's competitiveness. The climate change package had a similar rationale, in that it was supposed to create world-leading companies based upon what would be relatively cheap renewable energy. Neither has delivered.

In thinking through how Europe might turn this mess around, there are two approaches to take. The first is to work out how each can be reformed. That indeed is what has been happening, although with little success so far. The energy commissioner has pursued the IEM, and the Climate Commissioner has pursued the climate change package. Yet since they cover the same energy markets, the two pillars should be considered as one—providing an integrated approach.

To see why reform must span both, the interfaces between them need to be examined. The climate change package is very much about picking technologies and designing mechanisms to make sure they are built. Thus the heart of the climate change policy is about investment. To ensure that the chosen technologies are built, policy is designed to preserve and protect their markets from competition. This is what the Renewables Obligation (RO) does. Next, the task is to make sure that long-term contracts are put in place. This is what the FiTs do. Finally, on a mainly national basis, the task is to ensure that the networks are designed to handle intermittent generation, and again this is about investment, with priority access to grids for renewables.

The result is that Europe has grafted onto the IEM 27 different renewables policy instruments, and that trade between the countries has been limited. It is a very national approach. Indeed in Germany's case, it not only unilaterally abandoned nuclear without regard for the impacts on its neighbours, but it also has paid little regard to the consequences of spilling lots of wind onto its Europeans neighbours' transmission networks. The renewables target and the associated obligations are the antithesis of the IEM. Renewables are a reserved, separate market, protected from competition.

The result is that the IEM is largely about gas and coal. But even here the renewables policies as currently designed undermine the IEM. For intermittent wind renders everything else intermittent too—especially gas. As a result the investment incentives for gas (and indeed other fossil fuel power stations) are weakened. This, in turn, means that if gas is to be built in a context of lots of wind, it too requires guaranteed contracts. The chosen approach is to develop capacity markets—and at present across Europe each country is developing its own capacity market design. To the 27 renewables policies, 27 capacity markets and mechanisms are in danger of being added.

The implications for the IEM have yet to be understood. They are very radical. The economics of the energy market is moving away from wholesale spot markets towards fixed-price contracts—whether FiTs or capacity contracts. The IEM so far has nothing to say about these sorts of contracts, yet if the IEM is to survive and prosper it urgently needs to address the competition issues and to harmonize the capacity and FiTs markets.

In principle, it is easy to see how a common European capacity market might work. The difference between capacity and wholesale markets is that in the former case the government fixes the quantity, and then either centrally purchases through customized individual contracts (procurement) or auctions the capacity requirements to the market. The IEM can only really work if these requirements are auctioned. Furthermore, since a major advantage of the IEM is that the total capacity requirement is reduced as the networks are interconnected, the necessary capacity requirement depends on what others in Europe do. Indeed eventually it is

⁹ European Commission (2013) has at least recognised this rather challenging context.

possible to imagine a European capacity requirement, within which auctions fall.

When it comes to the renewables, the most inefficient approach is for each country to have its own target, to be discharged on a national basis. Climate change knows no boundaries, and it would be much more efficient for Europe as a whole to achieve its renewables targets than for each country alone to do so. This would require trading between countries and therefore a common intervention mechanism. The FiTs could be auctioned on a Europe-wide basis.

The result would be a Europe-wide capacity market, and a Europe-wide renewables market. It is a further step to unite the capacity and FiTs markets into a single contract auction, with the renewables being labeled within the auction. Such a market would not only solve the renewables and capacity problems, but it would also address the weakness in the IEM identified in Section 2—the liberalization undermined long-term contracts. The contract auction approach turns this on its head—liberalized customers can switch, but the system operators ensure that the overall contract sunk costs are recovered.

The integration of the climate agenda framework with the IEM does require a market-based approach. It lends itself to auctions, network access and a degree of locational independence. It should force renewables costs and prices to converge too. Such a convergence around contract auctions can then be set alongside the other reforms necessary to make more economic sense of Europe's energy approach. Each market failure needs a policy instrument. Carbon is the core problem for the climate change framework, and hence a carbon price is the obvious market solution. The EUETS is not working. Its price is very low and it offsets and therefore undermines the renewables. The right solution – recognized by the Commission back in 1991 – is a carbon tax.¹⁰ This tax should be on carbon consumption, not carbon production, and this means that there need to be border adjustments.¹¹

The climate policy cannot continue to allow coal to play an important role, nor indeed allow new coal fired power stations to keep coming onto Europe's electricity industries. Europe has its own energy resources, and it has lots on its borders. It is irrational to allow coal mining and coal burning to carry on, whilst at the same time banning shale gas. Coal mines leak methane, they pollute water tables (including with heavy metals), mining is very energy intensive, lots of miners are killed and the health of everyone who works in coal mines is damaged. Coal is bulky to transport, and coal power stations emit twice the carbon of gas power stations, as well as SO_x and NO_x. Coal power stations use lots of water and then the ash has to be disposed of. Anyone in Europe who wants to ban shale gas must believe that coal mining should be made illegal. This does not mean that shale gas should not be tightly regulated, but this is very different from the bans in France and effectively in Germany (where coal mining is subsidized). In any event Europe will be importing shale gas from North Africa, and the Ukraine, and it is already contracting to buy shale gas LNG from the US.¹² It is bizarre to be prepared to import shale gas, and yet ban production in Europe, where it would be more heavily environmentally regulated.

With contract auctions, a proper carbon price and the development of indigenous resources, Europe's energy markets could be much more efficient. To this should be added the development of the physical infrastructure and the gaining of the portfolio effects of greater interconnection and hence lower capacity margins. Grid

and pipeline access will require common accounting and common pricing principles—those radical requirements for the IEM identified in Section 2.

Europe, however, has not yet relaxed its grip on these inefficient policies. Many interested parties argue that what is needed now is not an overhaul, but rather a redoubling of efforts around the existing framework. In particular, there are intense pressures to adopt a 2030 renewables target to compliment the 2020–20–20 targets. It is easy to see why vested interests in receipt of renewables subsidies might like the carbon pork barrel to continue, and it is also easy to see why the green NGOs and green political parties want more of the same. Both are immune to admitting that the current renewables have not and cannot make much difference to climate change¹³, let alone recognizing that their high costs are undermining the European economy and pushing carbon production overseas, only to be repatriated to Europe via imports and higher carbon consumption.

Yet the renewables case is not hopeless. Once it is recognized that decarbonisation of the global energy systems is necessary and that *current* renewables cannot bridge the gap, it is obvious that future renewables will be needed. For Europe, this is where the competitive opportunity lies—in developing the next generation of technologies. Whilst some benefits accrue through deployment of existing wind and existing solar panels, the technological progress is limited by their physical characteristics. Instead of putting all Europe's eggs in the technology baskets necessary to reach its self-imposed short term target for 2020 (and potentially for 2030), there is scope to switch some of this subsidy across to R&D. Developing more of the light spectrum offers great opportunity for the next generation of solar. There are lots of geothermal technologies, and perhaps even small scale and modular nuclear. Then there are batteries, smart demand-side technologies, Carbon Capture and Storage (CCS), and many other opportunities. Instead of spending, say, £100 billion on offshore wind, switching a few billion (or even tens of billions) would result in the largest global energy R&D programme. Europe's chances of competing on the basis of expensive current renewables or making any difference to Climate change with these technologies are very slim, but the field is wide open for the next generation of renewables.

5. Conclusions

Europe's energy and climate policies are going nowhere. They are achieving the remarkable consequence of driving up prices, driving down competitiveness and not making much difference to climate change. It is an unenviable record. In the face of continuing economic crises, mass unemployment and the exit of key countries from the Kyoto framework, these policies are unsustainable. Hence, however many times the Europeans reiterate their commitment to the current approach, they will not be sustained.

Europe formed its energy and climate policies for a different world. The late twentieth century boom, the collapse of the Berlin wall, and the enlargement of the European Community provided a political optimism about further integration, and rising oil and gas prices from 2000 onwards led to a conviction that the days of fossil fuels were numbered. The world recession, the Eurozone crisis and the coming of unconvensionals have turned the underlying assumptions on their head. The failures at Copenhagen and Durban put paid to any complacency about the world following Europe's climate change "leadership".

The new realities call for an urgent reassessment. Some components of Europe's policies need to be revitalized. The IEM

¹⁰ See Commission of the European Communities (1992).

¹¹ See Helm et al. (2012) for an analysis of border taxes and their effects on political economy incentives.

¹² In March 2013, Centrica became the first European utility to sign contracts for US gas supplies. <http://www.centrica.com/index.asp?newsid=2693&pageid=1041>.

¹³ See MacKay (2008).

is a good idea, pregnant with the potential for very great economic gains. To date, it has not really been tried: the IEM is notable by the symptoms of its absence—wide differences in prices, a lack of interconnection, and 27 different national energy policies. The climate change package is not even a good idea. Short term targets, an overwhelming focus and subsidies for a small number of expensive technologies, a deeply flawed EUETS which undermines the limited rationale for the renewables targets, and a focus on carbon production when it is carbon consumption that matters combine to cause high cost and little or no impact on carbon concentrations in the atmosphere.

Energy and climate change policies need not be complicated. The IEM can deliver competitively priced energy that is secure and compatible with a path to reduced emissions. It needs a credible carbon price, with a border adjustment, a European capacity market, a rapid transitional switch from coal to gas, and the targeting of subsidies on future rather than current renewables. The longer it takes Europe to rethink, the greater will be the costs. In any circumstances, those costs would turn out to be large, but in the current economic circumstances, new energy and climate change policies are a matter of urgency.

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