Enhancing European Energy and Climate Security: Eastern Strategic Partners, Unconventional Sources and Public Policies

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Abstract Energy security has become a heavily discussed topic due to rising energy demand worldwide, increasing import dependence in many European countries, geopolitical tensions and conflicts and the need for a regulatory and policy response. The papers collected in this volume aim at analyzing how energy security in Europe influences international relations and environmental issues with a multidisciplinary perspective, corresponding to the book three sections: international relations, focusing on Eastern EU partners; energy economics, highlighting the current unconventional hydrocarbons revolution and its impact on EU energy and climate strategies; public policy perspective, with the analysis of EU policies and two case studies. The issues considered in the volume represent a selection of hot topics in the debate that are framed together by this introductory chapter where the editors give an overview of the research themes, outline the structure of the book and summarize the contents of the individual chapters.

1 The Issue: Energy and Climate Security

Recent years have seen increasing attention being paid to the broad issues of energy security and climate change, which are of the utmost importance for the European Union and its member states. Energy security has become a heavily discussed topic due to rising energy demand worldwide, increasing import dependence in many European countries, geopolitical tensions and conflicts, the globalization of formerly regional markets, and the need for a regulatory and policy response.

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A possible forthcoming fossil fuel depletion, geopolitical instability, and competing energy demands from high-growth countries are only a short list of the emerging and long-standing energy issues for the EU. These challenges are strictly intertwined with the climate change issue. The objective of building a low-carbon economy in Europe implies a reduction in fossil fuel use in residential and industrial activities. This goal is consistent with the energy security strategy, which includes a moderation of energy demand, an improvement in energy efficiency, increases in domestic energy production through renewables, and the development of new technologies. Indeed, these are some of the pillars of the European Energy Security Strategy, which was approved by the European Commission in May 2014 (EC 2014). This communication states very clearly that the strategy is '*an integral part of the 2030 policy framework on climate and energy*' (p. 3).

However, the energy security strategy is also based on diversification of energy sources, including traditional fossil fuels. For instance, electricity generation still partly depends on the use of coal and lignite (about 27 % at the EU level), and coal—which is highly polluting—is gradually becoming more available on the international markets in increasing quantities and with decreasing prices. Meanwhile, the Commission considers the exploitation of oil and gas from unconventional sources to be an option to compensate for declining conventional hydrocarbon production. These examples show that pursuing energy security could mitigate climate change, but in some cases it could harm the environment as well. Therefore, we refer to *energy security* and *climate security* as an interlinked issue, to be tackled through energy policies which should consider their implications for both aspects of the problem.[1]

The concept of energy security, although ubiquitous in the debate about energy, is often considered to be 'abstract, elusive, vague, inherently difficult and blurred'.[2] Indeed, the meaning of the concept has changed over time and has a different focus in different disciplines, but it definitely emerges as a multidimensional concept. As an example, Brown et al. (2014) define energy security as "equitably providing available, affordable, reliable, efficient, environmentally benign, proactively governed and socially acceptable energy services to end-users". Moreover, definitions of energy security are highly context-dependent (Pointvogl 2009; Yergin 2006) as they are influenced by the different perceptions of the relevant stakeholders due to national characteristics (resource-rich or resource-poor, industrialised or developing countries, market-oriented or state-oriented economies). Finally, it is a dynamic concept needing to be tackled with flexible strategies which adapt to changing circumstances.[3] Therefore, following Winzer (2012) and Sovacool (2011), we can affirm that energy security has a multidimensional definition including physical

[1]Luft et al. (2011) argue that because of complementarities and trade-offs between energy and climate security, analysis of the two issues should not be mixed. Specifically, climate change should not be factored into the energy security debate.

[2]See Chester (2010) and the references cited there.

[3]This characteristic is also acknowledged in the European Commission communication (EC 2014).

availability, price stability, competition, sustainability and supply security.[4] There is a broad consensus that energy security is promoted by open and competitive markets that favour the exchange of information, the availability of resources and investments, and lead to a diversified supply structure.

However, there is less consensus on the relation between energy security and environmental objectives, in particular CO_2 mitigation, since restrictions in this area may limit the options for diversifying energy supplies. On the other hand, climate change policies may help the transition towards a larger use of renewable energies, which at least partially increase energy security. This trend is taking the pressure off fossil fuels, on the way to a hydrogen—or solar—energy system. In this changing picture, the future of natural gas depends on its ability to establish itself as a 'clean' energy in a low-carbon world. The traditional wisdom that gas is a clean source of energy is no longer valid in a Europe with more ambitious climate targets. Thus, natural gas is threatening to become a 'sunset industry' by 2030, caught in the middle between 'clean' coal (carbon capture and storage), biogas and other renewable sources of energy.

These issues can only provide a rough idea of the complexity of energy problems. For example, the physical availability of energy sources may be interpreted as their being able to satisfy levels of reserves and as providing reliability, which implies analysing infrastructure efficiency and natural risks. The issues are deeply interrelated and too complex to be adequately tackled by a single discipline or from a single point of view. Multidisciplinarity—meaning that the subject is approached from different perspectives with different methodologies—is therefore a prerequisite for advancing in knowledge and comprehension. This needs to be done because the energy issue deeply influences both international relations and environmental quality.

At the EU level, energy is becoming an issue of both integration and disintegration, and will perhaps turn out to be the ultimate test of political and economic unity. External policy is a central component of Europe's new integration phase, in which climate and energy policies represent two interrelated issues for which the definition of a common stance will be of critical importance. Demand uncertainty is even greater than before, and it is driven both by the quest for sustainable energy systems in a low-carbon world and the effects of the economic and financial crisis in Western countries. Therefore, the challenge for Europe is to reassess some of its internal instruments in the light of the need for a single foreign policy stance regarding its major partners and suppliers. This is a somewhat complicated task, as current European energy and climate policies are often the outcome of a fragile compromise between national sovereignty over resource exploitation, industry structure strategy and energy taxation issues on the one hand, and EU competence, both for ensuring an efficient energy market and energy security and for promoting interconnections of grids and low carbon technologies, on the other.

[4]For a discussion which stresses the roles of vulnerability and resilience, see Cherp and Jewell (2014).

Regarding security, the EU currently has a relatively well-composed mix of imports (Lévêque et al. 2010). The role of Russia as a strategic supplier of natural gas to Europe is well known, but in the future its share of European natural gas imports is unlikely to exceed 35–40 %. With rising production costs and rising domestic demand, Russia's cost advantage will diminish in the medium term. This will make room for new suppliers, namely the Caspian and central Asian countries, whose hydrocarbons can reach European consumers via Turkey, the Mediterranean, and the Balkans. Conflicting views on the main energy partners (Russia, Turkey, North Africa or eastern countries), on the best gas pipeline routes, and ambitious and competing smart or super-smart grids are only some examples of issues on which European countries often disagree.

Finally, at the global level, LNG exporters compete with traditional gas suppliers. The increasing share of LNG in the international natural gas trade will allow a further diversification of EU imports, but at higher prices than previous long-term pipeline gas supplies. Europe has the capacity to import more LNG and the problem, at present, is inelastic supply. US shale gas production may increase potential LNG exports to Europe and, although the infrastructure is not yet in place, large investments are being made to increase export capacities in North America. This transformation has already triggered changes in fuel prices and therefore in interfuel substitution, with LNG volumes diverted from North America to Europe and with coal more competitive than natural gas for power generation. These dynamics must therefore also be considered in analysing the energy market conditions in Europe and beyond.

The purpose of this collection of essays is to shed some light on the complex relationships between energy and climate security, between Europe and its eastern suppliers, between traditional and unconventional energy sources, and between the different policies which can be adopted by EU member countries and by the EU as a whole.

2 Structure of the Book

This book aims to analyse some of the aforementioned issues through the lens of energy security from different perspectives. The three sections of the book correspond to these different perspectives: international relations, focusing on the EU's eastern partners; energy economics, highlighting the current unconventional hydrocarbons revolution and its impact on EU energy and climate strategies; and public policy, with analysis of EU policies and two case studies. Obviously, the issues covered by this volume are not sufficient to exhaustively depict the overall energy security question for Europe. However, they represent a selection of the hottest topics now being addressed in the institutional and academic debate.

Europe suffered a big energy crisis as a consequence of the 2009 Russian-Ukrainian conflict over gas transit fees. The ongoing new conflict between Russia and Ukraine has exposed EU vulnerability once more, and in March 2014

the EU heads of government told the Commission to conduct an in-depth study of EU energy security and to prepare a comprehensive plan to reduce EU energy dependence. These crises constituted an abrupt warning, as the weakness of European external energy policy was clearly revealed and its key role came to general attention. Development of new cross-border interconnectors and additional routes through Eastern Europe, and investigation of ways to facilitate natural gas exports from North America to the EU are very high priorities on the European agenda. This is why the first part of the book deals with energy diplomacy and geopolitics, with a special focus on Russia as energy supplier and Turkey as a transit country. These two energy partners for Europe embody some typical issues for EU energy security concerning the future availability of resources and the construction of routes to transport them. In the first chapter, Alberto Tonini investigates the last three decades of European diplomacy towards supplier countries as part of the effort to create a common European energy policy, together with the growing institutional role of the European Commission in the field of energy and climate security. The EU Commission's long struggle for a greater role in energy policy and the birth of a European energy policy prepares the ground for discussing the conflicting views on future pipelines by the other contributors to the first section. In the following chapter, Matteo Verda deals with the development of the western Europe-Russia gas pipeline network over recent decades, investigating the economic and political underpinnings of the Russian strategy. He also points out the current and future trends in the European final demand and the role of Russia as the major gas supplier to Europe. According to Verda's analysis, several challenges are looming, ranging from increasing competition, to an uncertain regulatory framework, to geopolitical risks in Eastern Europe.

To reduce these risks, in her chapter Nursin Guney explores the current and future potential of Turkey as an energy hub for Europe. In her analysis, Guney recalls that the periodic discovery of new energy sources in the regions surrounding Turkey stimulates the desire of both Turkey and the EU countries to have new suppliers and diversified routes. The changing geopolitics in Eastern Europe has revived debates about the Southern Gas Corridor (SGC) and notions of strengthening the SGC by simply reaching more supply countries through Turkey, Turkey's neighbourhood and beyond.

The final chapter in the first section, by Valeriy Kryukov, deals with current trends in Russian oil production and Russia's alternatives arising from the development of the eastern Asian markets. In Kryukov's view, Russia is facing a new challenge in its role of major energy supplier to Europe. To a large extent, the pace of integration of Russian hydrocarbon production with the European market is still based upon old economic foundations: economies of scale in developing large rent-bearing fields. However, nowadays the situation is changing rapidly with oil development from unconventional sources (shale and bitumen) and the old production model may no longer be able to dominate—especially in the case of a deteriorating and fast-changing resources base. Kryukov's final considerations focus on the Russian oil fields (becoming smaller and more expensive), and on the resultant new challenges and options for Russian energy producers. Although the

geography of new fields is a driving force explaining the growing role of Russia's exports to eastern Asia, westward oil exports have been and will be the most substantial in the years to come. This is due not only to infrastructure availability but also to deeper ties between the Russian oil sector and the EU countries' economies.

The second section of the volume investigates the role of unconventional hydrocarbons in the supply and security of energy in Europe, and their impact on world energy markets. The sharp rise of shale gas and other unconventional fossil sources has led to a reconsideration of national energy strategies, and can even affect gas pipeline plans. In the recently-published Energy Union Package, the European Commission supports investment in liquid gas hubs in northern Europe to exploit the potential of liquefied natural gas and enhance supply security with imports from the US and other LNG producers (EC 2015). Moreover, unconventional hydrocarbons can also affect the pattern of other fuel flows by changing world prices and diverting traditional international energy trade routes. Recent trends in some European countries concerning a new shift in the production of electricity away from natural gas toward coal—a cheaper but more polluting input—may exemplify how fast energy flows can change after relative price variations and how dangerous the consequences of such changes can be for the environment. While shale gas will not be produced commercially in Europe in the short term due to the time needed for exploration and licensing, in the US this energy source could already be a real 'game changer'. The role of shale gas in the US market is analysed in Douglas Meade's chapter, together with a quantitative assessment of future increased exports of it to Europe. North American gas supplies have increased dramatically since 2006, leading to a reduction in prices and an increase in their use in electric power generation and industry. Meade describes the results of a scientific collaboration between Inforum and the Mitre Corporation to use the LIFT and MARKAL models in a coupled system in order to understand some of the implications of the shale gas revolution. He uses scenario analysis to assess the impact of increased gas supplies on the structure of production, and on aggregate measures of wellbeing such as GDP and disposable income. A crucial question is whether the potential for increased US gas exports to Europe in the form of LNG can improve the state of energy security in Europe. The infrastructure is not yet in place but significant investments are beginning. In the final part of the chapter, the potential of these increased exports to affect gas supplies in both the US and Europe is explored.

Shale gas is also a potential energy source to be exploited in European countries. This option has raised several concerns about environmental risks associated with the high volume hydraulic fracturing technique, to which the Commission has responded with a recommendation and a communication inviting Member States to follow minimum principles in exploration or production using fracking.[5] Indigenous shale gas will not resolve short-term security issues, as exploration and development will take 5–15 years and serious doubts about the economic viability

[5]See the Commission Recommendation of 22 January 2014 (2014/70/EU) and the Communication COM (2014) 23 final.

of exploitation are arising, given the falling world energy prices and the difficult geological conditions for drilling. Virginia Di Nino and Ivan Faiella critically investigate these issues in their chapter. High energy prices, abundant reserves, a firm-friendly business environment and a de facto moratorium on environmental rules boosted the adoption of hydraulic fracturing in the US, causing a sea-change in the energy landscape within a few years. Nonetheless, the economic benefits accruing from shale fuel production must be weighed against higher extraction, logistic and environmental costs. The authors argue that technical and social hurdles and stricter environmental regulations limit the possibility of replicating the US experience on the same scale elsewhere.

In the final chapter of this section, Laura Castellucci addresses the energy and climate security issue from an economic perspective, arguing that if energy security is defined as reliable and adequate supply of energy at reasonable prices, prices should include all the costs borne by society as a whole. In particular, environmental damage incurred by unconventional sources should be accounted for in comparing the costs and benefits of this option. In general, it appears that not only is technical progress in energy production driven by a search for increases in resource productivity which are not always environmentally friendly, but it is driven by market prices, which are increasingly sensitive to financial speculation. Therefore, there is room for an active government policy. Beside shale gas, unconventional oil from bituminous sands represents an interesting case study. Oil sand production results in environmental overexploitation and high greenhouse gas emissions causing air quality depletion. The author claims that imports of this unconventional oil to Europe—as well as indigenous production of shale gas—need to be discouraged on the basis of their negative effects on climate change. For Europe to retain its leadership in climate change policy and at the same time enhance its energy security, it suffices to maintain its renewable energy orientation policy and support the promotion of investment in energy storage technologies.

In addition to diplomacy and general strategic choices, other public policies can drive changes in European agents' behaviour to enhance energy and climate security. Under this perspective, the third part of the book deals with two general policy issues—namely new technology opportunities and the use of market-based instruments—and each theme is analysed both from an international perspective and through a national case study. These two policies should jointly focus on the aim of raising the share of carbon-free resources and increasing energy efficiency, so that energy dependency can be reduced and the quality of the environment simultaneously increased. These two goals can be reached mainly through a technology discontinuity and a change in agents' behaviour, induced by monetary incentives or market-based instruments. The need for a technological advance able to trigger a jump in the share of renewables and in the common market is analysed in a chapter discussing the state of the art of European intervention, and in a second contribution considering the economic impact of a very successful intervention, the German Energiewende. After reviewing the general rationale for a public intervention in innovation policy, Sophia Ruester's chapter analyses why a discontinuity in EU energy-related innovation policy is urgent, and calls for an increase in R&D

activities. Despite several funding programmes, EU innovation policy cannot be considered totally effective because of its complex regulations, limited financial resources, and a lack of a reliable long-run strategy, which is very important when considering new and expensive energy sources. Although the author argues that no energy technology policy can work properly without a certain degree of coordinated supra-national governance, there are several examples of uncoordinated national actions. Among these, competitive national schemes aimed at fostering renewable energy sources constitute an interesting example because many member countries are generously incentivizing renewables with the goal of increasing energy security and fostering economic growth. However, insufficient interconnections between national grids make these efforts not fully efficient at the European level. Ulrike Lehr and Christian Lutz analyze the German case. The policy shift towards a cleaner more efficient and technologically advanced energy system is the focus of the chapter, and an assessment of the 2011 *Energiewende* package is performed using a macro econometric model. The analysis is partially based on historical data (an ex post analysis) and partially devoted to forecasting the long-run impacts of *Energiewende* on macroeconomic variables and the energy mix. The *Energiewende* scenario is compared to a counterfactual scenario: the results indicate that this energy transition concept can be seen as a positive example of a "green growth" policy, as it shows positive impacts not only with regard to energy intensity, the share of renewables in the German energy mix, and therefore on emissions, but also on GDP and employment levels. However, the study warns about the adverse effects of price changes driven by renewable incentives: on the one hand, a merit order effect contributes to a reduction in electricity prices; on the other hand, subsidies to finance renewables in Germany are mainly paid for by household electricity bills, meaning electricity price increases. A significant price increase can also occur as an effect of energy taxation, the main pillar of market-based policy instruments. After discussing the economic rationale for energy taxation, Michelle Harding, Chiara Martini and Alastair Thomas's chapter gives a snapshot of patterns of energy use and energy taxation in EU and OECD countries. The authors estimate and compare effective tax rates based on the energy and carbon content of different energy products, and highlight that in EU countries different fuels and users of fuels face different tax rates, thus making the energy taxation directive substantially not binding, and the idea of a unique carbon price very distant from reality. Behind this result, governments make different uses of fiscal policy to attain energy security and decarbonisation, and also different competitiveness protection policies, with selective use of tax expenditures. Inefficiencies and incoherencies in the use of market-based instruments occur not only among countries but also within national economies: Rossella Bardazzi and Maria Grazia Pazienza's chapter deals with the Italian case, traditionally one of the most energy dependent and energy efficient countries in the EU, but also characterized by a wavering and inconsistent energy and climate policy. The chapter discusses how the low energy content of Italian GDP has been driven down by high energy prices and tax rates. However, it also shows that in the last decade Italy did not make improvements in this respect, notwithstanding the relative inefficiency of specific sectors, such as public and

private buildings, for which a coherent policy and adequate public funds are still lacking. The authors review the use of market-based instruments in Italy and highlight cases in which different policy signals overlap, thus generating an inefficient policy framework. They suggest a review of energy taxation in a direction able to produce a coherent price signal to economic agents.

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