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Completing the Union: Is the European Energy Union Really Real?

Abstract

The Energy Union Package (European Commission, 2015) is permeated by the tensions between different objectives in the realization of an energy union. It is at its most effective in dealing with the geo-political challenge, in particular in the advocacy of a quick move to greater liquefied natural gas capacity across the EU especially in eastern and southern Europe, as an answer to avoiding dependence on Russian supply. However, the document is reluctant to take on clearly the future of European nuclear power. It is helpless in the face of the substantial problems of the Emission Trading Scheme permits trading. It is too slow in its approach to the integration of electricity capacity, and has not tackled the problem of what kind of large-scale infrastructure investment is needed in order to allow the successful operation of an integrated but decentralized and non-controlled market. Moreover, markets are crucial, but they don't just spring up by themselves; and coordinated attempts to run them often unfortunately generate perverse effects.

1 Introduction

"Completing the European Union" has become a major priority. There has been progress on establishing the Banking Union; there is a debate about a Capital Markets Union, with capital markets substituting for banks as a source of funding; the coordination of refugee policy is an urgent issue, requiring a Migration Union; and the coordination of energy policy has also and already for a long time been a focus of political attention.

The financial and economic themes are at the core of the recent Five Presidents' Report, though the report observes that: "In significant policy areas, such as goods and services, as well as in areas with untapped potential, such as energy, digital and capital markets, the Single Market is still incomplete." There are no detailed suggestions on energy (or indeed digital markets) in the Presidents' Report. But the argument in favour of a European Energy Union – a genuine common energy market with common regulation – may even be stronger than the case that was successfully made in the 1980s and 1990s for a monetary union. European Commission (2015) sets out an Energy Union Package, both as a development of previous initiatives at energy coordination, and as an urgent response to a Russian foreign policy challenge in the aftermath of the annexation of Crimea and the invasion of parts of eastern Ukraine in 2014, with continued fighting: European Commission (2015). The document describes the need for a "fundamental transformation of Europe's energy system" in order to provide consumers with "secure, sustainable, competitive and affordable energy." It is based on the following stated priorities:

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- Energy security, solidarity and trust;
- A fully integrated European energy market;
- Energy efficiency contributing to moderation of demand;
- Decarbonizing the economy;
- Research, innovation and competitiveness.

Given the geopolitical background, it is not surprising that the document places a great deal of attention to the need for Europe to speak "with one voice in global affairs" and that it points out that energy policy is "often used as a foreign policy tool." The new document is a significant step on the way to an important completion of the Union, but there are significant gaps and areas where the recommendations have a certain lack of clarity.

An energy union involves substantially enhanced coordination between the 28 national energy regulators, so that regulation-induced price differences are removed. Ultimately a move to a single European regulatory system (as in the case of the banking union) is needed. As European Commission (2015) notes, European energy policy is currently poorly coordinated between the member states of the EU, although large gains could be achieved through enhanced cooperation both at the European and the global level. The economic principle of a single wholesale price is uncontroversial, but establishing the interconnections (creating the appropriate trade channels) in practice is difficult and requires considerable investment.

This paper will examine first the general problems of coordination between countries with multiple objectives in regard to energy policy; then the multiple risks posed by carbon dioxide emissions and global warming, by nuclear energy, by the threat of foreign policy disruption, and by limits to capacity; it then turns to the question of whether and how the high price of responding effectively to diverse risks is at odds with the goal of "competitive and affordable" energy; finally, the paper assesses whether the current approach successfully resolves the coordination problem.

2 Coordination problems – a fully integrated Energy Union?

The opportunities and pitfalls for Europe in the energy context are similar to those arising in all other policy areas in the Union. The advantages of a common coordinated approach are obvious, but there are substantial established interests at a national level that stand in the way of its realization. Crisis situations – such as an external challenge – give an opportunity to think of mutual benefits that can be derived from overriding the national veto players.

Pooling energy is desirable because it leads to gains from trade and the diversification of risks. This is not only because wind patterns and other renewable sources of energy are imperfectly correlated geographically, or because of different degrees of access to imported energy sources, but also because the risks of nuclear energy production are shared by all European countries and carbon emissions create a world-wide externality, regardless of where in Europe they occur. The failure to achieve greater coordination reveals how the greater part of policy formation and preference accumulation primarily occurs at the national level.

There are analogies with Europe's problematic path to monetary union in the development of energy policy. Energy coordination in respect to coal, the primary fuel and basis of industrial prosperity at the time, was at the centre of the first major push for post-war integration and the institutional forerunner of the EU, the European Coal and Steel Community (1953). As with monetary union, the European experience was frequently held up as a model worthy of imitation in other parts of the world – until its flaws appeared. In particular, the carbon emissions trading scheme was widely touted as a model for a global initiative to reduce the threat of global warming posed by CO_2 emissions, but its operation in practice has proved quite problematic.

2.1 Can multiple objectives be solved by market mechanisms?

A coordinated approach to energy, however, like monetary integration, needs to address equally obvious problems that are often not recognised explicitly. The problem of multiple objectives is an old one. From the beginning incompatible objectives were set for Europe's energy policy. The 1996 Internal Energy Market directive's goals of (1) secure, (2) environmentally compatible, and (3) competitive energy sources are in conflict with each other: renewable energy may be environmentally sound, but is neither secure nor inexpensive; foreign supplies of oil and gas may be inexpensive at a point in time, but are subject to geo-political risks etc. (European Parliament and Council of the European Union 1996). The tensions remain in European Commission (2015), and perhaps inevitably there is no completely clear roadmap as to how they might be resolved.

From the economic point of view, a "we-want-it-all" approach to conflicting objectives is of course nonsense. Trade-offs can and should be addressed by careful economic assessments, and by coherent and pragmatic policy compromises. Policy choices need to provide a framework to guide the myriad choices of market participants, producers

and consumers, through a pricing mechanism that is accepted as fair and transparent. An economic argument can be made for security-oriented policies like renewable energy subsidies that increase both current costs and self-sufficiency.

Since the necessary policy compromises are difficult to formulate and enforce without unified politics, the European integration process has typically tried to leapfrog such difficulties by relying on market mechanisms, in the hope that the latter not only enhance economic efficiency, but also bring about a common perspective on common problems.

Energy is no exception to this pattern. The heterogeneous priorities assigned to conflicting goals by different actors across and within countries trigger inefficient competition among tax and subsidy systems in ways that are reminiscent of another long-standing European policy problem: the Common Agricultural Policy (CAP).[1] Similarly, renewable energy subsidies in the energy sector clearly trigger political haggling and redistribution. The Emission Trading Scheme (ETS) suffers from the same problems, as each national government lobbies for the assignment of plentiful quotas to its country's firms. Policy is crucial because no market is perfect, and all markets need an infrastructure of rules. The energy market also needs a physical infrastructure that requires large, slowly depreciating investments, and hence consistent and predictable policies and market conditions. As policy preferences shift to an increased dependence on renewable energy resources, the basis of price calculations shifts. Instead of a production system in which operating costs (paying for fossil fuels) constitute a major component of pricing, fixed capital costs form the largest element in the cost of producing useable energy, and marginal costs fall to a minimal level. While markets can efficiently supply energy at a point in time, longer-term security can only be assured by policy.

2.2 Centralizing coordination?

Individual priorities are set by the separate member states, and are incompatible with each other. Energy issues were highlighted in the 2007 Lisbon Treaty, where Article 194(1) recognised the reality that national states were primarily in charge of determining energy policy, but set out the four principal overall aims of EU energy policy. That article did not give the EU the competence to adopt measures significantly affecting a member state's choice between different energy sources and the general structure of its energy supply; but such measures might be adopted under Article 192(3) by a special legislative process of the Council, in practice requiring unanimity, rather than majority voting. This is the hope of the current initiative, and the proper question to ask is whether it is sufficient to really move Europe in the direction of a coherent energy union. In 2008, the EU laid out an ambitious programme for changes by 2020: the reduction of greenhouse gas emissions by 20 percent, a 20 percent share of renewables, and a 20 percent improvement in energy efficiency. The programme was highly ambitious as the reduction goals were meant to be binding for each individual country. One year later came the 2009 Third Energy Package (TEP), which immediately ran into opposition from multiple energy players, including national energy companies, governments, foreign energy exporters, and consumers. These parties believed that the TEP threatened their individual interests and control over domestic markets that had long been protected by regulatory privileges. Eastern European critics saw the TEP as creating a regional divide, and primarily benefitting Western European countries that already had significant energy infrastructure in place, as well as diversified suppliers that could deal with the reforms. In short, a vision of how market coordination at an EU level might be achieved does exist, but it has not been implemented completely or satisfactorily.

The same can be said of the planned emissions reductions, where the problem lies in the implementation mechanism. On 24 October 2014 an EU Summit postponed the emission reduction goals to 2030, stipulating (European Council 2014):

- A reduction of CO_2 output by 40 percent (relative to 1990);
- An increase in renewable energy as a share of total energy consumption to 27 percent;
- An increase in energy efficiency by 27 percent.

These are the goals that are stated again in European Commission (2015). It is remarkable (and regrettable)

[1] The CAP was nominally motivated in its early phases by security considerations similar to those that are currently relevant to energy (and related to them, through bio-fuel production and regulation). It was also rooted in distributional considerations, however, and tightly linked to political considerations within each country, where agricultural markets were heavily regulated. Adoption of Europe-wide policies unleashes national as well as within-country rent-seeking activities, and results in distortions, which, in the CAP case, eventually obscured any security considerations.

that the two latter goals are now little more than mere declarations. Moreover, all national goals for expanding renewable energy have been abolished. In that sense, the central issue of coordination has not been resolved.

3 Energy security: Weighing the different risks

The difficulty in formulating a forward-looking energy policy also arises from the difficulty in comparing different types of risk and drawing appropriate policy lessons about how to protect against it - through a collectivization of risk in an insurance mechanism (analogous to the banking union proposal). There are at least four different perceptions of risk related to energy, and while all are clearly present, they tend to be seen in quite contrasting ways in different European countries, and consequently produce varied and mutually incompatible responses from national political authorities:

- The question of CO_2 and its relation to global warming;
- The risk of nuclear catastrophe;
- The use of supply monopolies to create foreign policy pressure; and
- Vulnerability to domestic (non-political) disruption and overload, for instance when renewable sun and wind energy fails to supply the needs of consumers.

Each of these threats – climate change, nuclear accident, geopolitical blackmail, system disintegration and wind and sunshine volatility – is treated in very different ways. Since public debate is often driven by single headlines, a nuclear accident such as Fukushima produces a greater sense of danger than the vaguer (but more certain) long-term threat of climate change. The risk of system breakdown only enters the political debate after a concrete instance. Politics thus tends to respond too late to threats.

In addition, the geographic areas that are affected by these four types of threat vary. Cascading failures affect at the worst neighbouring countries. Politically-driven energy blockades are also targeted at individual states, although the geography of supply chains and pipelines means that there will also be collateral damage. Nuclear reactor catastrophes prima facie involve a relatively localised area; in reality, however, radiation clouds may spread over very wide distances covering a number of countries. We turn to an examination of these four areas of desirable policy – and the policy options for achieving them – in turn.

3.1 Sustainable? Decarbonising the economy

There is a near certainty, backed by a massive body of scientific evidence, that CO_2 emissions are leading to a rise in world temperatures.[2] A policy response to this phenomenon includes systematic efforts to reduce CO_2 emissions, although even such measures could only be expected to slow, rather than halt or reverse global warming. The circulation of greenhouse gases occurs at a global level, meaning that there is no obvious link between the extent of loss as a result of measures to reduce CO_2 emissions (that might impede industrialisation efforts in emerging markets) and the gains from preventing the negative effects of global warming. [3]

CO_2 emissions result in a long-term build-up of CO_2 in the entire atmosphere, and do not affect the regions where the CO_2 originated specifically. No particular country has a stake in reduction, if that reduction is not generally followed. The application of an emissions trading scheme in one area leads to increased costs there; but competitive advantages elsewhere. Apparently altruistic action energy to produce better and more sustainable energy outcomes may even have a perversely harmful general outcome. Carbon not burned in one part of the world might be shipped to another and burned there (direct carbon leakage). Resource owners might anticipate their sales of carbon resources to avoid selling them when green technologies and emission constraints threaten market destruction.[4]

The behaviour of European consumers has a minimal impact on global levels of energy consumption, or on CO_2

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2 The consequences include the risk of more extreme weather events, the melting of polar ice caps, a rise in the sea level with devastating consequences for low lying densely inhabited regions, the likely desertification of some parts of the world nearer to the equator (including Mediterranean Europe), as well as the extension of the cultivable area (that might benefit Northern Europe, as well as Canada and Russia).

3 The widely cited 2006 Stern report commissioned by the UK government concluded that the costs of inaction on CO_2 were high (5 to 20 percent of annual GDP) and could be mitigated by relatively cheap anticipatory measures, costing some 1 percent of annual GDP; but that the implementation of such measures poses an acute collective action problem (Stern 2006). At the moment, Europe looks as if it is leading the way, but not having a substantial impact on the rest of the world.

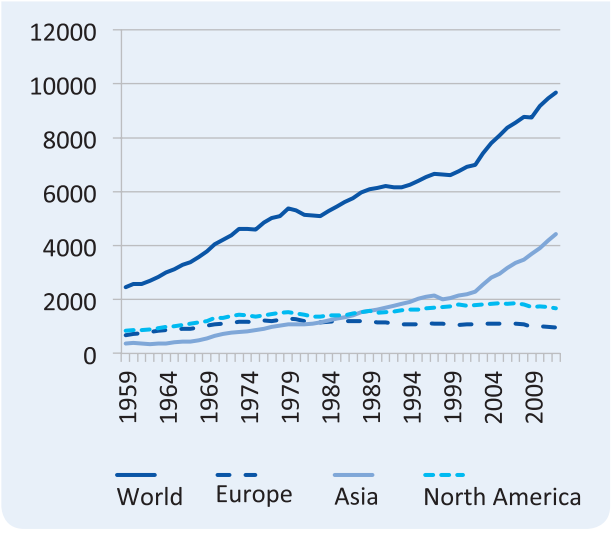
4 According to the so-called Green Paradox (Sinn 2012), the more serious attempts are to restrict future emissions, the greater the incentives to current producers to use their time-limited CO_2 producing sources as quickly as possible. The logic of the Green Paradox predicts a dramatic fall in fossil fuel (including oil) prices as producers scramble to use the window in which they can still sell their products.

emissions, and hence on the major issue of global warming. Currently, most projections also show an energy future in which the world's major energy resources will remain the fossil fuels oil, gas and coal, which release carbon into the atmosphere. A recent assessment by the International Energy Agency (2014) suggests that global energy consumption will rise by 37 percent from 2013 to 2040, with coal and oil rising at a rate of15 percent and CO_2 emissions from power production increasing from 13.2 gigatonnes to 15.4 gigatonnes. In that sense, Europe's ambitious attempts to reduce carbon emissions on a global level – which should surely have been a policy priority – have proven at best irrelevant but possibly also counter-productive in that the debate about reduction pushes producers to market their energy producers as quickly as possible.

Figure 1 shows the time path of aggregate worldwide CO_2 emissions. It is clear that the two oil crises of the 1970s and the 2009 world recession had an impact on emissions. Europe's special attempts to curtail emissions are not visible, however, in this graph, which indicates that other countries compensated for any reductions that took place in Europe.

CO_2 trading would be a desirable global approach to the climate change issue, but its application in a more limited geographic framework produces inconsistencies. The global scheme produced some absurdities in its interactions with the European program: notably Russian and Ukrainian firms increased their output of poisonous gases in order to sell to large European corporations the certificates they might gain by reducing their output (Schneider and Kollmuss 2015). The EU Emissions Trading System (ETS) launched in 2005 was intended to represent a major effort on the part of the EU to achieve the targets set out in the 1997 Kyoto Protocol. It does not cover all of EU emissions, but focuses on high-polluting industrial sectors, including power generation, iron and steel, cement, glass, pulp and paper. [5] This amounts to around two fifths of total EU emissions, and in that sense the current system is still far from "well-functioning EU Emissions Trading System" that European Commission (2015) presents as being "the cornerstone of Europe's climate policy." National targets need to be devised for the emissions not covered by the ETS scheme.[6]

FIGURE 1 THE WORLD'S CO2 EMISSIONS (MT CARBON/YEAR)



Source: Global Carbon Project: Global Carbon Budget 2013, http://cdiac.ornl.gov/GCP/carbonbudget/2013/

The problems of the EU ETS are partly design flaws that followed from the particular path chosen. At the beginning, permits were over-allocated, and simply amounted to a subsidy for high polluting producers. Then the price of permits was affected by the economic slowdown after the financial crisis, and dropped precipitately, from 35 euros per ton in 2008 to 14 euros per ton in 2010, to around 5 euros per ton in 2013, and then rose slightly to 8.09 euros per ton at the time of writing (September 2, 2015), rendering the signal that the price was supposed to generate meaningless. As a consequence, incentives resulted that undermined the concept behind the proposal. Part of the reform package that is urgently required is an alteration of the scheme to preempt the emergence of a glut in permits.

The collapse of permit prices perversely led to a greater incentive to use coal than gas. Some Combined Cycle Gas Turbine (CCGT) plants with a higher thermal efficiency were mothballed. The others are operating at well below their capacity. Given today's prices of fuels the price of emission certificates would have to be about 70 euros per ton to make such plants profitable. Coal consumption in the EU consequently rose after 2005, especially in Germany, but also in the UK.

The price collapse of emission certificates was not just a consequence of the financial crisis, but also followed from

[5] But attempts to include aviation in 2012 were controversial and led to a dispute with the US, when the EU proposed to apply the restrictions to American airlines.

[6] "Cap and trade" allows companies to trade allotted carbon permits; while a "Linking Directive" allows carbon emitters to buy carbon credits generated from emissions savings or offset projects, in other countries, and above all in emerging markets.

the interaction of national energy schemes that were poorly coordinated. This effect was magnified by separate national attempts to reduce emissions in a more limited context by means of favourable feed-in tariffs for green energy. On a national level, these incentives looked as if they successfully resulted in lower carbon emissions, as planned by the legislator. But when the results interacted with other parts of the policy framework, in an international context, the outcome looks much less satisfactory.

There are other perverse consequences of national choices regarding the desirability of environmentally sustainable energy production. Notably, biomass produced energy was defined as carbon-neutral, so that no permits are required for energy production from biomass. Yet studies suggest that carbon emissions from biomass are 50 percent higher than from coal. The subsidies for biofuel had the additional unwanted effect of increasing food prices, squeezing low income earners throughout the world and generating widespread popular unrest and political instability in 2006–7 (including the "Arab spring").

The de facto collapse of the ETS has fuelled a new debate about substituting a less market-driven and more coordinated approach: a postponing of auctions of emissions allowances (back-loading), with a rule-based market stability scheme designed to put prices on an upward trajectory and provide ever increasing incentives to cut carbon release. In this way, with allowance prices no longer freely set, the scheme is starting to resemble what was originally presented as a simple alternative: a tax system. According to some analysts, the tax approach has the advantage that it can be used to penalise products from third countries whose manufacture involves large and environmentally harmful carbon emissions. Such an approach clearly takes energy policy deep into the domain of trade policy (Helm, 2012).

In order to be credible in respect to decarbonization, a plan for a European Energy Union urgently requires a mechanism to integrate a viable and effective European system of incentives – either based on ETS or on a carbon tax – within a compatible global framework.

3.2 Secure? The risk of nuclear catastrophe

Nuclear energy is an obvious way of producing power without the harmful effects of CO_2 emissions. It carries some direct environmental risks (warming of river water used for reactor cooling); but the major fear is of unlikely and very rare catastrophes (that might be induced by human action, such as terrorist attacks). The dangers arising from catastrophically uncontrollable nuclear reactions in power generating plants, as seen in Chernobyl in 1986 and in Fukushima in 2011, are great and terrifying.[7]

European Commission (2015) correctly states that: "The EU is highly dependent on the import of nuclear fuel and related services to Member States where nuclear energy is part of the energy mix. Diversification of supply is important to ensure security of supply." It emphasizes safety, but has little to say about which reactors should be decommissioned, and in particular on the safety assessment of the quite different reactor system of former communist countries. Europe has two fundamentally different systems of nuclear power generation. Western design reactors usually involve separate contracts for different stages of production (uranium mining, conversion of uranium into gaseous form, enrichment, fuel assembly). By contrast, in Eastern Europe (Bulgaria, Czech Republic, Hungary and Slovakia) Russian designed reactors rely on bundled supply services provided by a single Russian company, TVEL. Historic choices establish a path dependence. Hungary, for instance, recently rejected a Westinghouse reactor in favour of a Russian system that was compatible with its existing infrastructure. The two alternatives in different parts of Europe reflect not only contrasting perceptions of safety standards, but also varying degrees of willingness to escape dependence on a single source of supply, and of trust in market processes.

The problem is obvious. Europeans do not approach the assessment and evaluation of nuclear risks in the same way. There are very different national orientations to the risks arising from nuclear power. The most obvious contrast is between the widespread enthusiasm in Finland and acceptance in France of nuclear energy as a clean source and equally general scepticism in Germany and outright hostility in Austria (OECD, Nuclear Energy Agency 2010). In the aftermath of Fukushima, a majority of French respondents in opinion poll surveys were still sympathetic to France's reliance on nuclear energy, which the French government reaffirmed its commitment to; while in May 2011 Germany's government announced a phase-out of

[7] In the aftermath of events like Fukushima, calculations made primarily by the nuclear industry that sought to demonstrate plant safety are called into question. On the other hand, new research published after the Fukushima event has shown that nuclear power has proven far less harmful than the coal power it replaced. According to Kharecha und Hansen (2013), nuclear power stations globally saved 1.84 million lives in net terms between 1971 and 2009 by lowering the number of deaths related to fossil fuels, primarily in terms of lung diseases.

nuclear energy by 2022 (Foratom 2014; also GlobeScan 2011). Older nuclear reactors elsewhere will also face redundancy and decommissioning: the International Energy Agency (2014) estimates that by 2040 200 of the world's 434 nuclear reactors will be shut down. At the same time, however, over 530 new reactors are likely to be constructed. In order to be credible, a plan for a European Energy Union requires specifics on the siting, the financing and the technology of new nuclear power stations.

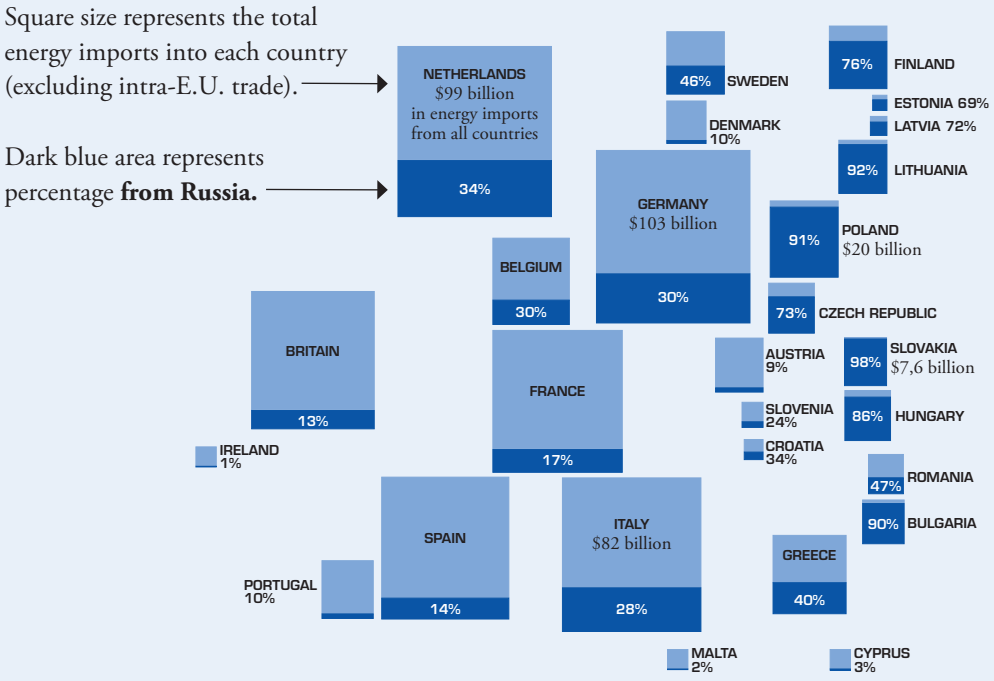
3.3 Secure? Supply monopolies and foreign policy pressure

Most industrial countries are dependent on imported energy, and particularly on oil and gas; and the latest figures show that the EU imports 53 percent of its energy (European Commission, 2015) . Even with a dramatic shift towards the enhanced use of renewable energy resources, carbon fuels (gas and coal) offer a degree of flexibility in response to demand surges to which no obvious or cheap alternatives exist.[8] The resource curse, whereby abundant natural resources (and above all energy) promote rent-seeking behaviour, means that many large energy exporters are prone to corrupt politics, instable and erratic policies, and a proclivity to resort to blackmail. It also means that the export of manufactured goods becomes more difficult because the revenue from selling the resource typically increases domestic wages and income aspirations (Dutch disease).

For modern Europe, the most obvious threat is posed by the extent of its dependence on Russian gas. Although there were incidents in the past in which disputes between Russia and Ukraine over the pricing of long-term gas contracts led to a cut-off of supplies to some areas, notably in January 2009, when there were major shortages and cut-offs in Bulgaria and Romania; the issue only reached a high level of political and popular salience as a strategic threat to Europe in the aftermath of the collapse of the Yanukovych regime in Ukraine and the subsequent Russian annexation of the Crimea and destabilisation of Eastern Ukraine. In 2014, tensions with Russia escalated to an extent reminiscent of Cold War conflicts, and made Europe's dependence on imported Russian gas seem like a security liability.

Europe's dependence on imported gas, by far the cleanest fossil fuel, has increased. EU domestic production of gas has fallen since the late 1990s, in line with the depletion of the resources of the UK and the Netherlands in the North Sea. Only the Netherlands and Denmark are net gas exporters. There are some shale gas resources, but these may prove

FIGURE 2 DEPENDENCE ON ENERGY IMPORTS



Source: Eurostat as published by Global Trade Information Services / New York Times

[8] The history of interrupted supply threats include dramatic episodes, like the 1941 U.S. blockade of energy imports by Japan, or most importantly, the two major oil crises of the 1970s.

largely unusable, for economic as well as political reasons (including worries about the environmental consequences of shale extraction). Only Poland has the potential to become a major producer of shale gas, with 4.2 trillion cubic meters of unproven technically recoverable shale gas reserves (France has 3.9 trillion, while the EU as a whole has 13.3 trillion, compared with 16.1 in the US). Gas consumption is also higher as a proportion of total energy requirements in the smaller EU countries, and especially in Eastern and South-Eastern Europe (Figure 2), where in some cases (Slovakia, Hungary and Bulgaria) there is an almost complete dependence on gas sourced through Russia.

The share of gas imports in the EU has risen steadily from the mid-1990s (when it was around 40 percent) to approximately 70 percent today. In 2013, 39 percent of extra-EU imports (in volume) came from Russia, followed by Norway (34 percent), Algeria (13 percent) and Qatar (7 percent). Almost all of this gas comes through pipelines, with Nord Stream supplying Finland and Germany, and the older Yamal-Europe line supplying Poland and Germany. Slovakia, which obtains a major competitive advantage from low energy prices, is almost exclusively dependent on a single (Russian) source.

The history of discussions about gas supply is fraught with suspicions that a monopoly (or near monopoly) supplier is attempting to cut special deals with individual countries in a divide and rule strategy. Russian President Vladimir Putin cultivated strong ties with the former Italian Prime Minister Silvio Berlusconi. Berlusconi, in signing a project for a pipeline (South Stream, recently cancelled by Russia) that was to send substantial quantities of Russian gas to the Italian state-owned firm ENI, advised Brussels to "cultivate the same kind of good relations that Rome enjoys with Moscow." (EurActiv2009) In Germany, Chancellor Gerhard Schröder cultivated an analogous relationship with Putin, and after he retired from politics took a position with the energy giant Gazprom.[9]

European Commission (2015) correctly sees the use of liquefied natural gas (LNG), and in particular the notion of extending LNG facilities from northern to eastern and south-eastern Europe as a critical step to maintaining Europe's energy security. A great deal thus depends on the adoption of an appropriate energy mix in consuming countries. Flexibility is discouraged wherever there is dependence on long-term price contracts. It is also discouraged by political considerations, as politicians see stable and low energy prices as a response to the demands of voters. An extreme example is the way in which Hungary's populist Prime Minister Viktor Orban legislated lower energy prices and even raised the question of whether this issue should be inserted into the Hungarian constitution.

There is a geographical divide in Europe between those countries that rely on spot markets and those that use long-term oil-indexed contracts to purchase and receive their natural gas supplies. Spot markets are more likely to develop in Northwest Europe with LNG import facilities and hubs that can provide gas buyers with access to multiple and geographically diversified suppliers. Oil-indexed contract markets, on the other hand, are more likely to exist in Central, Eastern, and Southern European countries, where only one or two suppliers provide gas to domestic markets and there is little gas supply diversification. The geopolitical strategy of President Putin is based around a pipeline view of the world, rather than a LNG vision (Melling, 2010; Wilson, 2014).

There is a substantial (and at present greatly under-used) capacity for handling LNG imports in Western Europe (UK, the Netherlands, Belgium, France, Spain). Indeed, in recent years (after 2011), the proportion of LNG imports has fallen. EU Regulation 994/2010 provided for obligatory investment in infrastructure that would allow the reversibility of gas supplies, where economic calculations showed that such facilities would produce positive spillovers. Poland, which relies on imports for 74 percent of its consumption (almost all of which normally comes from Russia), may now, as a result, cover half of its demand through a reversal of flows in the Yamal pipeline, from Germany and the Czech Republic. On the other hand, Russian flows through Ukraine and Romania to Bulgaria,

[9] When Russia negotiated the construction of a new sea pipeline in the mid-2000s (North Transgas, then Nord Stream) to bring Siberian gas to North-Western Europe, despite the higher costs and potential environmental threat of an underwater line, the Baltic states and Poland felt that they were being cut out, and that they would consequently be vulnerable to Russian pressure over their own supplies. In 2006 the then Polish Defence Minister Radek Sikorski made the extreme comparison between the German-Russian negotiations on Nord Stream and the Molotov-Ribbentrop Pact. In fact, however, Poland's safety may have been increased by this pipeline, as the country has become more independent of the conflict in the Ukraine, given that it can now receive Russian gas via Germany. The key is a network that provides the maximum flexibility: the EU has stipulated that all gas pipelines in the EU be reconstructed so as to allow for flows in both directions.

Greece and Turkey are not operated in accordance with the EU legislation, and there is no provision for reversibility. That result generates a political dynamic that undermines the formulation of a collective EU approach to economic aspects of European security policy. Long-term dependence reduces the opportunity for effective foreign policy coordination.

The result of the Ukraine-Russia crisis of 2014 has been be a greater awareness of the security threat, an enhanced willingness to construct LNG facilities, and an expansion of the market principle of spot pricing as a result, rather than long-term indexation to other energy products. This new willingness is expressed in European Commission (2015). The appropriate development is harder to imagine in the case of Russian-designed nuclear power plants in Eastern Europe, where technology dependence is far greater, and is not really described in the Commission document. In order to be credible, the technology issue as well as the supply problem needs to be resolved, and Europe requires a greater level of inter-connectedness.

3.4 Secure? Vulnerability to domestic (non-political) disruption and overload

Electricity supply networks are vulnerable to systemic breakdowns as a result of overloads caused by random factors (climatic conditions, the failure of a particular unit). In the absence of flexible capacity, a demand spike can lead to massive failures. These affect electricity supplies to control centres and internet communication, with further shutdowns of power plants resulting in a cascade. Such failures occurred in the US in August 2003 and in France and Italy one month later, in September. The prospect of network failure also increases the risk of nuclear accidents, as control systems are incapacitated in widespread power outages. Many European countries are operating electricity systems at levels precariously close to their capacity limits.

The question of flexibility has become a major issue with regard to renewable energy sources. In particular, solar energy and wind generated power cannot be easily switched on or off, and it may be delivered by nature at times when it is not needed. In fact, electricity made from wind and sunlight is extremely volatile.[10] There is clearly not enough hydro-electric capacity to smooth out the demand and supply fluctuations that arise from increased use of renewables.

The problem is that electricity cannot be easily and cheaply stored. The most effective solutions to the storage problem so far have mainly tended to involve rather simple mechanical arrangements, notably pumping water uphill in periods of surplus capacity and then using it to power turbines when demand increases (which currently accounts for over 95 percent of power storage). The wider the area that is connected in a "smart grid," the greater the potential should be to compensate for random shocks.[11] But there is substantial political resistance to long distance electricity transmission lines, which are aesthetically unattractive, may have side effects on animals and humans, and are also not very efficient as transmitters. The use of reservoirs as energy storage facilities could work well across frontiers: the development of a German-Norwegian transmission system means that German surplus electricity will be exported to Norway and used to fill hydro-electric reservoirs, and Germany can then import the electricity when it is required as a result of a German supply shortfall. However, the potential to smooth the energy supply through pump storage lakes is very limited. For example, the Ifo Institute has calculated that around 3,500 average-sized pump storage stations would be required to smooth Germany's 2013 actual wind and solar power production (Sinn 2014b). Germany currently has about one hundred of these.

In order to be credible, a considerable amount of investment in coordinating and linking separate national energy markets is required. Resolving all the elements of risk outlined in this Chapter requires a greater level of interconnectedness in European energy markets, that cannot be established cheaply. The trade-off between affordability and security, and the role of competition, are the subjects of the next chapter.

4 Competitive and affordable? Flexible pricing and incentives

The fundamental question arises of whether linking European energy markets – establishing the Energy Union – can contribute to a lowering of prices as well as

[10] In Germany, in 2013, electricity from wind had a nominally installed capacity of 35 gigawatt, peaked at around 25 gigawatt at certain hours of the year, was delivered at an average of 5.4 gigawatt and provided a "safe" supply of 0.42 gigawatt at a relative frequency of 99.5 percent of all hours of the year. Germany is occasionally, at moments when there is sun and high winds, exporting electricity to its neighbours at negative prices, because the capability to smooth the green electricity by temporarily shutting down conventional power plants has been exhausted.

[11] Telephone systems, for instance, are today more interconnected than they were fifty years ago, and as a result are much less prone to periodic overloading and breakdown.

a diminution of the risks that the uncoordinated national systems currently are facing.

4.1 Expensive options

The subsidies regime in Europe – especially in respect to promoting an increased share of renewables - has created expensive energy that conflicts with the goal of energy supply being "competitive and affordable." Industrial consumers pay a higher price for electricity in Europe than in any other part of the world, except for Japan: the contrast with the US is especially striking, as European Commission (2015) notes, with European wholesale prices 30 percent on average higher than in the US. The higher cost is a significant element in comparative competitiveness. There is also a consumer issue. From 2008 to 2012, EU household electricity prices increased considerably, at a rate of 4 percent annually.

In addition, electricity prices in the EU vary considerably, and in this sense defy the logic of a single market that Europe established with the Single European Act in 1986 for most other sorts of economic activity. Countries with a higher share of renewable energy also have significantly higher consumer prices.

The subsidies to renewable energy producers also appear to be a violation of the underlying principles, if not the law, of the EU. Their legality was tested in the case of the Finnish wind farm supplier, Alands Vindkraft, which complained that the Swedish Energy Agency, Energimyndigheten, had only awarded certificates to producers physically located in Sweden. Although the European Court of Justice ruled – surprisingly to most observers – against the foreign plaintiffs, it is difficult to see how a systematic energy policy can be built up on jurisdictional practice that allows discrimination against foreign producers.

The German and Swedish practice raises a fundamental conceptual problem that has not yet been solved. Is the best way of solving energy supply problems to allow market mechanisms to work, within an overall framework of priorities determined collectively by governments; or is it preferable to manage parts of the energy adjustment process separately in accordance with the preferences of particular national authorities? The new Commission document clearly takes a stance against a "centralised, supply-side approach" that is reliant on "old technologies and outdated business models." The debate is most pronounced in the case of the two environmentally and politically most sensitive issues: gas pricing, and nuclear energy. The distinction reflects the long legacy of past (and frequently contradictory) policies, and the difficulty of quickly establishing all the institutions that are really required to let market mechanisms work effectively through the generation of price signals. The cases of gas and nuclear energy illustrate the fundamental nature of the choice facing Europe's policy-makers.

The greater the diversity of supply, and the more market alternatives exist (including different forms of energy), the more resilient the energy economy becomes against unanticipated events, including attempts to blackmail energy users. In other words, diversity of supply limits the power of the resource providers. Marketisation can thus also provide a substantial impetus to improve political conditions in other parts of the world, and reduce the monopoly rents that corrupt politicians extract in resource-rich countries.

4.2 Interconnectedness

European Commission (2015) assigns a priority to increasing the interconnectedness of European energy supply, but is quite modest about the pace in which this reform – surely the major step in accomplishing a single internal energy market – or an Energy Union – will be realized. It sets for 2020 a specific minimum interconnection target for electricity at 10% of installed electricity production capacity of the member states.

Reducing extreme peaks of demand (and consequently of pricing) in an energy supply network that is pushing against capacity restraints requires a better linkage of supply systems that are still not fully integrated. The same is true for the potentially even bigger problem of smoothing peaks in green energy supply. If the national smoothing capacity becomes exhausted thanks to the closure of conventional power plants, as is regularly the case in Germany, there is a case for selling the excess electricity to other national energy markets and use their smoothing capacity. There has been some development in the integration of regional markets. But the linkage projects – such as the French-Spanish link across the Pyrenees or the Steiermarkleitung in Austria – are plagued by long delays (ranging up to 25 years); and a number of ENTSO-E (European Network of Transmission System Operators for Electricity) "Projects of Pan-European Significance" have been cancelled. A recent, widely-quoted estimate suggests that annual savings could amount to 2.5 to 4 billion euros. Even once networks are built, their limited capacity and significant leakages imply significant geographical cost differences. Network operators (and indeed whole countries, such as Switzerland) profit from price differentials without completely eliminating them. Further improving the linkage requires a substantial

investment in transmission systems. The European Commission document estimates a need for 200 billion euros in investment annually, but it is difficult to see how this investment can be supplied by energy suppliers who are already burdened with very high levels of debts.

One response to the financial and debt crisis, which is also a crisis of European growth, is to demand higher levels of investment – both public and private – in Europe. The problem is that in the past, much public sector investment has been misdirected as a result of the political bargaining processes. However, private investment has also been misdirected (above all in large construction booms). Investment in energy networks may offer appropriate incentives to private producers looking at innovative ways of producing new clean energy sources. Since the search for funding also coincides with a widespread sentiment that Europe should investigate large infrastructure investment projects, it may be conceivable to fund the new energy transmission channels, both electricity gridlines and gas pipelines, with public or a mixture of public and private funding. A security levy on energy supply might be an appropriate way of ensuring the fiscal sustainability of such investment, but that is not envisaged in European Commission (2015).

5 Conclusion: Fully Integrated?

The geopolitical consequences of Europe's new interest energy strategy clearly depend on interactions with other players. The response of other big players is of most immediate interest. The US over the past year has demonstrated a more sustained and committed interest in global CO_2 emissions reduction than in previous moments in its history; the new goals of a 30 percent share of renewables in electricity output by 2030 even goes above the European figure. Unlike in Europe, there is little doubt about the capacity of federal institutions to enforce a rigorous approach to new standards. China is moving toward a greater sensitivity to pollution issues, and has embarked on an intensive green energy program. So is Brazil. But those programs may turn into casualties of China's slowing growth and financial sector problems, and Brazil's deep economic crisis.

The immediate precipitant of a new push for an effective solution to Europe's energy problem however came not from the global warming debate, but from vulnerability created by reliance on Russian imports. In the early 2000s, the Russian Federation made a strategic decision – surely in hindsight mistaken – not to develop a modern diversified economy, but rather to build up its position as a supplier of energy and raw materials. Russia is clearly irritated by the EU program, and its political leadership has embarked on a relentless program to use conventional and unconventional propaganda to discredit the EU. It may be expected that it will try to use its influence in south-eastern European states that it is close to – including Cyprus, Hungary, Slovakia and Bulgaria – to try to slow down the implementation of measures to reduce reliance on Russian imports (of gas) and technology (in the nuclear field) (New York Times 2015; Wall Street Journal 2015). Russia's capacity to block a move to greater European self-sufficiency, and the adoption of a coherent energy program, however is acutely limited by the consequences of the fall in energy prices – a fall which is likely to endure for at least a few years, in which the debate in Russia about its appropriate strategy is bound to become more acute. It is going to be a long time before the renegotiation of Europe's energy relations with Russia can take place ("When the conditions are right, the EU will consider reframing the energy relationship with Russia based on a level playing field in terms of market opening, fair competition, environmental protection and safety."). The price fall, perhaps induced in part by the Green Paradox, is limiting the scope for Russian energy diplomacy to be effective, even in south-eastern Europe. An unintended consequence of environmentalism is thus responsible for a substantial shift in geo-politics, to the disadvantage of classical petroleum producers in the Gulf, but also of the Russian Federation.

European Commission (2015) is permeated by the tensions between different objectives in the realization of an energy union. It is most persuasive in the advocacy of a quick move to greater LNG capacity across the EU, in particular in eastern and southern Europe, as an answer to avoiding dependence on Russian supply. But the document is problematical in its reluctance to address more clearly the question of the future of European nuclear power, and rather helpless in the face of the substantial problems of the ETS permits trading. It is too slow in its approach to the integration of electricity capacity, in other words the creation of a real European market; and it has not tackled the problem of what kind of large-scale infrastructure investment is needed in order to allow the successful operation of an integrated but decentralized and non-controlled market. Markets are crucial, but they don't just spring up by themselves; and coordinated attempts to run them often unfortunately generate perverse effects.

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