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The EU Energy Union

More than the sum of its parts?

By Dieter Helm

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★ The EU Energy Union is a concept whose time has come. Yet there is little consensus as to what it should contain. The Commission has listed all the current measures and added a layer of governance. Yet the key to success is to focus not on what is currently being done on a piecemeal basis but on the core infrastructure of the European market – the network systems of electricity and transmission.

★ The integration of these networks has multiple pay-offs to the European economy. Integrating networks increases Europe's security of supply and reduces the pressure of those countries exposed to Russia's aggressive threats to gas supplies; reduces the costs of meeting the capacity requirements in each member-state; and brings competition to the heart of the dominant national incumbents and hence helps to harmonise prices.

★ Integration significantly reduces the system costs of renewables and decarbonisation – by allowing the various types of renewables to be located in the best places, with the most sunshine and the best wind flows, and by providing better back-up to intermittency.

★ An EU Energy Union built around the core networks is therefore the best and probably only way to achieve the EU's trilemma of objectives – security, decarbonisation and competitiveness.

★ The paper proposes three steps to the development of the EU Energy Union: that the Commission undertake an assessment of the prize that integration will bring; that it should map out the networks at the European level; and gradually move towards a European system operator.

European – as opposed to national – energy policy has been noticeable largely by its absence. Despite decades of trying to bring the disparate national energy systems together, and reap the considerable gains for competitiveness, security and decarbonisation, very little has in fact been achieved. And that which has, has been primarily nationally driven. Even the single energy market has grown out of bottom-up initiatives, starting with Britain. The Lisbon Treaty confirmed the primacy of national governments over the energy mix.

This is surprising, since energy is one of the areas where it makes great economic sense to do more things at a European level. The prize from taking a European approach is very great – and probably much greater than in a number of other areas where the European Commission has deployed its efforts.

Energy policy tends to develop after, not before, crises. In this respect, the Russian annexation of Crimea, its destabilisation of eastern Ukraine, and Russian president Vladimir Putin's revisionist approach to post-Soviet borders have together had a helpful by-product in encouraging the Europeans to take energy policy seriously. Putin is the unintended father of the EU Energy Union concept. It has great potential – yet to be realised.

This paper summarises the background to the Energy Union initiative; discusses the underlying economic fundamentals and the case for a European approach; critiques the Commission's Energy Union proposals; identifies the immediate priorities and in particular the centrality of the European electricity and gas networks; and concludes by setting out a three-stage plan for finally completing European energy integration into an effective Energy Union.

The long road towards a European energy policy

European energy policy has developed in three distinct and separate parts: the completion of the broader internal market in 1992 and its extension to energy; the climate change packages; and the response to the security threat posed by Russia. The first gave rise to the Internal Energy Market (IEM); the second to the 2020 – that are now the 2030 – targets for carbon emissions, renewables and energy efficiency; and the third to the security measures in response to the Russian interruptions in gas supplies in 2006, 2009 and 2014.

The IEM has followed a long and tortuous path, and after nearly a quarter of a century the key directives are not yet fully implemented. The initial focus on liberalisation and unbundling – by requiring the separation of electricity generation and electricity and gas sales from transmission and pipeline ownership – created necessary (but not sufficient) conditions for the market to function. But the absence of much interconnection between member-states, common regulatory frameworks for grid and pipeline access, and a common accounting basis for charging, have meant that its full benefits have yet to materialise. Aiming at virtual competition before the physical connectivity was in place put the cart before the horse.

The climate change policies were developed independently of the IEM. The main policy instruments, notably the renewables targets, were outside the internal market, and by selecting a small number of preferred technologies (wind, solar and biomass), the option of using the market to find the cheapest technologies was largely ignored. Even where market-based solutions were adopted which could in principle be consistent with the IEM – such as in the case of the EU Emissions Trading Scheme (EU ETS) – the Commission's renewables directive undermined the policy's effectiveness. Since renewables were outside the market, but reduced emissions, they simply allowed for more carbon emissions within the EU ETS to meet the overall 20 per cent reductions target for 2020.

Unsurprisingly, Europe therefore witnessed an increase in renewables offset by a significant increase in the burning of coal, notably in Germany and the UK. Even without this major inefficiency, the EU's climate policies would have made little difference to global warming, since Europe has been de-industrialising and swapping carbon consumption for carbon production: instead of emitting carbon from factories inside the EU, carbon-intensive goods have been increasingly imported. De-industrialisation has led to lower emissions, but not a lower carbon footprint.

The security dimension has been largely neglected. There was a Green Paper in 2000, which recognised Europe's emerging gas dependency, but at the time relationships with Russia were still cordial and little thought was given to the risks this dependency created. In response to disputes with Ukraine over the payments for gas supplies and transit arrangements, the 2006 interruptions came as a shock. Even then, the special energy relationship between Germany and Russia muted the necessary responses. It was only in 2014 and with the Russian annexation of Crimea and the fomenting of violence in eastern Ukraine that the EU got serious about its energy security.

> *"In 2015 Europe remains dominated by a series of national energy markets, supported by national energy policies."*

Outside the direct energy and climate domains, but of great significance, EU competition policy proved weak in the face of a very large merger wave which followed liberalisation. The European Commission's competition directorate took a narrow national measure of markets and market dominance when it should have focussed on the nascent European-wide market. The big, vertically integrated national players were therefore allowed to acquire what would eventually have been potential competitors in each others' markets. The trouble is that by the time the markets get linked up, there will not be enough players on the pitch to have a proper competitive game. It is only their subsequent financial difficulties that will have prevented national champions becoming European ones. State aid policy was similarly ineffectual: the national champions continued to receive favourable treatment, especially where state and municipal ownership was involved, through their reduced cost of capital. Finally, the anti-competitive elements of some of the environmental measures – notably the protection and subsidies for the chosen 'winners' amongst the renewables – have not been properly addressed.

As a result of these separate policy approaches, and weaknesses within each, it is not surprising that in 2015 Europe remains dominated by a series of national energy markets, supported by national energy policies. Prices differ widely across Europe, and the interconnectivity of the networks remains weak.

These are serious shortcomings, but they have been exacerbated by two further developments: the coming of US shale gas; and further Russian belligerence. Shale gas changed the balance of European and US energy prices, and seriously undermined European energy-intensive industries. As a result, there are now few if any major energy-intensive investments being made in Europe.

This trend has the effect of making European progress of reducing carbon emissions look better than it should. Importing carbon-intensive goods rather than producing them in Europe does not reduce global warming, but it does reduce the European industrial base.

The absence of measures to address the threat posed by Putin and his autocratic regime both encouraged Russia to take further action against Ukraine and exposed EU member-states in the south-east to serious risks – in turn encouraging them to placate the Russians. Only firm pressure by the Commission on Bulgaria, for example, prevented a deal on the South Stream pipeline, which would have completed Putin's strategy of bypassing Ukraine.

The upshot of the last two decades of fragmented and piecemeal energy policies is that Europe's position is weak, its competitiveness is exposed, its climate policies have facilitated a rise in carbon consumption and more coal burning, and its security is compromised. With this poor backdrop in mind, the scope for improvement is potentially very large. This is where the EU Energy Union comes in.

The economic fundamentals

It is one thing to identify the problems, and another to work out what a more efficient and effective policy framework might look like. To do this, the benefits from a Europe-wide energy policy need to be identified. Surprisingly these benefits are poorly understood.

The starting point is to recognise the gains from integrating Europe's electricity generation capacity. In the absence of large-scale storage, electricity requires supply and demand to be instantaneously matched. Since demand cannot be precisely predicted in advance, and since it varies over the daytime and with the weather, electricity systems need a margin of excess of capacity to meet this gap. The fact that European countries have heterogeneous energy mixes adds to the portfolio benefits of interconnections: nuclear in one country complements hydro and wind in another. The capacity margin is additionally required in the event of shocks and unanticipated failures, since the costs to the economy of power cuts are asymmetrically large and increasingly so as electricity becomes ever more critical to the functioning of all key economic activities.

As interconnection increases, the required level of excess capacity in each market is reduced as more heterogeneous assets are added to the available portfolio of each energy system. Over the last century, as the electricity industry migrated from the very local to the regional and then national levels, interconnection kept adding to these benefits. At the European level, the further gains are likely to be significant.

A second economic benefit comes from price harmonisation. Interconnected systems bring competition down the wires and pipes. This is a primary reason why dominant incumbents in national markets put up such a strong fight against the early development of the IEM – and continue to oppose significant further interconnection. Where there are large fixed and sunk costs – for example, the French nuclear programme – market power enables the incumbents to recover their costs. These incentives to inhibit competition continue today – for example, recently in the shape of the repeated French opposition to large scale interconnection to Spain's excess supplies of renewables.

"The starting point is to recognise the gains from integrating Europe's electricity generation capacity."

To these two main economic benefits of a Europe-wide approach, a third has been introduced by the renewables directive. Wind and solar (but not biomass typically) have zero marginal costs. The capital costs are fixed (and substantial), but the wind and solar are free, unlike conventional fossil fuels. They are also intermittent. Combining these two features together, they wreak havoc with the rest of the electricity systems in Europe. Add to this the German *Energiewende* and its sudden withdrawal of a significant amount of base-load nuclear generation, and a perfect storm results: with large surpluses of wind spilling onto the north European networks when the wind blows, and Germany's need to import power from its neighbours when the wind does not blow (including, ironically, French nuclear). In the context of intermittency and zero marginal costs, the costs of national backup are high relative to the portfolio benefits of interconnection. Put another way, for any given carbon target, more integration tends to reduce the costs.

The gains to security from an interconnected European system for both gas and electricity are also significant. On a national basis, each member-state is forced to fall back on its own resources. Poland, for example, places a greater emphasis on domestic coal, confronted with the Russian threat. More LNG (liquid natural gas) will be added to bypass the Russian threat, and there may be more nuclear built for national security too. But the greater the interconnectivity, the less national capacity margin is needed for a given level of security. Interconnection makes solidarity real, as opposed to diplomatic.

For these reasons, the economic gains from a fully integrated European energy market are likely to be significant. By contrast, lots of distinct national energy islands, with limited interconnections, are likely to make all worse off. All or almost all EU member-states would be better off with a Europe-wide interconnected energy market. The obstacle is not economic, but rather the harm done to vested interests – dominant national champions and incumbents, and political interests in pet technologies – which leads to obstructive lobbying.

The EU Energy Union proposals

The EU Energy Union concept had its immediate origins as a response to Russian aggression in 2014, and unsurprisingly it was Poland that took the lead. But it grabbed attention not only as a credible European response to Putin, but for two other reasons. The EU in 2014 was beginning to emerge from the worst economic conditions in the post-Second World War period, but the eurozone remained in crisis. The rise of populist parties exploiting these inauspicious circumstances challenged the very idea of ever greater European integration, and the new Juncker Commission needed a set of policy ideas to address these very difficult economic circumstances.

The EU Energy Union provided an example of a good European idea – almost everyone could see that 'Europe' was a potentially better solution than lots of individual national policies; everyone sought the security of everyone else; and the objective of economic growth could be met with a lot of infrastructure investment.

The EU proposals had a typically European birth. It started with the European Council calling for a security response to the Russian interruption of gas supplies in March 2014. In April, Donald Tusk called explicitly for an "energy union". In February 2015, the Commission tabled a plan, which the Council adopted, and this then went forward to form the basis of the EU Energy Union proposal. The Council of Ministers drove the process, encouraged by Tusk – who by then was the President of the Council – but the Commission filled in the details.

The original Tusk proposal was a six-point plan: develop a joint gas purchasing mechanism; create a solidarity mechanism among member-states in case of energy shortages; give support for energy infrastructure projects which promote diversification of supply; make full use of available national fossil fuel reserves; seek new international suppliers; and strengthen European neighbourhood ties. Tusk confused the issues by trying to weave in the Polish self-interest in coal rather than sticking to the principles of European-wide solidarity. Worse, since Poland was seen for understandable reasons to be less keen on prioritising climate change over security (in a context in which over 90 per cent of its electricity was generated from coal), tagging on the bit about coal encouraged general resistance to the Energy Union concept, as opposed to Tusk's particular variant.

The Commission's response was to write a list of all the things the Commission was already doing and to focus on those areas where it wanted further steps to be taken – notably trying to undo the Council of Ministers' insistence not to have new national renewables targets for 2030 (instead it preferred an EU-wide one). The aim was to give the Commission an element of control over the governance of the Energy Union and hence put it in the driving seat.

This governance issue was compounded by the early debate about how to stand up to Gazprom. One group of member-states wanted Europe to limit Gazprom's ability to divide, discriminate and therefore rule over the contracts for different countries in an overtly political way. The suggestion was that Europe should buy the gas for everyone – in effect becoming a single buyer. There was much to be said for this, except that it left open the question of who the central buyer would be, and there was widespread suspicion that there would be a power grab by the Commission. The companies also hated it, since they would be undermined.

Another approach was grounded on the recognition that Gazprom's discrimination on political, rather than solely on cost grounds, was an obvious breach of the spirit and probably the letter of European competition law – which prohibits discrimination and the abuse of market power. The proper and full application of European competition law should have put a stop to Gazprom's conditionality, such as preventing the further sale of the gas to third parties. In a competitive market, price reflects costs and, once sold, the vendor cannot dictate what the customer does with the gas.

Eventually the Commission took the second – bottom-up – approach. It ended up with a wish list of measures and objectives that the Commissioners duly trotted around Europe advocating, and looked for specific cases where they could be applied. The objectives were: energy security and solidarity and trust; a fully integrated European energy market; energy efficiency contributing to modernisation of demand; decarbonising the economy; and research, innovation and competitiveness.

The EU Energy Union has turned out – as arguably the Commission intended – being a list of all the things the Commission is currently doing, with some extra 'asks'. This, in itself, is a useful exercise – it draws attention to just how disjointed the various initiatives are. But it also serves a more serious purpose: it highlights the gap between what is and what could be. In losing sight of the overarching concept of an Energy Union, and disaggregating its presentation into a series of discrete bits, the Commission

has not exploited its full economic potential. The result is that there is so far no integrated plan – because the trade-offs between the objectives (and how they will play out in the future) have not been defined. Trade-offs are both essential and politically difficult.

The immediate priority – the grids

What could the Energy Union be? What should its central components be? To find an answer, it is necessary to engage in a thought experiment: taking a blank piece of paper and describing what an ideal, efficient European energy system and market would look like.

The centre piece in this ideal world would be the European electricity and gas transmission systems, defined at a European level and with a European system operator. Electricity and gas systems would be run by Europe and for Europe.

Crucially, it would not start with particular individual 'missing links'. The exercise would be similar to that conducted in Britain and France before and after the Second World War as they became the most integrated national systems in Europe. Instead of gradually developing bottom-up from a series of entrenched local municipalities – as happened in, for example, the Netherlands and Germany – the British government took a top-down systems-wide view, setting up a Central Electricity Board as early as the late 1920s. It was the nationalisation and therefore the buying out of the municipalities and regional electricity companies in 1947-48, which enabled a national approach to be taken, and a high voltage grid to be developed in the national interest. It proved extremely successful, and a similar national approach was taken for the development of the British national natural gas transmission system in the 1970s and 1980s. Few would doubt the efficiency of the outcomes.

In this idealised exercise, the European grid would be planned to take account of the main locations of generation and demand. It would exploit the base-load nuclear generation in France, lots of coal in Poland, lots of renewable wind in Germany and around the North Sea, hydro from Scandinavia, and solar from Spain. In an ideal world for European gas, the Russian supplies would be balanced by other sources, such as from Norway and the UK, as well as developing new supplies from Algeria and perhaps again Libya, and pipelines from the Caspian and possibly Iran, and the Kurdish areas of Iraq. LNG would complete the picture. The electricity transmission systems and the gas pipelines would be optimised at the European level against these supplies.

The great advantage of taking this European systems approach is that it is probably the only way to address simultaneously the three 'trilemma' objectives of energy policy: integrated European energy networks increase competitiveness, reduce the costs of meeting carbon targets, and add to security.

On competitiveness, as noted above, the gains of interconnection come by completing the internal energy market – a physically integrated grid brings competition to the incumbents and harmonises prices. Businesses and customers benefit. The cost gap may not be closed with the US entirely, but interconnection is a problem in the US too, and Europe could steal a march.

> *"A system approach is probably the only way to address the three 'trilemma' objectives of energy policy."*

On security, the impact of interconnectivity is obvious. If Russia cannot prevent a country being supplied, because there would always be alternative pipelines and wires, it could not cut off any particular country. It makes a reality of solidarity. If the networks were run at a European level, it would also weaken Russia's ability to put pressure on a particular government, since the rules of the competitive market and the operation of the networks would be outside national hands.

On climate change, the main benefits would be from dealing with intermittency. But there is another more subtle benefit from fully integrated gas and electricity systems. Almost all the low carbon technologies generate electricity at or near zero marginal cost – nuclear, wind and solar, but not necessarily biomass. More and more zero marginal cost generation undermines the wholesale price. If the marginal cost is zero, then when there is sufficient low carbon generation, the price will fall to zero. This is already happening from time to time in Germany. But it does not mean that the cost of electricity is falling to zero. Rather the revenues migrate from variable wholesale markets to fixed-price contracts, like capacity payments and feed-in-tariffs.

More and more countries are taking over this fixed-price contracting role and, in effect, re-inventing central buyers. If governments auction these contracts, it is possible for them to have more influence over the locational dimensions of electricity generation investments, and their location matters for the design and performance of the networks. Many renewables are at the periphery of energy networks, making their location especially relevant from the climate change perspective. Auctioning fixed-price contracts at the European level is likely to be much more cost effective than the national approach. In effect, it harmonises renewables policy.

A three stage plan to complete the European Energy Union

At present, member-states regard the Energy Union proposals as an opportunity to pursue their own national interests and have little concern for their Europe-wide benefits. They do not have either the incentive or the means to internalise these benefits. Instead, they see the Energy Union as a way to protect the interests of their preferred energy sources and to get EU subsidies for specific investments.

Thus the Germans argue for compulsory national renewables targets (with the implication that others should suffer the same cost disadvantages that Germany does, and it can gain extra markets). The Poles argue the case for making room for coal. The Spanish want interconnection to France to export their surplus solar. And so on.

How to proceed? There are three stages to turn the idea of a European Energy Union into a reality. The first stage is to identify the size of the prize. When a similar problem confronted those – like the British – who wanted to complete the single market in goods and services in the 1980s, a study of the benefits was commissioned from Paolo Cecchini, a widely respected economist. He showed that the gains from opening up markets would be of the order of 5 per cent or more, of EU GDP.

With this European prize for completing the single market in mind, there remained a problem: how to deal with the inevitable losers. The answer was to make sure that there were none: that every country would be a net winner. The ingenious solution was to concoct a set of measures, which in aggregate left every country better off, even if specific measures within the package created losers. Then the package was presented as a whole – and not on the basis of a case-by-case approach. Voting on the entire package enabled the programme to be carried – and then the Commission could subsequently add other areas, though typically with difficulty. Financial and professional services proved to be particularly contentious cases.

To date, the Commission has pursued the three objectives in the 'trilemma' separately. The Energy Union has the great merit of bringing these different parts together. This helps create the 'everyone-a-winner' outcome. Think, for example, of Poland, with its overwhelming dependency on coal and its exposure to Russia. Its interests are primarily in security, and climate change policy is a problem. With each part addressed separately, it can encourage others to help on security, but backpedal on climate change. Think of Germany. It has climate change as its priority, amongst the three objectives, partly because its political system has to date placed the Green Party in a pivotal position to potentially form coalitions. Security is less of an issue, as it has lots of gas storage, the Nord Stream pipeline and a long history of energy relations with Russia. Britain has greater concerns with competitiveness and electricity prices, and little worries about security. And so on.

The art of the politics of the Energy Union is to create a grander bargain. Thus in the example above, Poland gets more security, assisted by Germany and Britain, in exchange for conceding on climate change targets. This grand bargain is not however a horse-trade amongst the key players and in particular those who wish to have a political fight. Rather it is a bargain in which everyone gets the benefits by combining policies together which hit all the objectives together, and therefore give something to each.

"Both electricity and gas are systems, and they merit systems analysis, not a cost-benefit analysis of the individual parts."

The grand bargain will not progress far, however, if it is just about objectives. Every member-state trots out its commitment to the three objectives. This is easy and largely meaningless because the trade-offs are not defined. What matters to the grand bargain is that there are policies that meet all three, and at the core of this are the European networks and the internal market. European networks improve security, help with decarbonisation and reduce costs.

The first stage is then to estimate the net benefits to Europe of a European Energy Union, based upon a Europe-wide complete set of electricity transmission and gas pipelines. It is in essence a map of the potential infrastructures and an economic evaluation of the benefits compared with the status quo.

This Cecchini-type estimation of the prize then needs to show that every member-state is individually better off from this aggregate approach, provided the systems as a whole are established.

The second stage is to draw up the network plans for electricity and gas infrastructure. This is not a list of projects – as at present – and it cannot be left to the member-states to propose and bid on projects. It is not the sum of the parts countries wish to pursue in their own interests. It is the top-down network requirements, followed by a systematic programme for their completion.

This distinction is crucial. Individual connections do of course contribute, but they will take time and they will not maximise the system's benefits. Both electricity and gas are systems, and they merit systems analysis, not a cost-benefit analysis of the individual parts on a stand-

alone basis. Thus, whilst it might be helpful to reinforce gas pipelines between and into exposed Central and Eastern European states, it would be better to ask what sort of gas network and storage would best serve Eastern and South-Eastern Europe as a whole.

An example illustrates the difference between member-state driven investments and European approaches. Consider the Nord Stream pipeline which runs from Russia across the Baltic Sea directly to Germany. A Europe-wide approach would have taken account of the interests of the Baltic States and Poland, and also the impact on Western Europe of new supply routes. Instead, German Chancellor Gerhard Schröder negotiated with President Vladimir Putin and, at the latter's request, opted for a route which bypassed the Baltic States and Poland, going by sea. It was not wholly surprising that reference was made in Poland to the Molotov-Ribbentrop Pact between Stalin's Russia and Hitler's Germany. Yet for Schröder, and against the historical background of the special relationship between Germany and Russia, it made perfect national sense.

What would a top-down European grid look like? It is important to recognise that in practice there is no unique optimal solution, and the search for one is unlikely to be a useful exercise. The reason is that the structure of such systems depend upon history, which bequeaths certain assets and influences the way the system evolves over time. The nuclear power stations in France are a fact, as are the main centres of demand. Gas pipelines exist with Russia. Any infrastructure system has to take these assets into account and it is irrelevant to ask whether they are optimal. They just are. We start where we are, not where we would like to be, and define a transitionary path between reality and the ideal.

The answer is therefore always pragmatic. Some obvious stakes need to be fixed in the ground, and then the systems can be approximately optimised to them. The top-down task is similar to that conducted in member-states when they moved from local municipal systems to national ones. There are core generating assets and core sources of gas supply. These are the fixed points.

In future terms, there are more degrees of freedom, both on the demand and the supply sides. It is an open question as to where demands will grow fastest. Flexibility on the demand side is needed. But on the supply side, there are big European questions. These include the development of pipelines for future sources of gas supply. No member-state can on its own best decide about Caspian pipelines and the opportunities for Iraqi and Iranian gas deals and associated pipelines. Similarly, it is unlikely that the development of Algerian gas can be left to Spain – not least because the gas needs to get into other European countries. Long distance electricity transmission from solar-rich southern member-states to cloudy Northern Europe is again a European rather than an individual country matter. Indeed, this is an example where European approaches are much better than national ones. How does it help Europe meet European carbon targets to put so much solar in Germany?

"In a fully interconnected system, it is increasingly difficult to do anything other than dispatch generation on a system-wide basis."

The third step is to operate the European transmission and gas pipeline systems at the European level – ultimately with a European system operator. As with the development of the networks, there are two approaches here – top-down and bottom-up. In both electricity and gas, progress is being made at the regional level. There is, in effect, already a North European electricity system operator, the Nord Pool system operator. Others on the edge of these regions face the considerable and often costly consequences of being outsiders. Germany spills wind and solar onto the Central European system in volumes which can cause great disruption to its neighbours and indeed threaten the stability of the system. The Germans operate their systems, alongside the Northern Europeans, without much regard to the stability of the Czech or Polish systems.

It is unlikely that any member-state will want to compulsorily transfer system control, but the voluntary approach will be much enhanced by the development of European networks. In a fully interconnected system, it is increasingly difficult to do anything other than dispatch generation on a system-wide basis. In a system, everything depends upon everything else. An action in one part of a system has consequences for all the others. As the regions within Europe co-ordinate their systems, these regions can then take co-operation to the European level – in effect, forming an oligopoly of system operators.

What will help is the IEM and competition policy. If the systems are fully developed and if anyone can have access on regulated and common third-party access terms, then more efficient system-wide trading will dominate over resistance by national and regional incumbents. The great merit of the IEM is that it forces through efficient solutions. The great problem is that competition in electricity and gas is unlikely to be perfect, and in particular the retail end may remain sticky. However, even here there are grounds for optimism – smart meters and smart technology may help to open up these retail markets and therefore undermine incumbent market power.

A new treaty or another set of directives?

The term 'Energy Union' suggests more than a common European energy policy. It harks back to the early days of European integration, when the Coal and Steel Community and Euratom were set up as separate entities. Does the Energy Union have to be the EU Energy Union, or could it be a separate organisation with a separate treaty and a membership which does not necessarily confine itself to EU members?

Energy does not confine itself neatly to the present EU membership, and the advantages of a wider domain are already recognised with the European Energy Community and the Energy Charter. Yet neither is a particular good model for the Energy Union. The Energy Community has not been a notable success and, in any event, it requires its members to sign up to the European *acquis*. The Energy Charter has a specific role and lots of members, but it is mired – and confined - in its own disputes.

An Energy Union based upon European networks could be defined at several different levels. Pragmatically it should start with what exists, and not some wider ideal pan-European domain. This can always be added later. Rather the question of a separate organisation turns on its decision-making process. A stand-alone Union can take Union-based decisions. It would not be meshed into the fabric of EU decision-making. There would not be energy versus agriculture versus migration trade-offs to be made. It would have one dimension only. It would have its own executive, secretariat and research support. It would deal directly with other international energy bodies, like the International Energy Agency (IEA) and the oil-cartel OPEC. It could develop a Europe-wide interest in the security of supply for gas, electricity and also oil. Finally, it could negotiate directly with Russia and other suppliers.

But a separate organisation and treaty would have disadvantages too. It would find it hard to have the political clout of the EU. For example, in the recent disputes with Russia, the Europeans could bring a range of pressures to bear on Russia, including sanctions, which an energy-only body could not. Even the IEA has had limited success; the release of stockpiles of oil is in reality very much a national affair. There would also be the problem of the relationship between an energy-only body and the climate change and competition policies that the EU will continue to develop.

These disadvantages are likely to be decisive: it will have to be an EU Energy Union. The challenge is to combine the benefits of a stand-alone focus with existing EU law and institutions. This can be best achieved by having major treaty changes in respect of energy. These would include: revising the Lisbon Treaty energy paragraphs; creating a European networks body; and defining the voting rights, procedures and objectives of the new body. The alternative – carrying on with 'Lisbon' and the current structures – may be politically more palatable, but it does have a consequence: Europe will continue to suffer from insecurity, un-competitiveness, and very high decarbonisation costs.

Finally, there is the question of financing grid and pipeline developments. At present this is a mess of private company funding, national government contributions, the European Investment Bank and the European Commission. Given that a thriving infrastructure capital market has developed in Europe, a possible model is to create a European infrastructure fund for the networks, and combine the energy network assets together into a single regulatory asset base (as is currently the case for conventional private utilities) – either just the new assets or possibly some of the existing assets too. This asset base would have a regulated guaranteed return, and the costs would be parcelled out as a system charge to the members and their customers. It would be very similar to the financial structure of the British National Grid, but on a European scale.

Conclusions and immediate priorities

The European Energy Union is a good idea, whose time has come. It represents a major opportunity for both the energy markets and for the EU more generally. It is the route to achieving the 'trilemma' objectives of security, decarbonisation and competitiveness.

At the core of the Energy Union lie the network systems. Developing European electricity and gas networks hits all the objectives – it increases security to those exposed to the Russians and others; it backs up and supports renewables; and it reduces costs through the portfolio effects and helps to harmonise prices across Europe.

The Energy Union will not get far as a bottom-up process – it has not so far, despite a quarter of a century of trying. The current proposals are little more than a summary listing of existing initiatives, with an attached bid for more 'governance' power for the Commission. This is the wrong way to think about networks and systems - they have to be thought of as integrated systems, not the sum of the parts that Europeans can agree to on a case-by-case basis.

The immediate priority is to provide a credible estimate of the gains from fully integrated networks – the prize. A Cecchini-type exercise is urgently needed. The second

step is to draw up the outline of European grids, and the third is to structure a credible European Energy Union organisation, a system operator and an infrastructure fund with a single regulated asset base, paid for through system charges on the members of the Energy Union. This may well require a treaty change – the Lisbon treaty and existing arrangements entrench members' individual interests at the expense of a potentially enormous European prize. This may not be politically very appealing, but without it, Europe is probably doomed to carry on with its expensive and inefficient national energy systems.

If every member-state can be in aggregate a winner, the Energy Union has the potential to make a big difference to the competitiveness of the European economy, and more widely to its security and to decarbonising at the minimum cost. What is there not to like about this?

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