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Europe's Energy Politics

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ABSTRACT *A cluster of interconnected energy-related challenges confronts the European Union (EU), individual member states, and their populations. GHG emissions, economic–industrial restructuring, rising costs, developing and implementing new technologies, and external dependency, are prominent. Existential imperatives and political constraints imposed by energy needs have affected environmental and foreign policy ambitions. Some EU states are compelled to renew their nuclear industries.*

KEY WORDS: energy policy, European Union, international relations, domestic politics

Although political and bureaucratic elites in the EU might prefer that nominally distinct policy fields could be administered within self-contained silos, it is increasingly difficult to do so. The conflicting imperatives of energy represent an exemplary case of multilevel politics intruding on policy. Beyond technical issues, economic, geostrategic, security and normative considerations permeate a constellation of interconnected challenges. Policy-shapers and decision makers are confronted by consumer and producer demands, interest groups, varied preferences among governments, institutions and national publics, increasing financial costs, and an apparently unavoidable need to deal with authoritarian resource suppliers. Some stakeholders or constituencies will oppose choices made by member states or the EU. Notwithstanding agreements reached and programs underway, energy politics betray a basic lack of European unity.

European Commission President, José Barroso, said that 'when we talk about European energy policy, security of supply is today our foremost concern' (Barroso, 2009). With this statement he confirmed that, until viable alternatives replace them, ensuring a constant flow of (fossil fuel) resources is the EU's premier energy priority. Establishing this as the most important consideration concurrently subordinates declared goals of reducing GHG emissions and the promotion of normative foreign policy, both now merged with energy politics. More use of renewable source (RES) or nuclear energy, which, by decreasing external dependency on oil, gas and coal, would help lower emissions and better enable a foreign policy that actively reinforces oft-stated normative aims and conditionality, precipitate other, chiefly intra-European, conflicts.

This article provides a brief background before examining energy mixes in the EU; economic and regulatory matters; environmental concerns, in particular, CO_2 emissions;

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relations with resource suppliers; public opinion; and the future of nuclear power. Scenarios and conclusions are then presented. The discussion seeks to illuminate how political pressures emanating from local, national, European, international, and global levels, make 'energy policy' multi-dimensional and inextricable from other fields. Contrasting preferences among member states, publics, and institutions such as the Commission and European Parliament intensify resulting dilemmas.

Background

Energy has been a feature of the European integration project since its inception. The European Coal and Steel Community (ESCS) sought to combine French and German heavy industry—and the latter's war-making capacity—under a common institutional roof. The European Atomic Energy Community (Euratom) extended cooperation to nuclear power. As the assemblage of member states and institutions evolved to become the EU, energy policies and industries tended to divergent national models. Only relatively recently has there been an attempt to develop a definitive, concerted response to intensifying challenges. Strategy papers and recommendations, wherein efficiency, diversification, climate change and technology are prominent themes, now appear frequently. A Commission (2006a) Green Paper set out three core objectives: sustainability, competitiveness, and security of supply; and 'concrete proposals' in six priority areas. It was followed by an 'Energy Policy for Europe' (European Commission, 2007a), part of a Strategic European Energy Review (SEER). Adopting an 'Action Plan' recommended in that communication, the Council of the EU (2007: 10–14, Annex 1) concluded that an integrated climate and energy policy was needed.

Energy Mixes

The EU is the world's third largest consumer of energy, devouring about 1850 million tonnes of oil equivalent (Mtoe), or 3.7 toe per capita, annually. There is considerable variation in national mixes (European Commission, 2009a) and changes required for lower intensity, lower CO_2 emitting, and lower external dependency-based energy use are not implemented uniformly. Presuming reasonable accuracy of Commission scenarios, diversity among mixes will test the Union's ability to reach consensus on foreign, economic, industrial, and environmental policies. Without big falls in consumption, a failure to increase the RES share, or removing nuclear power, means continued dominance of fossil fuels in most national contexts and the EU overall.

Having been Europe's main non-transport fuel for centuries, coal cannot be rapidly replaced. It is cheaper than most alternatives and several member states have large deposits. Nonetheless, coal production in the EU27 fell from 366 Mtoe in 1990 to 191 Mtoe in 2006. In Germany it decreased from 125 Mtoe to 53 Mtoe. Since the ECSC was founded, employment in Western European coal industries fell from 1.8 million to less than 100,000 in 2000 (Walker, 2001). Central and Eastern Europe (CEE) is undergoing a similar experience, accompanied by economic and geographic dislocation. As domestic industries shrink, coal imports increase. About 212 million tonnes of hard coal, or 40 per cent of EU consumption, was imported in 2006, almost double that in 1990 (European Commission, 2009a: 32, cf. 54). Energy-efficient Denmark generated 53 per cent of its electricity in 2006 with solid fuels, mainly the 9 million tonnes of hard coal it imported that year (European Commission, 2008a: 15).

Oil provides the largest share of all energy consumed and is predicted to retain this position in 2030, reducing slightly to 35.3 per cent. No common trend is foreseen in a baseline scenario of gross inland consumption (GIC). Oil's share in the EU15 will be 37 per cent; in the 12 new member states, 27 per cent. Some will diversify away from very high dependency (Cyprus 89 per cent in 2010 to 63 per cent in 2030; Malta 94 to 58) or reduce average to low shares (Lithuania 37.6 to 28; Sweden 29 to 24). In others the oil share will remain constant and in some it will rise (Czech Republic 23 per cent to 27 per cent; Estonia 25 to 29; UK 37 to 40). Oil will predominate as a fuel for road transport, falling to 90 per cent if an envisaged increase in the use of biofuels is realised. The aviation industry, which uses little biofuel, will triple consumption in 2030 compared with 1990 (European Commission, 2008b: 53-56, 96-155).

Added to increases in absolute volumes between 2000-2005, gas consumption is projected to rise another 71 mtoe by 2030. Less emissions compared to oil and coal, lower cost compared to RES, and flexibility compared to nuclear encourage its use. The relative share is predicted to increase only marginally to 25.7 per cent by 2030. Sweden has only 2.5 per cent gas in GIC while it constitutes 37 per cent in the UK and 45 per cent in the Netherlands. Both possess indigenous reserves though only the latter remains a net exporter. As their primary production decreases EU dependency on external sources will rise to about 85 per cent by 2030 (Commission, 2008b).

The EU has been a leading political and financial supporter of RES. Along with requiring each member state to ensure that at least 10 per cent of transport fuels are RES, a 'Renewables Directive' that became law in June 2009 prescribes that this form constitutes at least 20 per cent of total EU energy consumption by 2020. Individual national performance to 2005 and targets for 2020 again vary widely. Sweden is projected to increase its high share from 40 to 49 per cent, Latvia from 32.6 to 40 per cent, and Finland from 28.5 to 38 per cent. Malta is forecast to rise from 0 to 10 per cent, the UK from 1.3 to 15 per cent, and the Netherlands from 2.4 to 14 per cent (European Union, 2009: 46). Hope for improvement in the performance of laggards is tempered by the likelihood that a Commission Directive aiming at a 21 per cent RES share of total electricity by 2010 will not succeed.

The EU biofuel strategy (European Commission, 2006b) had a target of 10 per cent of auto fuel by 2020. Use of subsidies to promote it impacted on world food prices and caused shortages in developing countries (OECD, 2008). During the resulting controversy actors as disparate as the United Nations and Nestlé described the situation as 'morally unacceptable'. More public finances will be needed to alleviate the situation and maintain a biofuels program. For example, substantially increasing the use of bagasse for cogeneration requires additional commitments to countries where it is or could be cultivated. Support for RES may also lower the plant value of other energy types, creating 'incentives for some utilities to lobby against renewables or to obstruct their deployment'. According to Neuhoff (2009: 2–3), 'the typical strategy of such lobbyists is to request delayed action until the information base is improved'. Coenraads *et al.*, (2008: 6, 65–71) argue that progress in RES heat generation and biofuels for transport is modest and perceived 'bottlenecks' have undermined private investment.

Other questions arise regarding baseload power, the constant supply of electricity for standard large-scale consumption levels, mainly provided by coal-fired, gas-fired, or nuclear plants. Hydro (6 per cent of supply), geothermal (1 per cent), and other RES can increase flexibility in baseload mixes, though solar or wind forms are riskier. Some

disagree, arguing that the predominance of coal and nuclear, and related conventional wisdom, results from manipulation by vested interests. Diesendorf (2007) contends that with conventional source back-up the RES component could be increased without extra risk. There are also other factors to consider. Denmark, for example, is an efficient electricity generator that utilises wind power and relies on Norwegian oil and gas for contingencies. This is different to relying on post-Soviet, Middle Eastern, or African suppliers. The possibility of undesirable effects through dam construction or drilling projects for hydro or geothermal must also be taken into account.

The EU is the world's biggest consumer of nuclear generated electricity. The 944.2 ThW(e) used in 2005 was 30 per cent of its electricity and 15 per cent of its total energy consumption. The Commission (2008: 65) suggested a decrease to 20 per cent of total electricity consumption in 2030, a figure undermined by developments in some member states, 15 of which had operating nuclear plants in 2010. Nuclear power and associated politics is discussed in more depth below.

Economic and Regulatory Issues

Despite emphasis on competition as a general principle and as essential to meeting energy demand, some policy measures contradict it. Protectionism persists and the higher the level of import dependency, the greater the support for national champions (Deutsche Welle, 2006a; Röller *et al.*, 2007; McGowan, 2008). Subsidies for coal reached €4 billion per year in 2006–2008, down from €8 billion in 2002–2004. Palliative industrial care is inconsistent with CO_2 emission reduction goals, particularly for old EU members like Germany, one of the louder 'pro-environment' voices, which dispensed the largest subsidies in that reporting period. By comparison, Poland decreased aid from €4 billion in 2003 (European Commission, 2008c).

To boost its green credentials, Germany became one of the biggest per capita environmental aid grantors, providing 0.3 per cent of GDP in 2005–2007. Only Sweden, with 0.77 per cent, was higher. Denmark, Austria, the Netherlands and Finland were above average, the UK just over half the average, and Belgium, Slovenia and Lithuania less than half. Other states granted less than one quarter of the average in GDP terms. Tax cuts and exemptions were responsible for a large rise in Sweden's expenditure. In Germany, aid rose steadily from 2002–2006 following measures that prolonged tax exemptions on electricity and mineral oils. Modifications saw the figure fall by €2.5 billion in 2007 to €5.8 billion. Total EU environmental aid was €7 billion in 2001 and €12 billion in 2007. A large proportion benefited energy intensive industries including 'big polluters' and was necessary 'in order to allow for certain types of environmental taxes to be introduced' (European Commission, 2008c: 37). The EU's biggest corporate emitter, German firm RWE, wanted costs for new carbon, capture and storage (CCS) plant to be eligible for state aid (Lambertz, 2007).

State funding for environmentally preferable projects is now being dispensed or demanded when the EU is in a deep economic downturn and accumulating vast debt. In addition to a multitude of existing instruments, about 14 per cent of the combined EU stimulus package induced by the global financial crisis is 'green investment' (Bernard *et al.*, 2009). Before the financial crisis and later bailout of Greece, the German government aimed to generate 12 per cent of electricity with RES by 2010, helped by incentives and compensation schemes (Agnolucci, 2006). In 2005, 1.4 million people were

directly or indirectly employed in the EU RES sector, which then had a total value added of €58 billion (Ragwitz *et al.*, 2009). Gross employment increases resulting from current and projected policies were also modelled. But net figures are 'significantly smaller due to replaced investments in conventional energy technologies as well as due to the dampening effect of the higher cost of renewable energies compared with conventional alternatives'. Rather than internal growth, exports outside 'dominate the economic impact of renewable energy policies'. To sustain a positive balance 'it will be necessary to uphold and improve the competitive position of European manufacturers of RES technology and to reduce the costs of renewable energies'. Favourable 'international framework conditions' for RES are also needed (Ragwitz *et al.*, 2009). In Germany, short-term effects of state RES promotion could include jobs growth of up to 33,000. But by 2010, argued Hillebrand *et al.*, (2006), higher consumer prices would have contractive effects and cause a negative employment balance.

The Commission (2008a) estimated total cumulative investment in electricity between 2005 and 2030 at €900 billion. 36 per cent is foreseen for RES, 29 per cent coal, 17 per cent gas and 16 per cent on nuclear energy. By comparison, in one scenario, investment in RES *alone* is projected to reach €672 billion between 2005 and 2030 (Coenraads *et al.*, 2008: 10). This will ensure a steep and continuing rise in electricity costs. Averaged across the EU27, prices increased from €12.67 per 100kWh in 2005 to €14.51 in 2007. Heating gasoil prices rose 20 per cent having stabilised after a spike in 2006. Natural gas costs for households rose about 28 per cent (European Commission, 2009a: 51). Industry prices rose from €6.43 to €7.81 per kWh. In Germany, where feed-in tariffs for RES generation were introduced in 1991 (Büsgen & Dürrschmidt, 2009), industry prices rose from €7.40 in 2004 to €9.79 in 2007 (European Commission, 2009a: 47). While RES receives most current public investment, the nuclear industry has in the past benefited from more state spending than other energy forms: about $US24 billion for Germany, France, the UK and Italy combined from 1974 to 1998 (IEA, 2001: 230). Special investment rules also advantaged the industry and other costs such as waste disposal have to be factored into total costs of subsidisation.

National or EU-wide strategies must allow for long lead-in periods when planning capital projects or finalising supply contracts. It can be technically difficult and costly to introduce revisions once implementation is underway. Neuhoff (2009: 2–3) explains that RES deployment 'requires changes to financial support schemes, network regulation, regional planning, permit processes, and energy market design. If any one of the changes is not pursued effectively, then deployment will be halted in the respective country'. Moreover, political 'volatility' deters private enterprise when 'demand depends on future government decisions'. If there is no 'early private sector investment' targets will be unachievable or require higher levels of public investment and debt.

Rising costs for one energy type may temporarily make others appear better value, but prices can change quickly. It is certain that consumers will pay more, and even taxpayers who consume relatively little will fund restructuring, research and development, and subsidisation in the energy sector.

Emissions Reduction Goals

At Kyoto in 1997, the EU15 agreed to reduce GHG emissions (of which CO_2 is about 80 per cent) by 8 per cent by 2008, measured against 1990 levels. States that acceded in 2004

and 2007 had other targets. In 2001, a 6th Environment Action Programme (EAP) was adopted (European Commission, 2001). Climate change has become the most conspicuous focus and a concern for 87 per cent of the EU population (European Commission, 2005; European Commission/Gallup, 2007). The EU's own performance has not been outstanding. CO_2 emissions for the EU27 were 9230 kg per capita in 2006 after being 9290 kg in 1990 (European Commission, 2009a: 214). In March 2007, a binding emissions cut of 20 per cent by 2020, with an endorsed objective of 30 per cent, was agreed (Council of the European Union, 2007a: 12). The UK government tabled a Climate Change Bill, which proposed a 'statutory goal' to reduce UK emissions by 60 per cent by 2050 and 26-32 per cent by 2020 (UK HM Government, 2007).

The Emissions Trading Scheme (ETS) was described as the 'cornerstone of the EU's strategy for fighting climate change' (European Commission, 2006c). The ETS is backed by National Allocation Plans (NAPs), which determine the quantity of emissions allocated to sectors of economy and society in each member state. NAPs are assessed by the Commission and considered by a Climate Change Committee. They must correspond with Emissions Trading Directive criteria (European Parliament/European Union, 2003). States can partly offset Kyoto commitments by investing in Joint Implementation and Clean Development Mechanism projects in other countries.

The scheme was not as successful as envisaged. EU climate policy was soon depicted as 'stagnating' and the ETS, 'once held up as a model to be emulated' was 'floundering' (Deutsche Welle, 2007a). An excessive allotment of emission allowances caused prices to fall precipitously. During the second phase, from 2008–2012, the EU has attempted to implement lessons learnt and a Commission review altered the allocations basis for 2013–2017. Some national and European Parliament politicians (MEPs) remain averse to aspects of the ETS including its market mechanism.

The United Nations Framework Convention on Climate Change aimed at stabilising atmospheric GHG concentrations so as to 'prevent dangerous interference with the climate system … allow ecosystems to adapt … ensure that food production is not threatened … and enable economic development to proceed in a sustainable manner' (EU Climate Change Expert Group, 2008). The EU, which viewed itself as having a 'leadership role in the international negotiations' (European Commission, 2009c: 23), proposed a mean temperature increase of below 2°C relative to pre-industrial (1850–1899) temperatures. Measured against 1990, industrialised countries will have to reduce their emissions by 30 per cent in 2020 and 85 per cent in 2050 to achieve this. According to the EU Climate Change Expert Group (2008), the 'key mitigation techniques and practices currently available' comprise 'Improved supply and distribution efficiency; fuel switching from coal to gas; nuclear power; renewable heat and power (hydropower, solar, wind, geothermal and bioenergy); combined heat and power; early applications of Carbon Capture and Storage'. Technologies and practices projected to be available by 2030 include 'CCS for gas, biomass and coal-fired electricity generating facilities; advanced nuclear power; advanced renewable energy, including tidal and waves energy, concentrating solar and solar PV'.

Almost any EU policy field can trigger national reflexes and conflict. Climate change is no different. Progress in some areas does not exclude discord in others. A proposal to cut automobile emissions involved phasing in fines of €20 to €95 per excess gram of CO_2 from 2012. It angered the politically influential German auto industry and incited Chancellor Angela Merkel to declare that the EU was 'making policy at expense of Germany'.

The Environment Ministry, then headed by the SPD's Sigmar Gabriel, said the plan favoured French and Italian carmakers, whose vehicles had lower rates of emissions (Deutsche Welle, 2007c). Other contentious developments include plans to construct up to 26 new coal-fired power plants in Germany. A Green Party politician claimed 'if all of those plants end up being installed, there is no way we can reach our climate protection goals for reducing emissions' (Deutsche Welle, 2007b). In its annual report, the CEO of RWE noted that it was 'virtually impossible' to build coal-fired plants in Western Europe (RWE, 2009: 25), although this did not rule out a shift to CEE.

Foreign Affairs

EU decision-makers have more than internal contexts to consider. The Green Paper's sixth priority was a concerted external policy that enabled the EU to speak with 'one voice' to foreign actors (Commission, 2006a: 14–15). Even if member states and institutions can agree, effective 'dialogue' with outsiders presumes they are reliable. One set of external issues relate to the EU's assumed role as global leader in promoting a cleaner, sustainable environment. In this regard, a degree of unity has been reached. The EU encourages governments, industries and consumers elsewhere to pursue similar goals and censured non-Kyoto ratifiers such as the former Bush and Howard governments in the USA and Australia.

More problematic is how a climate change blueprint requiring €100 billion per year for developing countries, later agreed in principle at the UN Climate Change Conference (UNCCC), will be funded. The Commission (2009d) estimated one half will come from public sources globally, with the EU providing up to €15 billion of this. It rests again on an assumption that sums of this size, and the other €50 billion foreseen from private investment, will actually be provided annually. At the UNCCC, despite previous EU provision of technical and financial assistance to China for 'near zero' emission coal plant projects (European Commission, 2009b), intensive planning efforts (Commission, 2009c), and the apparent goodwill generated in the long lead-up, a non-binding 'Accord' substituted for a more ambitious global agreement (UNFCCC, 2010).

Whatever its aims or achievements in global environmental management, the EU's foremost energy concern is external dependency. About 56 per cent of its energy resources are imported, a share predicted to grow to 67 per cent by 2030. Oil imports will rise to 95 per cent of consumption, natural gas imports to 84 per cent, and hard coal to 81 per cent. The critical factor is *on whom* the EU is dependent. Excepting Norway, its principal oil and gas suppliers are post-Soviet, Middle Eastern, and African states. All are rated as medium or high political risks (PRS Group, 2006; De Jong & van der Linde, 2008; Kaufmann *et al.*, 2009).

Russia is the EU's biggest foreign policy challenge, not least because energy has such a dominant role in the relationship. Even if some issues are ostensibly concentrated on relations between Russia and its' 'near abroad', a problem for one or a few member states is a problem for the EU (European Commission, 2007b; Baran, 2007; Hamilton, 2008; Hadfield, 2008; Wood, 2009; Economist, 2009). Russia provides 33.5 per cent of EU crude oil imports, 42 per cent of its gas imports, and 26 per cent of coal imports, the last having risen from 7 million tonnes in 1996 to almost 55 million tonnes in 2006. Collective energy resource imports from Russia sustain over 10 per cent of total EU demand. While implicitly recognising dependence as undesirable, some analysts downplay the political

element. They contend that the predicament is much greater in CEE than in Western Europe where diversification of gas supply has lowered relative dependence on Russia. Creating an integrated EU gas market is viewed as (further) reducing the potential for problems. Upstream production and investment difficulties restricting Gazprom's supply are emphasised as more important than political factors (Goldthau, 2008; Finon & Locatelli, 2008; Noel, 2009).

This line of argument underestimates how much the business component is entwined with others: it is *international political and geostrategic* economy. Russia's rulers have used energy resources as the instrument of an effective *Realpolitik*. The primarily economic focus above also presumes that a better functioning EU gas market would simultaneously overcome Russian leverage in the oil and coal sectors. It is to reduce this leverage that the EU, multilateral agencies, and consortium states are funding the Nabucco pipeline project, an expensive enterprise intended to circumvent Russia and convey hydrocarbons from Azerbaijan, Kazakhstan, Uzbekistan and Turkmenistan. Yet neither these states, nor others in the Middle East and North Africa, all of which the EU hopes to expand partnerships with, are improving much in terms of democratisation. Relations with them expose the EU regarding its commitment to human, political and civil rights, and open societies. These EU values are compromised by arrangements with most of its oil and gas suppliers (Schuette, 2004; Youngs, 2007; Wood, 2009).

The Commission contended that the EU must utilise its economy of scale and demand management power (European Commission, 2006a). It conceived of a 'pan-European Energy community' that integrated 'EU energy markets and those of its neighbours' as an optimal arrangement. This needs the agreement of external producer states, the governments of which may perceive their interests differently to how the EU would prefer. It also overlooks the possibility of hydrocarbon producers deploying a countervailing collective supply management. Arguments that a 'markets and institutions' approach has failed may be credible, but claims that a reliable alternative can be created through the EU-Russia energy dialogue and its extension to include Turkey (which has demanding *quids pro quo* of its own) in a 'hypothetical geo-energy space' were also overly optimistic (Mañé-Estrada, 2006).

Germany is the critical member state in the EU's energy future. Its transition from a government led by Gerhard Schröder, to a grand coalition with Angela Merkel as Chancellor, coincided with a deterioration of EU-Russia relations (Umbach, 2004; Rahr, 2006; Emerson *et al.*, 2006; Stelzenmüller, 2009). Yet, no German government will jeopardise resources supply and the lucrative distribution arrangements German companies have secured. French and Italian political and business leaders also aimed to secure bilateral deals that privilege national firms over the collective EU. The Commission response is to try to 'achieve through litigation what it couldn't achieve through legislation', fining Germany's E.ON and France's GDF Suez each €553 million for anti-competition sharing of Russian gas (Economist, 2009).

Public Opinion

In response to an open question on energy related issues, one third of participants in Eurobarometer survey mentioned financial costs and increases as their primary concern (European Commission, 2007e). Allowed only two selections from a list of alternatives that their governments should focus on developing, 48 per cent nominated solar power,

41 per cent new technologies such as hydrogen and clean coal, 31 per cent wind power and 12 per cent nuclear energy. While research into RES was supported, only 40 per cent of respondents were prepared to pay more for it. 2 per cent were prepared to pay 11 to 25 per cent more. 54 per cent were not prepared to pay any more. In the new member states 66 per cent would not pay more (European Commission, 2006d). Two years later 'global warming/climate change' was rated the second most serious problem facing the world. 44 per cent of EU respondents said they were prepared to pay more for green energy and 30 per cent that they would not pay any more (European Commission, 2008d). The following year, climate change was rated the third most serious global problem, surpassed by 'a major global economic downturn' (European Commission, 2009e). By comparison, in a hypothetical situation, respondents in Greece were willing to accept additional costs of external production and supply in exchange for a higher level of energy security (Damigos *et al.*, 2009).

For some years the Commission has conducted surveys that include questions implying links between nuclear power and a cleaner environment. Other questions aim to connect endogenous nuclear power with reductions in dependency on external suppliers of energy resources. A basic pattern can be identified. Certain EU publics usually appear at the sceptical end of opinion on nuclear power. They return the highest levels of opposition and tend to be the least positive about the actual or potential contribution of nuclear energy to a reduction in emissions or dependency on external suppliers of oil, gas or solid fuels. These publics include those of Austria, Cyprus, Greece, Luxembourg, Malta, Portugal and Spain. These countries have relatively high levels of per capita GHG emissions and some have increased in recent years.

Another group of publics are more favourably disposed towards nuclear energy *and* more likely to view it as assisting reductions in GHG emissions and dependency on foreign suppliers. These include Sweden, Finland, Hungary, and the Czech and Slovak Republics. In contrast to the sceptical group, these countries generally produce lower levels of GHG emissions and/or are reducing. Larger nuclear energy users, France, the UK, and Germany, are around the middle of the opinion spectrum. Their emission levels have gradually reduced from 1990. 51 per cent of respondents to a 2008 survey in Germany agreed with the exit from nuclear energy, down from 58 per cent in December 2007. 44 per cent were for a continuation (Der Spiegel, 2008).

Public belief that the use of nuclear energy contributes to reduced GHG emissions and import dependency does not, as a consequence, mean majority support for its deployment. In February 2007, 69 per cent of the EU25 considered that nuclear energy would help reduce dependence on imported oil and gas, 50 per cent that it ensured lower prices, and 46 per cent that it helped to limit global warming. 38 per cent perceived no risk associated with nuclear power. 53 per cent said there was a risk (European Commission, 2007c). In April 2007, 61 per cent of the EU27 said that the share of nuclear energy should be decreased 'as it poses safety problems'. 30 per cent said it should be increased, 'as it does not contribute to climate change and global warming' (European Commission/Gallup, 2007).

In 2005, 92 per cent thought that a solution to highly radioactive waste had to be developed now and not left for future generations. 81 per cent said that the lack of a decision on the final management of such waste was due to its political unpopularity (European Commission, 2005). In 2007, 51 per cent of the EU25 considered that their national authorities sufficiently ensured the safe operation of nuclear power plants

(European Commission, 2007c). 46 per cent of the EU25, ranging from 73 per cent in Belgium to 16 per cent in Greece, said they trusted companies operating nuclear power plants. 44 per cent, ranging from 83 per cent in Greece to 25 per cent in Hungary, did not trust these companies (European Commission, 2007c).

Nuclear Power: Renaissance, Phase-out, or Status Quo?

Nuclear power will be the focus of a political showdown in the EU. Memories of Chernobyl and the possibility of other accidents, the predicament of waste disposal, the application of relevant technology for military purposes, and potential terrorist involvement, underpin public apprehensions. Prolonging or expanding nuclear industries will incite protest (Deutsche Welle, 2006b; Corporate Europe Observatory, 2006; Frankfurter Allgemeine Zeitung, 2009). There are also financial considerations: the cost of waste disposal will be factored in to energy bills. Conversely, the constraints of emission reduction demands, and problematic external resource suppliers, form the basis of counter arguments. Henningsen (2006) contends 'Without a clear strategy for developing alternative capacity, phasing out nuclear power through natural ageing (as in the UK) or a political decision (as in Germany and Belgium) is likely to leave the electricity sector uncomfortably dependant on natural gas'. With many EU states having little room for manoeuvre, and some possessing extensive nuclear infrastructure, nuclear energy offers a partial, if controversial, solution.

A 'Nuclear Illustrative Program' (PINC) appeared in the 1990s, outlining nuclear energy in the EU and globally, related challenges, and factors to consider. Commission documentation shifted from terming nuclear power 'undesirable' and a 'less than perfect' form of energy to expressing 'doubts that the importance of nuclear will decline' and the 'nuclear option must remain open if we are to have any chance of meeting our Kyoto targets' (European Commission, 2000; De Esteban, 2002). Commission discourse has since been heading towards overt espousal of the continued or expanded use of nuclear energy – at least until a preferable solution emerges.

The Green Paper's third priority of achieving a more sustainable, efficient and diverse energy mix raised the prospect of (increased) nuclear energy use and sought to pre-empt an intensifying of opposition by proposing a 'transparent and objective debate on the future role of nuclear energy in the EU' (European Commission, 2006: 9). The Commission (2007d) then noted that 'should the intention be to replace existing nuclear plants by new ones, decisions are required'. In the same year the 'role of nuclear power in Europe received an unexpected boost' when linked to a 'landmark climate change deal'. French, British and Czech governments were among the most pleased with the outcome. In response 'environmentalists complained that an ambitious headline goal to cut Europe's CO_2 emissions by a fifth by 2020 had been weakened by concessions to the main nuclear nations' (Charter & Watson, 2007).

A UK government White Paper supported extension of the nuclear option and a 200 page 'consultation document' on the 'Future of Nuclear Power', which generates 18 per cent of the UK's electricity, examined its role in a 'low carbon UK economy' (UK Department of Trade & Industry, 2007a, 2007b). A decision to renew the British nuclear industry was soon confirmed (Kennedy, 2007; BBC, 2009). Following the 2010 election, nuclear power, extended under the departed Labour government, may present new difficulties for the incoming Conservative (in favour) and Liberal Democrat (opposed)

coalition. In France, which generates almost 80 per cent of its electricity with nuclear power, two 'super reactors' recently augmented an extensive infrastructure, and in March 2008 an Anglo–French partnership began work on a 'new generation of nuclear power stations' (Wintour, 2008). The project aims to boost the supply of non-fossil fuel energy available for national markets and to sell the technology and expertise to help pay for the large investment required. The announcement came after France, through state-owned company Areva, had concluded deals to supply reactors and atomic fuel valued at $12 billion to China (MacCartney & Pagnamenta, 2007), and nuclear plants to Saudi Arabia, Qatar and the United Arab Emirates for £2 billion (Verna, 2008).

The Netherlands has reversed a phase-out strategy (excepting plants scheduled for decommission) and is planning new reactors. Belgium is likely to 'phase-out from phasing-out' (Belgian Ministry of Energy, 2007). In 2009, the then government deferred an earlier phase-out date by ten years. Sweden has gone down a similar path. In 2008, the Italian government announced it would resume construction of new nuclear plants twenty years after a referendum appeared to have put an end to the industry (Rosenthal, 2008). Legislation was passed in July 2009 (Nuclear Energy Agency, 2009) and major projects with French companies were announced (Alfroy, 2010). New facilities are being constructed in Finland (after a national referendum) and Romania (IAEA, 2009). Others are planned in Slovakia. In 2009 the Polish government announced a national nuclear energy program. Two plants are to be constructed and Poland will share another with Latvia, Estonia and Lithuania, which will provide the site (Polish National Atomic Energy Agency, 2009). Non-EU member Switzerland, one of several European states whose oil import inventories are rated as having high levels of geopolitical risk (Gupta, 2008), generates about 40 per cent of its electricity through nuclear means.

With its *Atomaustiegsgesetz* (Nuclear Exit Law) of 2002, Germany's Social Democratic-Green coalition government legislated the closure of all nuclear facilities by 2020/21 (Federal Republic of Germany, 2002). The Greens (Die Grünen), the world's most influential environmentalist and anti-nuclear political party, lost its place in government in 2005. Their Christian Democrat (CDU-CSU) successors were more favourably disposed towards nuclear energy. The federal education minister supported nuclear research with €13 million per year in funding, whereas the previous government provided none (Michel, 2008: 1). The liberal Free Democrats (FDP), who formed a new coalition with the CDU-CSU after the September 2009 federal election, propose that no new nuclear power plants be built but that, subject to assurances regarding safety, the operation of existing plants be extended indefinitely (CDU–CSU/FDP, 2009).

Germany's nuclear phase-out legislation and plan are not irreversible. The International Energy Agency (2007: 9) 'strongly encourage the government to reconsider the decision to phase out nuclear power' and argue that 'the early shut-down of these plants comes at a cost to energy security, economic efficiency and environmental sustainability, the tenets of Germany's energy policy'. The government was urged to 'initiate a national debate about the role of nuclear power in Germany's long-term fuel mix, with early attention paid to the possibility of extending the lifetime of existing plants'. After the UK and France announced that they would construct new nuclear power stations, industry figures urged that Germany follow this lead and 'pursue its own nuclear renaissance'. Without it, the country could face an electricity shortage of '12 to 21 gigawatts' and increased blackouts (Bell & Shipman, 2008).

Scenarios and Conclusions

At the UNCCC, the EU delegation pledged that it would go beyond a 20 per cent lower GHG emissions target if other developed countries were to do the same. Raising the EU target would further increase pressure to rapidly expand the RES sector, especially if nuclear generated energy is reduced. A Commission study (2008b: 12) declared:

> Carbon intensity … continues to improve up to 2010. However, this improvement comes to a halt after 2010 as nuclear plants are progressively retired and largely replaced by coal without renewables making sufficient progress.

Political tensions implicit in the above citation intersect with others related to 'security of supply'. Environmental and foreign dependency concerns are linked. First, a high proportion of emissions are attributed to the consumption of hydrocarbons; second, most of those that the EU consumes are imported. There is some measure of control over prices, competition, regulatory frameworks, technological advance, associated employment concerns, and even combating climate change. But EU influence over the resources it needs is limited because they are largely outside of Europe, with all the potential for coercion this entails. A few among many possible scenarios are outlined.

Business as usual: Coal reduces gradually in GIC, but continues to be mined indigenously and imports rise. The share of oil reduces slowly, but it remains the most used form of energy for decades and by far the main fuel for road and air transport. Gas demand continues to grow and prices rise steadily. Use of RES expands exponentially driven by EU sponsorship. Optimistically the 20 per cent by 2020 target is reached; 80 per cent of energy consumed is not RES. The EU makes a major contribution to addressing environmental sustainability and climate change, lowering its own GHG emissions level, but the issue is global and there is no comprehensive agreement in sight. Costs rise substantially. The problem of import dependency intensifies.

Hydrocarbon Supply Crisis: Apart from Norway, the EU's oil and gas suppliers are authoritarian and prone to unpredictability. Ongoing conflict in the Middle East, the Russo–Georgian war, Russo–Ukraine gas disputes, instability in Africa, and despotism and corruption in Central Asia and Azerbaijan are among the examples attesting to the potential for crises. The withholding of Russian gas (or oil or coal) supply to the EU or dramatically increasing prices is an omnipresent possibility. Several weeks in winter without delivery of gas and oil would force the EU to use its own reserves, try to make emergency purchases from Norway, and turn to existing coal and nuclear plants to increase capacity. It would impress that in the longer term Russia cannot be relied on. Contingencies would have to be rapidly implemented.

Renewables: Large public and private investment becomes available for RES. There is a genuine attempt to reach achievable CO_2 targets rather than declarations that will not be met. Unintended outcomes are possible, as the biofuels/food crisis controversy showed (Keyzer *et al.*, 2008). Concerns about reliability remain and wind or solar require continued underwriting by gas, coal or nuclear. Most EU biomass is imported, though not from the same sources as its fossil fuels. Some citizens consider nature conservation is jeopardised by use of biomass or hydropower schemes. Though efficiency improves, there are big cost increases for consumers and industry.

Nuclear power: Reduces GHG emissions and external dependency problems but ignites others related to public distrust and attendant issues of possible malfunctions, waste disposal, the linkage of civilian and military applications, and materials or facilities being stolen or damaged. It can reliably produce fairly low cost energy on a per unit basis but new projects are capital intensive. The entire cycle (plant construction, mineral extraction, waste storage and disposal) must be factored into emissions-reduction or financial calculations. This does not prevent the construction of new plants. The relevant governments calculate that discontent about nuclear power is a lesser price than that of increased CO_2 emissions or dependency on authoritarian resource producers. Some analysts argue that RES and nuclear will compete for funds, are incompatible, and cannot coexist in the longer term (Verbruggen, 2008). Others suggest they can coexist and that a complete phase out from nuclear power will lead to higher prices and emission levels (Bode, 2009). The latter would be even higher if about 160 reactors were not operating in the EU. The EU Climate Change Expert Group (2008: 39) predicts that from 2010 to 2025 nuclear energy will make a greater contribution to a 'portfolio of options needed for deep reductions of fossil CO_2 emissions'.

Despite lukewarm support or outright opposition in much of the EU, and after several member states announced phasing out operations (Bilefsky, 2007; Charter & Watson, 2007), nuclear power has made an 'eerie comeback' (Der Spiegel, 2008; Müller, 2008; Die Zeit, 2008; Deininger, 2008). Some states that do not have nuclear industries will draw on energy generated by nuclear plants in states that do. The current German government, and its successors, will hope for opposition to subside and for public opinion to gradually move in favour. They will attempt to disguise intentions to reverse the phase-out by withholding information on the one hand, and the dissemination of vague statements on the other. Evasion and procrastination may become the model response in the EU to competing and contradictory pressures that confront policy and decision-makers with limited options and difficult political choices in the energy field.

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