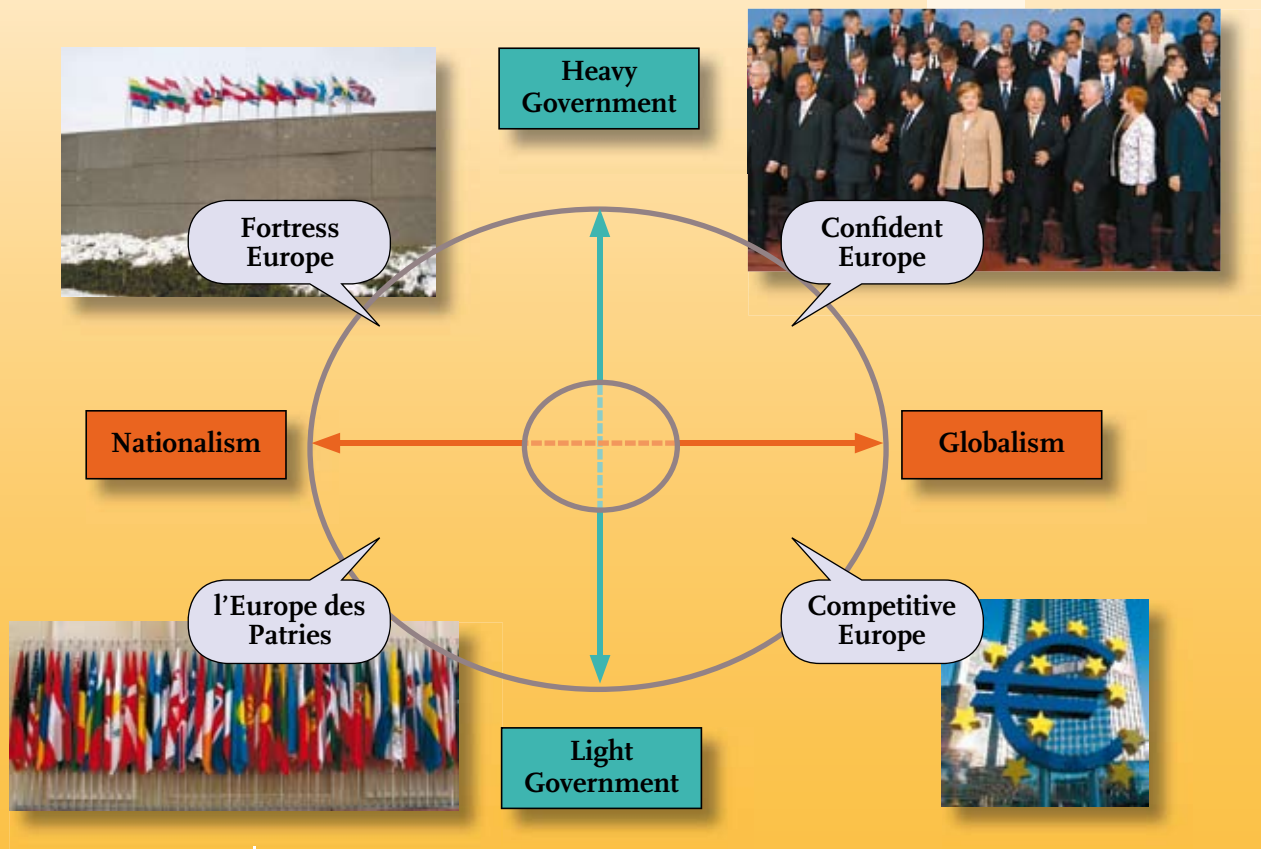


Europe, the EU and its 2050 Energy Storylines

Jacques J. de Jong and Ed Weeda

Clingendael International Energy Programme



Nederlands Instituut voor Internationale Betrekkingen
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List of abbreviations and acronyms

CCS	carbon capture and sequestration
CIS	Commonwealth of Independent States
CSP	concentrated solar power
ECSC	European Coal and Steel Community
ECT	Energy Community Treaty
EEC	European Economic Community
EPE	Energy Policy for Europe
EU	European Union
GHG	greenhouse gas
IEA	International Energy Agency
MENA	Middle East/North Africa
Mtoe	million tons of oil equivalent
OECD	Organisation for Economic Co-operation and Development
PPP	purchasing power parity
TPES	total primary energy supply
US	United States of America
WAES	Workshop on Alternative Energy Strategies
WTO	World Trade Organisation

Executive Summary

Energy policy is rich in emotion and diverse political and economic interests. Thus the journey towards establishing and implementing an integrated European energy policy has been and still is a cumbersome one, full of stories of failures and successes. This paper seeks to explore some of the conditions under which energy policy could be formulated in and by the EU over the next 40 years or so.

The development of energy policy at the EU level is addressed from a wider historical perspective, taking into account a number of factors that influence both the EU project and its energy supply security. These factors include the EU's international orientation and cooperation; the EU 'economic community of law' paradigm; the EU's (failing?) external leadership role; the impact of the fall of the Berlin Wall; and Europe's talents for creativity and improvisation. These factors are discussed in somewhat greater depth in the context of the formulation of an all-EU energy policy.

The global energy policy environment is briefly discussed, indicating that energy resources for the world are less at stake than access to them. On this basis, a closer look is taken at the theoretical and practical aspects of using scenarios as a tool for energy policy-making. A few examples are presented, and it is argued that scenarios should basically be addressed on the basis of storylines. Storylines do require a set of specific parameters, and in this case the choice was made to use the various roles played by stakeholders for intervening in markets and in the world order. This choice is argued on the basis of the global interrelations that are currently influencing resource policies in general and energy in particular. Market efficiency, climate change, poverty issues, geopolitics and global coordination mechanisms are considered, leading to the two policy dimensions of 'nationalism' versus 'globalism' and 'heavy' versus 'light' government as the axes for the scenarios and storylines.

This paper develops four storylines that are conceivable and inherently consistent. They are labelled with names that refer not only to their content, but also to the political and societal climate prevailing in the region. The first, '*l'Europe des Patries*', applies to a region where nation states are still the determinant factors. The second, 'Fortress Europe', is primarily inward-looking, with a strong drive towards inter-European cooperation and relations. 'Confident Europe' is an active participant in the global international system and practices what it preaches. And lastly, in 'Competitive Europe', market forces effectively deliver and are globally accepted.

The main conclusions to be drawn are that the issue for the EU is not energy resources per se, but rather access to them, and that current ambitions at the EU level on climate change adaptation and related energy issues are not likely to be matched by long-term performance in the region. More specifically, in the futures depicted by the four scenarios, the historical downward trend in energy intensity continues in all four storylines; the share of oil in the TPES decreases in all the storylines as well, and even ends up at roughly the same level in all four; coal remains important in the energy mix, largely for electricity generation; gas seems to be the most stable energy source in 2050, no matter what is happening in the world at large; and no physical supply constraints are anticipated. Nuclear energy seems to experience a revival in all the storylines, but with regard to renewable energy sources, there are some notable variations among them.

Finally, the new Energy Policy for Europe (EPE) presented in early 2007 is assessed from a historical perspective, in the light of the EU's 50-year energy policy quest, and is further analysed in relation to the four 2050 storylines. It is concluded that elements of all four scenarios are found in the EPE, but that the general tendency seems to be moving in the direction of more government intervention in markets instead of less. Meanwhile, for global climate issues the EU seems to be building its policy more on multilateralism and globalism, whereas when seeking energy supply security, nationalism and bilateral or regional approaches seem to prevail. The development of such policies however touches on the core competences of the national state. Developing such policies at EU level represents a huge challenge. The new energy policy is judged to be an intelligent first step towards balancing the triangle of energy policy objectives – the environment, competitiveness and supply security – that is usually framed as the Kyoto-Lisbon-Moscow triangle.

1

Introduction

Europe, the European Union and energy policy have a common history and foundations. The 20th century political and military conflicts in Europe had largely energy-related backgrounds. The 1952 European Coal and Steel Community (ECSC) Treaty made coal (and steel) a shared project in Western Europe, creating a community of mutual interest instead of a community of conflict. This energy-based concept was later followed by the 1957 Treaty of Rome establishing the European Economic Community (EEC), together with a further specific and wide-ranging treaty – the Euratom Treaty – dealing with what was commonly perceived as the future of energy: uranium. Efforts to define further cooperative and integrated approaches for the energy sector as a whole, however, failed in the early 1960s.

The events of 1989 triggered the process of integrating Eastern European countries into the EU project, and once again, energy was at the forefront of this process. The proposal for an East-West European Energy Charter, promoting development, investment and trade in energy and energy products, was based on the same political idea of supporting peace through energy that created the ECSC in 1952. However, as energy policy is full of emotion and diverse political and economic interests, the journey towards establishing and implementing an integrated European energy policy has been and still is a cumbersome one, full of stories of failures and successes.

Around the turn of the century, it became increasingly clear that energy and energy policy have become an essential part of the globalising world economy and of the climate change issue. With the growing awareness that EU energy import dependency will increase as well, it also became evident that an ‘EU-only’ approach to energy will be ever less effective. Energy policy is therefore turning more and more into energy politics, with geopolitical issues high on the policy agenda.

Energy issues are also long-term issues, where time horizons easily run up to 10 or 20 years and more. Thinking about the future therefore means thinking about energy in the period up to 2050 or so. This is what this paper attempts to do, by exploring the future of EU energy policy through different storylines and scenarios. One of the reasons for undertaking this exercise, apart from its relevance for Europe’s energy future, was the inspiration offered by a number of recent books and articles. These include, most notably, books by Geert Mak¹ and Karl Schlögel² on the history of Europe and the remarkable recent developments in the region, and an article by Sir Stephen Wall, a former adviser to Tony Blair.³ These publications share a vision of striking similarity, namely, that of a region with a history as rich as it is dramatic, with major challenges and great opportunities. However, Europe will only reap its blessings if it succeeds in using its capacities to seize its chances as well as to overcome its drawbacks. The scenarios presented here might provide insight into possible challenges ahead and conceivable solutions.

This paper also draws on the process employed by the World Energy Council in 2005-2007 for its study on 2050 policy scenarios, published in 2007⁴. This process was a bottom-up one, based on

¹ Geert Mak’s impressive book *In Europe* provides a broad overview of 20th century developments in Europe and their ongoing impacts. Mak, Geert, *In Europe: Travels Through the Twentieth Century*. London: Harvill-Secker, 2007.

² Schlögel, Karl, *Marjampole oder Europas Wiederkehr aus dem Geist der Städte*. Munich: Carl Hanser Verlag, 2005.

³ Wall, Sir Steven, “Vision and leadership are lacking today”, *Financial Times*, 20 March 2007, <http://www.ft.com/cms/s/d3e156d2-d703-11db-b9d7-000b5df10621.html>.

⁴ To be downloaded via http://www.worldenergy.org/documents/scenarios_study_online.pdf

regional inputs, and the authors of this paper were heavily involved in it. The quantitative elements were provided by Enerdata,⁵ and we are very grateful for being able to use them in this paper as well. Here it should be stressed that the figures used in this exercise should mainly be considered as illustrations of trends, which can assist in making comparisons between storylines. It should be clear by now that truly reliable figures over a period of several decades to come do not exist.

Before moving on to the discussion of energy futures, Chapter 2 will explore more general notions about the exciting and challenging developments in the EU, including its more recent Eastern adventures, and consider these from an energy policy perspective. This will be followed in Chapter 3 by a brief discussion of the EU energy policy environment in more global terms. Chapter 4 addresses issues of energy scenario-building, including the authors' reflections on the methodology used and the choices made regarding the axes for the four storylines developed in this paper. The storylines themselves and their quantitative illustrations are presented in Chapter 5. Chapter 6 then takes a somewhat closer look at the history of EU energy policy-making and the resulting 2007 EU energy package. This latest policy package will also be assessed in relation to the storylines developed here.

⁵ <http://www.enerdata.fr>; we are stressing however that the responsibility for the figures used is entirely the author's.

2

Europe, the EU and some energy-related factors

When thinking about Europe, the EU concept, and its impacts on policy making, including energy policy, a number of significant factors emerge. These factors are also relevant for describing and understanding storylines for energy futures. In the context of this paper we will try to highlight some of the factors that we consider to be most relevant, interesting or important. It is not our intent to develop coherent views or models, as the literature about the European adventures in the post-World War II era is rich and also demanding. Instead, we briefly address some of these factors below, modestly adding our views.

Basically, viewed from a historic perspective, both European culture and politics have been dominated by an inclination towards **international orientation and cooperation**.⁶ This may have been more visible on the continent than in Britain, as was illustrated by Jean Monnet (one of the founders of the European Union) when he said that, in not joining the original European Community in 1957, Britain had paid “the price of victory”: the illusion that it could maintain what it had without change. Change in politics and in international cooperation is inevitable. The whole EU project as it stands today could be seen as a huge political and economic success. It should be recognised that, uniquely in the history of international organisations, the member governments empowered the EC’s institutions – the Commission, Parliament and Court of Justice – to stand apart from the structures and constraints of national governments and, in clearly defined ways, to have authority over those governments. Nevertheless, the balance that has been achieved is not a very stable one, as new issues are constantly emerging: issues that would require ‘yes’ or ‘no’ European answers and solutions, raising difficult questions about the balance between the EU institutions and the national ones. Within the EU, different answers are given.

When Britain joined in 1973, it saw in the founding Treaty of Rome the limits of the sovereignty the country was willing to share. Most EU partners saw it differently, believing that the “ever closer union of the peoples of Europe” promised a dynamic enterprise whose destiny was some form of economic and political union. It was not thought necessary to define it too clearly: whether it was a wall or a cathedral, it was, as former French president François Mitterrand used to say, still essentially the same construction. The history of the EU is in part the story of the tension between those two views: wall or cathedral. When Helmut Kohl, chancellor of Germany, spoke in the 1980s of a United States of Europe, Margaret Thatcher thought he was talking dangerous twaddle. She asked about the single market, or open economies, indicating that Europe’s citizens would judge the EC’s success by results. But Mr. Kohl rightly stressed as well the need to search for a lasting political vision, fearing that later generations of political leaders in Europe would not understand the dangers of nationalism and protectionism. The political union of which Mr. Kohl dreamed has not happened. The economic and monetary union has not marked a step change to a new, integrated political relationship. On the contrary, the supranational institutions, especially the Commission, have to fight for their place in the hierarchy as the requirement for consensus among 27 member governments determines whether effective action can be taken on energy policy, climate change and foreign policy. When energy and climate change are among the main ingredients of domestic and foreign policy, the danger is that consensus will mean the policy of the lowest common denominator. And it is precisely these issues that demand strong EU action and leadership, in the wider EU interest as well as in the sense of providing international leadership.

⁶ Wall, Sir Steven, 2007, op. cit.

One might also say that the EU in many senses represents an **economic community of law**.⁷ This is an important factor, since it has also in some way dictated the focus of the business community, not only in a juridical sense but also physically as well as industrially. The EU has been an astonishing success, creating prosperity and peace across a continent devastated by the two most destructive wars in human history and then divided by an iron curtain. Today, the EU has 27 members, with a combined population of 493 million that generates 30% of world gross product at market prices. Each member chose to absorb not only the EU's values, but its body of laws, the celebrated *acquis communautaire*, recently estimated at 170,000 pages of legislation. The great achievement of the EU is to establish the cooperative 'service state' as the norm across the continent. Such a state sees its purpose as serving its citizens, not dominating them, and as cooperating with other states, not dictating to them. The genius of the founders was to realise that a law-governed market economy was the means to this end. It would pursue this goal by binding the discretionary interventions of each, thereby creating predictability and stability for all. These were liberal ideas that drew heavily on the ideas of postwar German thinkers and policy-makers, such as Ludwig Erhard. The EU's great successes have been the customs union, the competition policy, the single market, the abolition of exchange controls and the creation of a single currency adopted in a wide group of EU members and managed by an independent central bank. The market economy and representative democracy were the only possible bases for Europe's voluntary unification.

The process of further economic policy-making, while much needed, is facing growing challenges, such as job creation, modernising welfare states, and continuing market liberalisation. Although many of its targets and goals are not (yet) being met, the Lisbon Agenda formulated a vision and a strategy, thereby indicating a direction for EU policies. This whole philosophy is very relevant to the energy question, regarding such matters as external markets and the internal energy market (particularly the Energy Community Treaty⁸ process and the 34-country energy market emerging as a result), as well as its goals and objectives. It also relates strongly to the issues of climate change and enhancing supply security, both from domestic sources and from abroad. The broad notion of an economic community of law cannot be underestimated in meeting all these challenges. This community of law concept is also important in highlighting that the EU is basically a structure for cooperation and competition among states embedded in a shared institutional framework, creating a zone of stability and cooperation, a zone of freedom and the rule of law, a living example of the proposition that the interests of states lie in cooperation, not in conflict.

Is there a need or a role for **external European leadership**? While former US secretary of state Henry Kissinger raised the question of who to call when he wanted to speak to 'Europe', it should be noted that in the absence of an answer, US leaders have always been more than happy to play divide and rule where it suits them. The same applies to our big Eastern neighbour, especially when energy supply issues are at stake. But if there is one issue that demonstrates the effectiveness of external EU leadership so far, it is the climate issue. In order to maintain strong policies of efficiently curbing carbon emissions, Europe will have to accommodate the world at large, especially China and India. This means that Europe and North America will inevitably have to significantly reduce their carbon emissions. But also in wider issues of the global economy, such as international trade and the broader energy question, strong EU external representation is a vital interest for the EU.

In general terms, the EU has demonstrated that it is not a 'hard' power, but that it can be a 'soft' one. Through soft measures it is effectively able to promote development at large. It could willingly and enthusiastically open its markets to developing countries and provide generous aid to those poor countries that show a capacity to use it well. In view of Europe's own interests and its global responsibilities, member states cannot afford to play the card of national interest. What is needed is a united Europe, underlining and restoring its faith in, and commitment to, the EU's unique institutional

⁷ Wolf, Martin, "Why liberalism is the right future for a declining Europe", *Financial Times*, 13 March 2007, <http://www.ft.com/cms/s/8d98fe10-d176-11db-b921-000b5df10621.html>.

⁸ The Energy Community Treaty has been signed by the EU-27 member states together with Croatia, Serbia, Bosnia, Montenegro, Macedonia, Albania and Kosovo. Ukraine, Norway and Moldavia are observers and have applied for membership as well. ECT membership is based on the full *acquis communautaire* for energy.

structure. And finally, Europe must embrace the future. Nothing short of a catastrophe will stop China, India and the rest from developing. Europeans must adapt – but if they do so, they will enjoy a host of exciting opportunities in a bigger world.

The **fall of the Berlin wall**⁹ was a manifestation of fundamental changes in the main parameters of the region during the 1990s. To date, developments show that the region is still fully engaged in the search for new forms of cohesion and partnership under the new circumstances. This transition process also has significant impacts on the energy field and especially on the region's East-West relations. Eastern societies and economies have faced difficulties in making these transitions, especially because their pace is putting heavy pressure on economic and societal structures. But the EU-15 also had difficulties in this process. It is not only a question of adaptation to the internal EU machinery; sometimes it is also a confrontation of cultural, institutional and political approaches and manners. With regard to energy, this is especially relevant in the EU's relations with its big Eastern neighbour – a neighbour that itself is recovering from the internal institutional and sociocultural revolution after the collapse of the Soviet Union in 1991.

At the same time, however, the disappearance of the Iron Curtain has also led to unexpected, challenging, but also promising new flows: flows of information and contact between people, flows of ideas, experiences and approaches, flows of goods and products creating new transport routes with new disciplines, new opportunities and hence new prosperities. New trading hubs and therefore meeting places are popping up, creating new and dense networks for people and activities. Karl Schlögel's book *Marjampole*¹⁰ provides a number of interesting examples, some of which are briefly summarised in Box 1. Essentially, Schlögel describes a new Europe as a space of communication, of traffic and transport, of East-West migration. It is a space full of connections and interconnections, where new generations are emerging, building on historic and cultural values, on the experiences of conflicts and war from the 19th and 20th century whose traces are still evident today.¹¹ It is a Europe still in transition that will no doubt develop further, full of risks and opportunities, where new generations will take responsibility for further developing the necessary institutional and socioeconomic structures that will continue to bring peace and prosperity. A Europe that will need to issue and implement effective policies for securing reliable and affordable energy supplies in line with its global commitments, adapting to climate change and hence contributing to a sustainable energy system for future generations.

Creativity is plentiful in Europe, especially when it comes to **improvisation**. Europe used to be the centre of the modern intellectual world. Now that centre is the US. The reason is the dominance of the major US universities. Industries and private donations are playing an unprecedented role in the academic world, and have created an intellectual climate that is delivering a constant flow of Nobel Prize winners. But it is also useful to take a closer look at government policies and the institutional environment in general, and beyond that, to focus more specifically on energy. In general, as seen from the EU perspective, US policy-setting is rather clear. There is the federal level with its federal laws and lawmakers in Congress, and a large federal executive organisation with numerous agencies, including federal regulators. Federal jurisdiction in energy, however, is scattered, focussing largely on interstate matters, such as interstate electricity and gas transmission, and therefore much more focussed on wholesale than on retail functions. At the state level there is a similar pattern, with state law and lawmakers, and state executive bodies, including state regulators covering various utility functions. Jurisdiction is mainly focussed on retail markets. More generally, though, it should be noted that despite many efforts since the early 1970s, a comprehensive federal energy policy still does not exist, leaving plenty of room for interventions and approaches at state levels.

⁹ Schlögel, Karl, 2005, op. cit.

¹⁰ Ibid.

¹¹ Mak, Geert, 2007, op. cit.

Box 1 – Marjampole

In his 2005 book *Marjampole* Karl Schlögel describes a number of cases and developments as examples of the new Europe emerging on the continent. Three brief excerpts are presented here:

- **Marjampole**

Who knows Marjampole? A provincial city of 50,000 inhabitants near the Lithuanian/Polish border, near the crossroads of railways and automobiles, where Helsinki and St. Petersburg, Tallinn and Riga, Warsaw, Lodz, Prague and Budapest, Berlin and the rest of Western Europe, but also Minsk, Moscow and Kiev, all find their connections. The Marjampole story is about the automobile: the city lives from it. Marjampole has the largest auto bazaar in the whole of Eastern Europe. The entire city is packed with businesses related to the automobile, ranging from all sorts of parts, accessories, services, insurance and so on. When the weekend arrives, thousands of cars of all makes, types, brands and sizes change hands. But trade is impossible without people. And people mean contacts and contacts mean exchanges of information, knowledge, and experiences. It's not simply the law of supply and demand, loaded with direct cash payments, mostly in US dollars. Marjampole is more; it is a true roundabout of ideas, a meeting place for different peoples, cultures, habits and civilisations. The most fascinating aspect, however, is that it is a roundabout of younger generations. Their mission is not one of interactions within all these civilisations, but the impact adds to the wider European melting pot. The melting pot that has always influenced European culture and history. And that process has not ended yet. Marjampole therefore plays its role in inventing and re-inventing old and new trade routes. Trade routes with physical contacts, physical exchanges, going beyond the digital information sharing that the new human web with its worldwide connotation is creating.

- **Czernowitz.**

Marjampole, a city belonging to the EU, albeit in one of its more remote parts. Czernowitz, a city just beyond EU borders, near Romania, near Ukraine and near Moldova, lying in a three-country triangle. A city that over time has changed names from its Romanian Cernauti to its Russian Tchernowzy or Tchernopol and today is known as Czernowitz. A city full of cultural history with a magical appeal, near the northern edges of the Carpathians, surrounded by hilly prairies and beech woods. A city where the old Viennese elites from the times of the Austro-Hungarian Empire once interacted with the Bukovina Germans and with the large Jewish community. A birthplace for a rather unique, multilingual yet sunken culture. A "sunken city, a sunken world," in the words of 20th-century Czernowitz-born German writer Rose Ausländer. Today, however, the opening of the Iron Curtain has brought new life, new dimensions and new opportunities, giving new incentive to a community that preserves its multiculturalism. The city is still able to convert non-Czernowitzians to Czernowitz Tolerance. On the edges of the city, a new bazaar has emerged and is further developing. A bazaar where tens of thousands of visitors, buyers and sellers, meet every day, buying and selling huge amounts of consumer goods: CDs, perfumes, food products, clothes, linens, electrical appliances, building materials, Italian shoes and Moldavian fruit. Everything is very well organised in an open-air setting. Due to its three-nation-triangle setting, new trade axes are developing and maturing. Trade axes between Lodz and Istanbul, Odessa and Prague, Kiev and Budapest. Czernowitz, a sunken magical city, is returning as a crossroads for new North-South and East-West trade flows.

- **New transport corridors.**

Marjampole and Czernowitz, two examples of the many new hubs in the wider European continent between the East Sea and the Black Sea. Where goods and people are creating new traffic flows with new human interactions, building new social structures and creating and strengthening a new dimension of European civilisation. But it's not only the trading places that are bringing a new life to Europe. Movements of people, of skilled labor, of students and of backpacked younger generations are equally relevant. Airlines, railroads, but probably more so the buses of *Eurolines* with their interesting timetables of almost daily connections between Paris and Lodz, Berlin and Bucharest, Minsk and Amsterdam, Naples and Krakow, to name just a few. It is this free movement of people that is further building new human networks in a multi-ethnic and multi-linguistic setting. And although the internet data and information exchange boom is undeniable, these physical movements of human beings are a very important indicator of Europe's comeback after a 20th-century period of terrible military conflicts and violence that brought geographical divisions and walled societies and civilizations.

European creativity in governance issues is also a factor that Jeremy Rifkin explores when comparing American and European dreams.¹² With regard to the debate about the ‘cathedral’ versus the ‘wall’, or whether the EU should head in the direction of a federal structure or stick to the *l’Europe des Patries* concept, Rifkin points to the third route that is actually being pursued. To an ever growing extent, the EU is developing an orchestral role. It is a platform where networks are meeting and being formed, where stakeholders from all sorts of backgrounds and with all sorts of interests are discussing and coordinating views, ideas and proposals. The European Commission acts as the main facilitator, basing its policy and legislative proposals on the outcomes of these platforms. This lends a degree of legitimacy to the plans it presents to the political bodies in the European Parliament and Council of Ministers. By using these approaches, a kind of network-based governance structure is evolving in a very creative way. This process was recently further analysed by Adriaan Schout and Andrew Jordan,¹³ who argue that all policy systems are struggling to respond to challenging policy problems such as international terrorism and unsustainable development. This is happening even more so in the EU, with its fluidity, deeply sectoral structures and weak political leadership. As the traditional mode of coordinating – essentially issuing regulation – no longer commands sufficient political support, the EU has turned to what is increasingly termed soft or ‘new’ modes of governance, which rely upon different actors working together in relatively non-hierarchical networks. New modes of governance are in vogue because they appear to provide the EU with a new way to add value to national-level activities without the slow process of agreeing new legislation or the cost associated with building new administrative capacities in Brussels. Schout and Jordan analyse how this model is working in environmental policy-making in particular.

When the observations made so far are related to the more specific context of EU energy policy, its formulation, its history and its results, a number of points could be made. In this context it is also interesting to quote former US Supreme Court Justice Louis Brandeis, who noted in 1932: “The states are the laboratories for democracy and innovation. It is one of the happy accidents of the federal system that a single courageous state may, if its citizens choose, serve as a laboratory, and try novel social and economic experiments without risk to the rest of the country.” Examples in the US context are plentiful. For instance, in the electricity sector, they are found in California, Texas, Maine, Oregon and other states, all with differing degrees of success.¹⁴ Looking at Europe’s network-based governance structures, this approach can also be seen in energy policy-making. The EC is using not only extensive consultation processes with numerous stakeholders, but has also set up specific forums for discussing the wider implementation of the internal gas and electricity markets and for renewable and fossil energy policies.¹⁵

The EU record in comprehensive and integrated energy policy-making is diverse, however, and it makes sense in this context to have a closer look. The EU did succeed in creating a comprehensive EU-wide legal framework for its internal energy market. Policy creativity and improvisation were instrumental in accommodating the many political national differences and allowing the national capitals to explore Justice Brandeis’ observation. This all happened in a remarkably tight time frame of less than 10 years. Similar developments can be observed in energy sector approaches, with more or less successful policies in renewable energy and energy research. In the environmental policy setting, the climate change policy is worth highlighting. Emission trading has really landed in the EU-27, finding the right balance between regulation and market forces in a non-dogmatic and pragmatic

¹² Rifkin, Jeremy, *The European Dream: How Europe's Vision of the Future Is Quietly Eclipsing the American Dream*. New York: Tarcher, 2004.

¹³ Jordan, Andrew and Adriaan Schout, *The Coordination of the European Union: Exploring the Possibilities for Networked Governance*. Oxford: Oxford University Press, 2006.

¹⁴ Success ratios increase when the impact of state restructuring is limited to the single state, as is for instance the case in Texas, with its efficient electricity market and insular electric system. The bad example is California, where restructuring had a very wide impact on other states and led to numerous, still ongoing disputes about federal versus state jurisdiction.

¹⁵ The European Electricity Regulatory Forum (the Florence Forum), the European Gas Regulatory Forum of Madrid, the Berlin Forum, officially called Fossil Fuels Forum and the Amsterdam Sustainable Energy Forum.

manner. Recent proposals and EU-wide political commitments to the 2007 energy package also reflect this flexible and improvising evolution.

The EU energy story is not always a success story, although energy as an issue could be seen as core business for the EU. Since the early 1950s, European policy-makers, politicians and stakeholders in the energy sector have all participated in a quest for a successful EU energy policy.¹⁶ The EU project started with energy, with the creation of the Coal and Steel Community in 1952 (under the 1951 Treaty of Paris). When negotiations began on the EEC founding treaty (the Treaty of Rome), due to high expectations about the role of atomic energy and the perception of uranium scarcity, a separate treaty was established for this energy source, the Euratom Treaty. The 1956 Suez crisis placed oil security on the political agenda, but the negotiation and drafting processes for both the EEC and Euratom Treaties were too far advanced to incorporate oil issues. It was therefore decided in 1957 to request the three executive authorities of the three treaties to study the option of an integrated approach for an energy policy. This study was finished in 1962 and recommended a true *politique énergétique communautaire*, one coherent European energy policy. By that time, however, national interests among the six member states had already diverged too greatly, making the study ‘dead on arrival’ in political terms. When the three executives merged in 1967 into a single body, the European Commission, new momentum was created, but once again, national capitals were not interested in the energy issue anymore.

Trials and errors became part of the EU energy policy story.¹⁷ The EU completely failed to formulate a policy reaction to the 1973 oil crisis and the resulting Atlantic initiatives to create the International Energy Agency (IEA) in 1974. EU energy policy on the issues that really mattered was therefore absent for some 15 to 20 years. The Brandeis doctrine was able to flourish in many national capitals, and also resulted in their effective coordination within the wider IEA context, bypassing Brussels on many occasions. New momentum created new opportunities with the 1987 Brundtland Report from the World Commission on Environment and Development, leading to EU actions on environmental impacts from energy production and consumption. This resulted in strong EU leadership in the framework of the Kyoto Protocol and the establishment of an EU-wide trading system in carbon emission rights. The drive to complete the internal market and include network-based energy sectors gave further impetus to energy markets. But the early 1990s also saw failures, when the idea of the European Energy Charter was launched to extend East-West energy cooperation. It resulted, much like the IEA story, in a rather absent EU institutional machinery. It was the 2005 and 2006 events related to energy supply security that managed to increase political awareness of energy again, especially the 2006 Russia-Ukraine gas incident. These events presented an almost serendipitous opportunity for the EU to set its energy policy records straight, while Al Gore’s story on the ‘inconvenient truth’ about climate change added further political momentum. In early 2007, this process resulted, for the first time in EU history, in a comprehensive, integrated package for EU energy policy, covering the three dimensions of energy policy: supply security, the environment and the market.

The EU with its 27 member states has a volatile record in formulating and executing its role in the global energy market. The EU treaties, although based on bold visions with respect to political and democratic stability through market integration and economic trade and competition, failed to achieve a fully integrated and coherent approach for EU energy policy. Will the EU finally deliver? With its record of internationalism and multilateralism, with its strong economic legal frameworks, with its still ongoing process of transitions since the fall of the Soviet Union, with its poor record of effective external leadership, but with its cultural diversity full of creativity and improvisation, will this Europe succeed in meeting the high expectations? Will we see an integrated EU energy policy, based on a visionary approach and strategy in line with the EU’s traditions and record from the early 1950s?

¹⁶ For a more comprehensive analysis see van der Linde, Coby and René Lefeber, “Europese integratie vergt een energie(k) beleid”, *SEW* (6), 1987.

¹⁷ An overview of the Dutch position during the discussions on EU energy policy in the last 30 years or so can be found in the case study on the Netherlands and Brussels in de Jong, Jacques, Weeda, Ed, Westerwoudt, Theo and Aad Correljé, *Dertig Jaar Nederlands Energiebeleid*. CIEP Study. The Hague: Clingendael Institute, 2005.

And what will the outcome be? Will it be one in line with Mitterrand's 'cathedral', or will it be merely a 'wall'? The recent 2007 initiatives and political commitments point in the direction towards more coherence in energy policy-making, with a greater degree of integration, and with due regard for the three basic energy policy objectives (supply security, the environment and the market). On the basis of these initiatives, what appears to be emerging is not so much a cathedral as a couple of walls. But does the history of building cathedrals not teach us that most of them started with building walls, without a great visionary blueprint on the part of the master architect? The issues of the 2007 energy package and the historic developments that have occurred since 1957 will be discussed in more detail in Chapter 6, after the presentation of the four storylines of conceivable EU energy futures up to 2050. But first, a few brief remarks are needed on the wider global energy setting that will determine the EU's energy future.

3

The wider EU energy policy environment: The issue is not resources, but access

Meeting EU energy needs is a basic condition for sustaining EU economic growth. Even with energy efficiency increasing and energy intensity declining, EU energy needs are still forecasted to rise quite substantially. EU figures indicate a rise in primary energy demand from some 1,750 Mtoe (million tons of oil equivalent) to almost 1,900 in 2030.¹⁸ Energy balances will continue to be largely based on oil and gas (some 60%), with coal, uranium and renewables covering basically equal shares. The next 25 years will see dramatic changes in EU energy import dependency, particularly for oil and gas. With overall energy import dependency rising from today's 50% to some 65% in 2030, around 90% of the oil and gas demand will need to be covered by imports by then.

These developments reflect the global energy picture as a whole. The world at large¹⁹ faces similar circumstances, with oil and gas covering roughly 60% of worldwide energy growth. These fuel dependencies are increasing public and political awareness about oil and gas resources. Global experts estimate proven oil reserves at some 1,200 billion barrels, an amount that could sustain present production levels for some 40 years. Figures for gas are 180 trillion cubic meters, covering more than 60 years of current-level production. More oil and gas will need to be found, and technology development will continue as well.

Oil and gas resources are increasingly geographically concentrated. For oil this basically means the Middle East/North Africa (MENA) region, where some 60% of world oil reserves are located. In terms of gas, Russia and MENA combined account for around 75% of world resources. Since resources are concentrated in a handful of countries, their national state-owned oil and gas companies control roughly 90% of total reserves. These facts are bringing issues of access to the forefront. Oil and gas flows to world markets, with a small number of vulnerable transport choke points adding to supply security risks, will increasingly be subject to producer government policies. Therefore, the key issue is not resources, but rather access to those resources

Globally, the industrialised world – more specifically, the member countries of the Organisation for Economic Co-operation and Development (OECD) – will face a strong decline in its share of the 'energy pie' from its present 50% to some 40% in 2030. The developing world, with China and India as the main drivers, will see its share growing from today's 40% to almost 50% in 2030. Also observed is a growing role for the Asian oil and gas industry, with strong backing from national governments, and even some direct involvement. In this global context, questions arise over whether the prevailing paradigm of multilateral frameworks and market-driven strategies will survive in the medium to longer terms. A paradigm shift towards more bilateral and state-driven mechanisms may be emerging and gaining further momentum in setting the rules for global oil and gas supply-and-demand relations.

¹⁸ European Communities, *European Energy and Transport: Trends to 2030 – Update 2005*. Luxembourg: Office for Official Publications of the European Communities, 2006.
http://ec.europa.eu/dgs/energy_transport/figures/trends_2030_update_2005/energy_transport_trends_2030_update_2005_en.pdf

¹⁹ International Energy Agency, *World Energy Outlook 2006*. Paris: OECD/IEA, 2006.

These patterns are further affected by political instability in the MENA region, together with ongoing conflicts and wider security threats. In such a world, geopolitical issues will be strong drivers for governments in securing their energy needs. Although the major international oil companies and global oil and gas markets will still play large roles, hydrocarbon molecules are increasingly asked for their passports. China and India, Japan and Korea, and Latin American countries are not the only players in energy theatres. We are increasingly seeing performances by the US, Russia and some of the larger European countries as well. From the front or the back, governments are focusing more on energy flows, largely determining whether multilateral or bilateral frameworks will prevail, and whether economic efficiency and competition or foreign policy issues will set the rules. It is in this context that the world may move away from the prevailing multilateral and market-based frameworks into a much more scattered system of regional and national interests, with a variety of bilateralism and regionalism in energy relations. The EU, as the world's largest global economy, must determine its role, its vision and its strategy in the event of both types of future.

Accepting that sustaining EU energy supply security requires an EU external energy policy with due regard to geopolitical developments may seem self-evident to many energy policy watchers. Political agendas in national capitals, however, are still giving different signals. Concerns about national energy giants or EU giants-to-be are one such signal. Other signals seem to concentrate on bilateral energy relations with Russia or on mixed feelings about the future EU Convention, where common political views are seeking a strong EU energy policy. Given that the EU has always had difficulties in the past in combining a strong internal economic policy agenda with a coherent and effective external approach, the energy issue is not unique. Remembering that the EU also has a record of moving on such issues only when there is severe external pressure or even a crisis situation could give some hope for the EU and national energy policy futures.

4

Energy scenarios: Theory and practice

4.1. Introduction

The energy issue is crucial for the world's well-being, in terms of economic, social and environmental development. Governments and markets, energy producers and energy consumers, all have fundamental responsibilities to promote and sustain the use of energy for the benefit of all. The development of energy production and energy consumption has a number of strong drivers: physical, technological, demographic, social, economic, as well as the government policies connected to these drivers. A description of developments at the level of each of these drivers through different storylines could help to facilitate understanding, discussion and collective assessment of what the future challenges might be. All energy stakeholders, as well as policy-makers and politicians, should be able to take appropriate action in accordance with their own responsibilities. Storylines can be developed by means of scenarios. Scenarios are not forecasts; they are stories about what might happen in the future if certain assumptions are fulfilled, but they are most certainly not predictors of the future.

Energy scenario-building dates back to the early 1970s. The Club of Rome and the supporting forecasting done by Dennis Meadows and Amory Lovins, with their prognoses for global resource depletions and especially their scenarios, made it possible to explore the future in an imaginary and creative way. This in turn made it possible to attempt to answer questions about what might happen in the future and how to address the corresponding challenges. Later that decade, a project undertaken at the US university MIT produced the first international energy scenario study²⁰ on global prospects from 1985 to 2000. Interestingly, the project, based on a Workshop on Alternative Energy Strategies (WAES) with some 35 participants from 15 oil producing and consuming countries, concluded:

The crux of the problem... is that preferred oil demand exceeds maximum potential production from 1980 onwards... [T]he years up to 1985 are the critical ones. Events and policy decisions in the coming years will determine success in demand reduction, fuel substitutions or additions to supply... [T]he main thrust of our cases for the year 2000 is inescapable; the period to the end of the century will be one of energy transition, away from oil as the world's dominant fuel....

Today, in 2007, we know that the energy future turned out differently, albeit more in timing than in direction. The interesting thing about this project was that it was based on a process where a number of key policy decision-makers were involved, and the experience greatly influenced their views in subsequent years. Part of the spin-off of the process was a further developing and refining of energy scenarios as a tool for decision-making.

4.2. Scenarios, forecasting and backcasting

Scenarios are powerful tools for addressing what is both fundamentally significant and profoundly unknowable. Uncertainty makes most people very uncomfortable and they prefer to avoid it. We therefore tend to build mechanisms to simplify our world. All the uncertainties that can be identified are expressed in terms of risks, indicating possible events, trends and patterns. The art is to translate factors that are considered relevant for the future into storylines. Here the term storylines is used in the more classical sense, where plausible and/or conceivable, inherently consistent patterns are explored

²⁰ Wilson, Carroll, *Energy: Global Prospects 1985-2000. Report of the Workshop on Alternative Energy Strategies*. New York: McGraw-Hill, 1977.

and where thinking ‘outside the box’ is a dominant feature. Building scenarios on such a basis is basically a group process, where individual perspectives are shared and widened, improving understanding, exploring what might happen, and thinking about what should be done, anticipating and preparing for the uncertainties. Usually, but not necessarily, these storylines are supported by quantitative results based on sophisticated energy modelling. The storyline itself is the core of the message, with quantitative illustrations. To quote a Shell CEO: “Using scenarios helps us understand the dynamics of the business environment, recognise new opportunities, assess strategic options and take long-term decisions. I stress ‘using’ because scenarios are a process and not a product.” Figure 1 gives an illustration of this process.

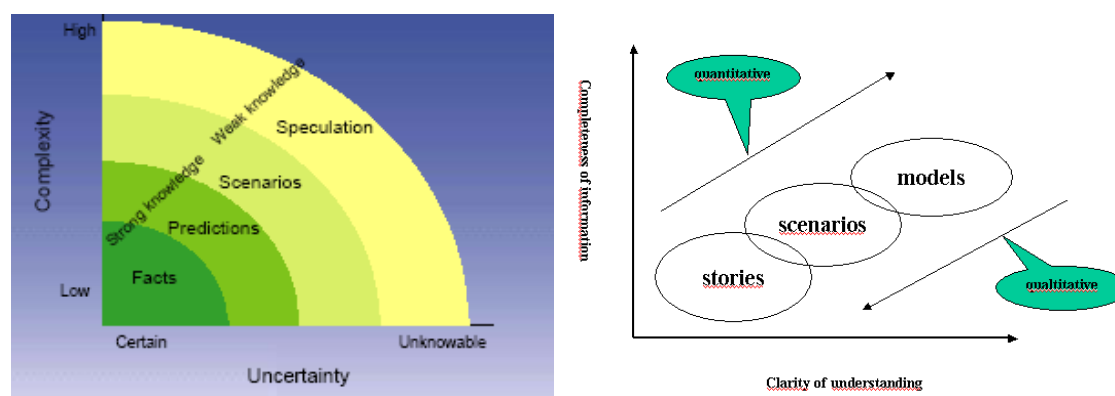


Figure 1 – **Stories, scenarios and models**

Building scenarios gradually shifted from a strongly quantitative-based output to a process based on discussion and persuasion, telling stories about conceivable different futures. Companies like Royal Dutch Shell were quite active in using and publishing this approach for energy, as the energy business usually works with projects, investments and planning on a 10-to-15-year timeframe. The Shell experience dates back to the early 1970s, when people like Hans Dumoulin and Peter Schwartz started to develop the art of scenario making.²¹ Every three years or so, Shell publishes its views of possible energy futures. It has used concepts such as TINA (There Is No Alternative) in the 1990s, depicting globalisation, the onrush of new technologies and market liberalisation, and presenting pairs of scenarios featuring both market-centric worlds and alternative worlds with more room for social and community aspirations. In the early 2000s, major events such as 9/11 and the Enron collapse dealt a destructive blow to international security and trust in the marketplace, highlighting the importance of the role of the state. This led to Shell’s latest set of global scenarios,²² exploring the three forces of market incentives, communities and coercion or regulation by the state. Based on the notion that there will always be a ‘two-win, one-loss’ world, the three resulting storylines were named Low Trust Globalisation (Carrots and Sticks), Open Doors (Incentives and Bridges) and Flags (Nations and Causes).

In the ‘scenarios as storylines’ approach, the process is more important than the product. A more product-oriented approach is found when forecasting of energy futures is done on the basis of a set of realistic assumptions, using alternative policy inputs and assumptions which are then translated into quantitative outcomes. The WAES report mentioned in 4.1 was an early example of this method. Another example is the IEA World Energy Outlook series.²³ The IEA has been active in energy forecasting since the early 1980s, and began to publish an annual World Energy Outlook in 1993.

²¹ Peter Schwartz has published books like *The Art of the Long View: Planning for the Future in an Uncertain World* (New York: Currency, 1996) and *Inevitable Surprises* (New York: Simon & Schuster, 2003).

²² Shell International Limited, *Shell Global Scenarios to 2025*. London: Shell, 2005.

²³ International Energy Agency, *World Energy Outlook*. Paris: OECD/IEA, 2006.

Every two years, beginning in 1999, the report addresses a specific subject, such as investments in 2003, the Middle East and North Africa in 2005, and China and India in 2007. A more EU-specific example is found in *European Energy and Transport: Trends to 2030*, where baseline assumptions and alternative policy scenarios for the EU-27 have been made by the University of Athens at the request of the EU Commission's Directorate-General for Energy and Transport.²⁴

Forecasts can also be based on the method of probabilistic assessment techniques, where probabilities and impacts are further combined. These techniques have become quite common in risk and safety assessments, where decision-tree types of events are analysed event by event and quantified based on statistical evidence. Their use in exploring possible futures is more recent, for instance, in the greenhouse gas (GHG) scenarios developed in the context of the Intergovernmental Panel on Climate Change (IPCC).²⁵ These long-term GHG scenarios are multi-purpose ones, where a variety of socio-economic parameters are used to calculate GHG emissions, which are then used to calculate the consequences for the atmosphere and the climate, which would then lead to assessments of the impacts on the planet at large.²⁶ Within the IPCC caucus, two different views were expressed in developing their scenarios, namely the probabilistic course versus the storyline approach. The first estimates best guesses and uncertainties of all relevant parameters in the model, resulting in a best-guess outcome within a range of uncertainties. The second develops storylines around the major uncertainties and uses the storyline estimates to produce a set of consistent values.

Highlighting these differences further, the proponents of the probabilistic approach argue that there is no value in providing policy-makers with a set of lines that go all over the place. Experts and scientists should determine the most likely assumptions and their outcomes. Decision-makers should then address these risks, expressed as a product of probability and impact. The storyline argument, however, underlines that future emissions are the product of a large range of very uncertain factors (population, technology, socio-economic developments, etc.). Storylines are then used to define a consistent set of assumptions, exploring but not predicting these futures. Storylines are therefore good at addressing all these uncertainties, and promoting creativity and flexibility when exploring what to do. But they are not easy to use or to understand in defining policy approaches, and run the risk of becoming fairy tales. The probabilistic approach then is good in producing more quantitative results, using scientific rigidities with rather easily interpretable outcomes for politicians and policy makers. In presenting different ranges, the mean outcome could then be used as a sound base for decision-making, and this is what we usually see in climate change remedial policy-making.

Another group of scenario-building approaches is based on telling the story about a desired outcome and recommending what should be done in order to get there. These outcomes could be quantitative or more qualitative, but it is the outcome that is the core of the message, not the story. The desired outcome is then defined and translated into a plausible set of policy and other assumptions supporting the feasibility of the end results. These approaches would therefore tend to have marked backcasting characteristics. Concrete, quantitative examples in the energy and climate discussion are provided by the scenarios developed by Greenpeace²⁷ and the recent 'energy vision' report from the Dutch Energy Research Centre (ECN).²⁸

On the basis of a study commissioned by Greenpeace from the World Resources Institute, a 2050 future is developed where there is no dangerous climate change, where nuclear energy is not necessary, where energy security is improved and energy bills are affordable. This future is based on an almost 50% energy efficiency increase and a very strong deployment of wind energy and biomass,

²⁴ European Communities, 2006, op. cit.

²⁵ The various documents and analyses on their scenarios are available on the IPCC website: <http://www.ipcc.ch/>

²⁶ Van Vuuren, Detlef, "The IPCC Process: Long-term energy/climate scenarios", presentation at the CIEP Seminar on Energy Scenarios, 18 June 2007, http://www.clingendael.nl/ciep/events/20070618/20070618_vuuren.pdf.

²⁷ Greenpeace, "A Convenient Truth: Global Energy Scenario", presentation at the CIEP Seminar on Energy Scenarios, 18 June 2007, http://www.clingendael.nl/ciep/events/20070618/20070618_baretta.pdf.

²⁸ Uytterlinde, M.A., Ybema J.R., and R.W. van den Brink, *De belofte van een duurzame Europese Energiehuishouding; Energievisie van ECN en NRG*. Petten: ECN, August 2007.

a stable role for natural gas, but heavy limitations for coal and oil. In its 2050 vision for a sustainable energy economy in Europe, ECN foresees a 60% cut in CO₂ emissions and substantially less imports of oil and gas. Renewable energy accounts for about a 35% share in total primary energy supply (TPES), with biomass, wind and solar energy as the main sources. Large-scale (mainly offshore) wind and concentrated solar power (CSP) parks take the renewable lead in electricity production, in addition to clean coal with large-scale application of carbon capture and sequestration (CCS), accounting for a 40% share. In this future scenario, nuclear energy remains stable, but biomass is booming. Large-scale flexible multi-purpose biomass gasification is applied for biofuels in transport and for heat and electricity. On the demand side, technology is also booming in the building environment and in decentralised smart grid systems. More generally, it is argued that 2050 does not represent the end of the story: a fully sustainable system has not yet been reached, and requires further conditions in the areas of CCS, biomass and nuclear energy. All available options will have to be pursued, however. Figure 2 summarises the ECN vision with respect to the TPES balance.

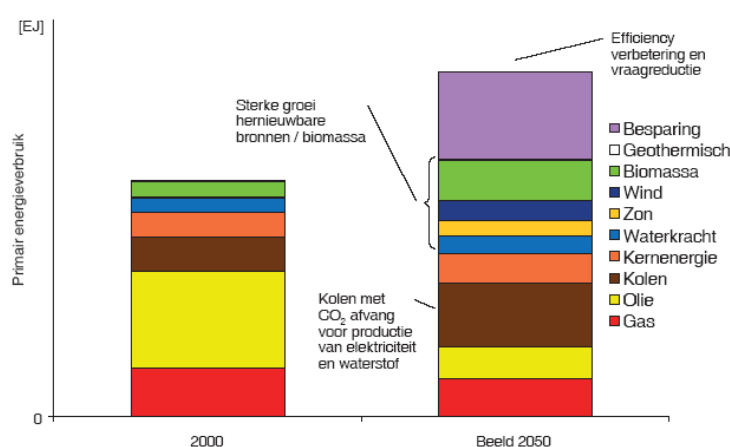


Figure 2 – TPES in Europe 2000-2050

Box 2 – Clingendael Essays on the EU's Future

In cooperation with the Ministry of Economic Affairs, the Clingendael Institute organised a contest for essays about the future of European integration. One of the winning essays, titled “Europe and the Bull’s Slow Death”, focused on energy. A few brief excerpts from the essay are presented here:

“May 2019, Istanbul, where a treaty was signed for the establishment of the European Energy Union of the Black Sea (EEUBS) between Romania, Bulgaria, Ukraine, Moldova, Turkey and Georgia. The EEUBS will launch the ‘Eurasia of the Six’, analogous to the 1952 ‘Europe of the Six’. With the EEUBS, the EU becomes directly involved in the Eurasian ‘energy wars’, creating a direct link with the Caspian Sea basin without Russian involvement and through a common approach free from Gazprom imperialism and GasPEC risks. The Nabucco pipeline project was seen as a key component in this development.”

“The EEUBS was also seen as a marker for making European boundaries, and the EU’s in particular, more explicit. A French veto on the accession of Turkey, a strong focus on Mediterranean partnerships as an alternative to EU membership, and NATO extensions with Ukraine and Georgia were all seen as geopolitical reactions towards Russia’s and Iran’s assertive energy policies. The failure of the Lisbon commitments on competitiveness and markets led the EU – under the leadership of a majority of female politicians headed by Angela Merkel and (from 2012) Ségolène Royal – to turn in the direction of a strong social focus, resulting in a Maastricht II Treaty in 2016 and the consequent founding of the European Economic and Social Union (EESU).”

“The further development of the EESU as a new concept for European integration and cooperation created strong political momentum for the EEUBS, allowing ‘old and new Europe’ to continue exploring its wide potential for creativity, improvisation and intelligent international (energy) diplomacy, using once again, as in 1952, the energy issue as a major starting point for creating a widening community of interest between European and neighboring nations.”

Box 3 – “In My Mother’s Time”

In this essay, Meagan Linde, the daughter of CIEP Director Coby van der Linde, is looking back from 2050, discussing some global energy market issues that her mother has worked on. Here are some brief excerpts:

“From 2015 onwards, the overall energy scene was one of increasing international conflicts, where the large economic and political powers in the world were facing major difficulties in the industrial organisation of global energy markets. A wave of takeovers, mergers and shakeouts occurred, with companies from India, China, Brazil, Saudi Arabia, Venezuela and Russia as the main winners, leading to the disappearance of companies such as Royal Dutch Shell, ENI and BP, whereas others could only survive due to strong backing and intervention from national capitals. This development and the underlying geopolitical conflicts resulted in the end of the era of fossil fuel with a large crash in 2027, leading to severe difficulties in energy supplies and hence in economic development.”

“And now, in 2050, many more electronic consumer products are based on small-scale solar cells than in my mother’s time, and households are using solar, wind and geothermal energy for their electricity and heating requirements. In the transportation sector, many difficulties had to be overcome in order to meet mobility requirements on land, at sea and in the air, where hydrogen has developed into its major energy source. The transition process from gas as a primary energy source to alternative renewable sources was a very difficult one. Nuclear energy did however produce enough electricity for large industrial consumers, but many international conflicts around the nuclear fuel cycle forced the nuclear industry to scale back its activities from 2025 onwards. Despite major research efforts, nuclear fusion was still not able to make its breakthrough into safe deployment as an energy source. The European agri-energy industry was already faced with major shortages around 2018 due to the deteriorating trade climate and growing energy nationalism in Africa and Latin America. Fourth-generation biotechnology developed to maturity around 2043, when bacteriological and nano-based technologies were able to free biofuels from agricultural production areas. In the meantime, Europe had to introduce a rationing of meat consumption in order to meet growing energy shortages.”

“Chaos emerged in the Middle East from 2009 onwards, with serious impacts on oil and gas supplies, while US actions secured some Saudi oil flows to US markets... Large Chinese interventions in Africa and the Middle East were in the end unsuccessful... Russia succeeded in controlling Caspian energy production, but around the mid-2020s the Cold War on Energy resulted only in a re-division of powers in oil and gas resources without a stable energy supply equilibrium. This brought the 2027 energy crash and the beginning of the end of the fossil fuel era.”

“The overall transition process from fossil fuels to clean and sustainable energy was much more difficult than foreseen in 2007. This was largely due to the changing geopolitical environment that made the transition in itself a subject of international conflicts. The US started around 2014 with a kind of Energy Manhattan Project, leading to some concrete results in the following years with zero-emission cars and net-energy-producing houses. The EU tried to catch up, but failed largely due to political and policy inertia within the legal frameworks, where competition law hindered adequate and effective cooperation in industry and even in universities. This changed with the arrival of large European Energy Institutes around 2020, where energy innovation and creativity could start to blossom again. But it was only after the 2027 crisis that effective political leadership within the EU created the political, legal, social and economic conditions that allowed major technology drives to move successfully to the energy transition that began to mature around the mid-2040s, and made Meagan drink coffee again after ten more years in a European setting where the lights did not need to go off at ten in the evening anymore...”

A qualitative example of this form of backcasting is found in the essays on the EU's future submitted for a contest organised by the Clingendael Institute.²⁹ Excerpts from one of the essays that specifically addressed the energy issue are presented in Box 2. An even more innovative exploratory approach is found in an essay by Coby van der Linde.³⁰ In this essay, part of a wider Dutch project of backcasting from 2050, she speaks through the voice of her daughter to describe the world energy situation in 2050 and the developments that resulted in this outcome (see Box 3). It is interesting to note the differences and similarities between the two essays. The first, titled "Europe and the Bull's Slow Death", is based on an optimistic idea about European leadership in creating a secure and stable energy corridor in Southeastern Europe towards Asian resources. "In My Mother's Time", however, expects continuing geopolitical tensions in and around the Middle East to lead to the end of the fossil fuel era. This outcome will result not so much from resource depletions, but rather from political inability to manage the wider Middle East issue. The two stories coincide in linking energy with geopolitics, international relations, and the EU's ability or inability to respond to the resulting challenges and consequences.

4.3. The scope of the scenarios

Energy policy is reappearing on many political agendas and gaining an ever higher degree of public attention. Increasing mobility and growing dependence on electricity-driven machinery in almost every part of global society increase the need for reliable energy supplies. The rising awareness of dependence on fossil fuels from a limited group of foreign, sometimes politically unstable sources; the promotion of renewable energy sources; the reduction of energy poverty to enable the fulfilment of the Millennium Development Goals; the contribution of the energy sector to global warming; and the introduction of consumer choice in electricity and gas markets are topics which feature high on the agendas of stakeholders. These topics cannot be tackled one by one, as they are increasingly interlinked and strongly influence and determine the effectiveness of actions taken.

On top of this there are increased geopolitical tensions, problematic legitimacy of the existing hegemonic powers, resurfacing nationalistic and protectionist tendencies in developed countries, and a distorted balance between energy consuming and producing countries. Strategic interests at national and regional levels are at stake when energy is concerned. Progress in international negotiations, whether on sustainable development, climate change or investments in producing countries, will most likely only be possible when these interests are recognised, accepted and taken into account. There seems to be no doubt that this will present a formidable challenge to decision-makers in the industry, to governments and their negotiating tactics, and to multilateral forums and institutions. Figure 3 summarises some of the main interrelations that are influencing the general area of resources and resource policies, including the global energy issue.

²⁹ Clingendael Institute, *The Future of European Integration in Nine Essays* (in Dutch). The Hague: Clingendael Institute, January 2007.

³⁰ Van der Linde, Coby, "Energie: de eeuw van mijn moeder", in Veld, Prof. dr. R.J. in 't Veld, Van der Veen, Ir. J.H. and Dr. F.M.R.C. Basten (eds.), *IJsberenplaag op de Veluwe; Essays over de Toekomst*. The Hague: COS, July 2007, http://www.clingendael.nl/publications/2007/20070618_linden_eeuw_van_mijn_moeder.pdf.

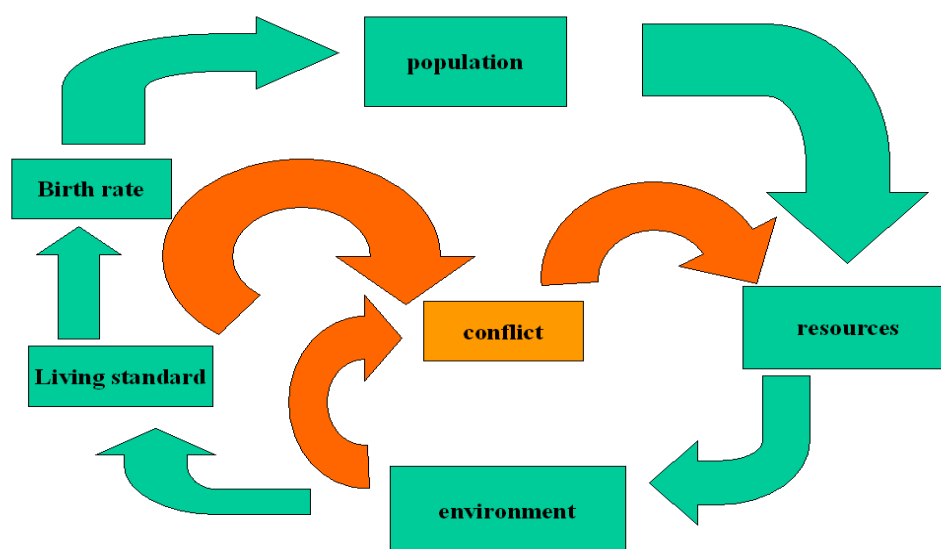


Figure 3 – **Global interrelations influencing resource policies**

Energy is a key input in the economy of every country. It is essential for developed countries to maintain current levels of economic welfare, and for developing countries to pursue economic take-off. However, energy policies have different perspectives from a consumer country, where security of supply, the environment and the market/price balance are central issues, and from a producer country, where security of demand and resource management are crucial. In general terms, four main global policy themes can be identified for determining the energy future: market efficiency, climate change, poverty reduction, and the increasingly important issue of geopolitics.

4.3.1. Market efficiency and energy

Since the early 1990s, the role of market mechanisms in energy policy and development has been the dominant ideology in many policy arenas. This driver for changes regarding the respective roles of the public and private sectors within national jurisdictions has resulted in a global trend towards opening energy markets and promoting free trade in energy and energy services. Energy deregulation in the US, energy liberalisation in the EU, market forces and the private sector in transition economies, and market conditions for energy investments from international financial institutions in the developing world are all different melodies and harmonies of the same basic song: to use market-based mechanisms wherever possible to pursue energy policy objectives and to balance government interventions. Market-based instruments are also used for a combination of policy objectives. Some examples are the EU Emission Trading Scheme, the Clean Development Mechanism and Joint Implementation under the Kyoto Protocol, tradable green and white certificates promoting the use of renewable energy sources and energy conservation, and incentive-based mechanisms for energy investments in production, distribution and consumption.

However, for markets to function properly and to deliver benefits for consumers, stable regulatory regimes with transparent, reliable and trustworthy public decision-making procedures are seen as necessary conditions. This process is still ongoing in many developed and developing countries, although there are signs that parties are less willing to accept this market paradigm. The role of energy prices and energy market mechanisms are essential elements in most government energy policies and in international energy discussions.

However, market mechanisms are not the silver bullet for solving all energy issues. Consumer behaviour leading to global conservation ethics could also be influenced by intrinsic values. It is widely recognised that historically the overall use of energy on a global scale has been wasteful, and little effort has been made to respect the fact that most energy sources are diminishing – that is, they

are not renewable. There is enormous scope for achieving greater efficiency and conservation through development and deployment of available and developing technologies. It is also recognised that there could be great benefit in ensuring that advanced technologies are transferred to developing and underdeveloped countries to ensure that earlier wasteful practices in the developed world are not repeated again in developing economies. In addition, it should be noted that market mechanisms per se are of little concern to governments when vital interests are thought to be at stake, which is also an important part of international negotiations.

4.3.2. Climate change and energy

Energy, along with food, water, ecological diversity and other elements, constitutes an absolutely essential ingredient for human sustainability throughout the world. There are many environmental concerns connected to the production and consumption of energy. Some are local concerns, such as the local air pollution caused by the burning of coal. There are also regional concerns, like acid rain in the 1980s in the developed world. But today there is one global concern that overshadows all others: the issue of global warming. There is increasing recognition that global warming is one of the most important problems for the future of mankind, and that the possible consequences such as shifting of climate zones and flooding of low-lying areas might even lead to geopolitical shifts in power. Nevertheless, the dependency on international cooperation, national interests and differences between countries in economic and political set-up make the chances for “winning the battle against global climate change” dependent on global geopolitical developments and effective energy investments and policies. The real challenge therefore is to develop effective policies to address the production of GHGs and seek solutions which avoid or minimise the release of GHGs into the atmosphere.

4.3.3. Energy and poverty

One of the Millennium Development Goals adopted by the United Nations is the eradication of extreme poverty and hunger. One of two targets to measure progress in achieving this goal is to halve the number of people living on USD 1 a day by 2015. Reaching this target is very difficult without improving access to electricity for poor people, since the strong link between income and access to electricity would imply an enormous increase in electrification rates in very poor countries. In the period until 2015, electricity should become available to at least 500 million people, which will cost roughly USD 200 billion. On top of that, modern cooking and heating fuels will need to replace traditional biomass consumption and be made available to at least 700 million people by 2015 to reach the USD 1 target. It is currently estimated that 1.6 billion people do not have access to electricity. Between now and 2030 about two billion people are expected to gain access to electricity, but due to population growth, the number of people without electricity would still be 1.4 billion. Higher electrification rates lead to higher economic growth, higher household income, higher energy consumption, higher energy supply volatilities and higher emission levels.

Meeting all these objectives represents a series of challenges which impede effective access to required capital for energy infrastructure developments. Governments generally do not have the essential financing capacity, while private sector organisations in developing countries are usually at an early stage of development and also unable to meet the challenge to finance major energy infrastructure developments. Clearly, it is essential to solve the investment challenges and break the cycle of poverty. The growing imbalance is a global moral dilemma as well, which requires a sustained programme of coordination and support aimed at progressively achieving energy sustainability on a global basis. Greater cooperation and support is therefore clearly required, especially from developed and developing economies. It is also important that this not be simply in the form of financial support. It is well known that in certain cases, restrictive trading practices are imposed by developing economies on underdeveloped nations, which only serve to impede progress by underdeveloped countries in participating in global trade, with its associated opportunity for economic growth and development.

4.3.4. Geopolitics and energy

For many years after the fall of the Berlin Wall there was a general belief in developed countries that the world would integrate in a global economy based on market principles. However, the expected strong globalisation gave way to weak globalisation in a relatively short time span. This general trend

is particularly visible in energy markets. The grounds for this interpretation of national interest-based or weak globalisation is that the countries adhering to this type of globalisation have little trust in the hegemonic power, the US. This became more apparent after 2001 when the US, for national security reasons, began to more closely define the political, legal and social requirements for integration, in other words, the rules or mores of the international system. Before this date, the US had been less clear about the mores and relied on the logic of the market as the main tool to achieve full integration. The new interpretation of the rule set by the US after 9/11, and the resulting policies developed and applied by the White House, motivated some emerging consumer countries (such as China and India) and producer countries towards a more state-oriented approach to globalisation in which national interests are the main purpose for their international activities. These developments are challenging the legitimacy of the prevailing messages of the Western world with regard to markets, democracy and freedom.

The awareness that traditional proponents of the market-based system have difficulty themselves in adhering to the economic principles that they propagate, adds to the suspicions towards the market-based system. The difficult World Trade Organisation (WTO) negotiations serve as a good example. On the other hand, when thought opportune, states with a formerly planned economy do adopt economic standards and integrate parts of their market into the international economy. The problems are worsened by difficult and strained relations between important actors – for instance, US-China, China-Japan, EU-Russia, US-EU member states – that can lead to misunderstandings and misinterpretation of actions, in addition to ongoing security concerns about North Korea, Taiwan and Iran, to mention a few examples.

Currently, the world is still characterised by two orientations to the international system: one focused more on economic efficiency as the leading principle of governance, and the other focused more on effectively promoting national interests. Today's changing international relations will lead to an unknown and unpredictable geopolitical landscape. Because energy itself is subject to geopolitical manoeuvring it is obvious that these changing relations will have an impact on international energy markets and international energy relations.

4.3.5. Global coordination mechanisms

Reconciling the international community's commitments to address global warming and reduce energy poverty with the global energy policy dilemma of supply and demand security is a very difficult challenge. The disparity in reliable access to commercial energy between developed and developing nations on the one hand and underdeveloped nations on the other hand is not only a global moral dilemma due to the very nature of its fundamental inequity; it also constitutes a major force for discontent, with the associated risk of insurrection, civil uprising and local or regional instabilities.

To address the global issues mentioned, there are various institutional and cooperative arrangements in place. While these arrangements have helped developed and developing economies, they have not contributed substantially to solving the fundamental problems of global warming and the energy policy dilemma or the inequities in a number of developing countries. Global coordination and support therefore requires more coherent mechanisms for addressing these issues effectively. If and how such mechanisms can be established by the world community is again a matter for governments to decide.

4.3.6. Energy scenarios and their new policy dimensions

Discussing and assessing world energy futures is thus increasingly related to developments in international and political systems. It is therefore highly appropriate for energy scenarios to take these developments as a basis for further analysis. A model that focuses on the parameters of government energy policy interventions in energy markets does not in itself address wider political realities. A further dimension is regarded as necessary, indicating the various degrees of geopolitical behaviour. These can range from full-fledged multilateral cooperation in a globalising world, to a world where the scene is set in accordance with the national interests of countries that have the political leverage to do

so.³¹ For these reasons, a model with two dimensions of government policy uncertainty is used. One of the dimensions indicates whether the world is heading towards increased multilateralism and global governance or more towards bilateralism and nationalism outside global governance institutions. The other dimension indicates whether the world is characterised by governments engaging in a more state-driven political-strategic orientation of actors, or in one driven by a market and economic efficiency orientation of actors. Figure 4 illustrates these two dimensions and the four resulting policy scenarios.³²

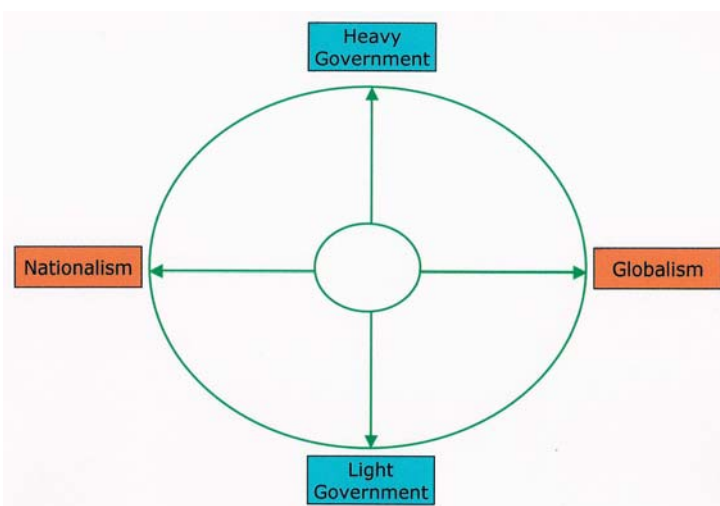


Figure 4 – **Policy dimensions and policy scenarios**

In using this model for describing our four storylines for the EU 2050 energy future, a number of clarifications should be made, first with regard to the interpretation of the scenario axes and their underlying dimensions, and second with regard to the themes that will be used for consistency purposes in all four storylines. As to the interpretation of the dimensions used in the axes of the scenarios – i.e., government engagement/intervention and globalisation/nationalism – the role of governments and their degrees of engagement and intervention in energy markets and energy market outcomes requires clear understanding. It should be stressed that these government roles have no relation with the notion of a ‘strong government’ or with ‘strong political leadership’. A strong government could very well manage light engagement or non-intervention, whereas a weak government could be forced to intervene heavily in energy market outcomes. Governments will always take enabling actions for energy market participants. This could include more or less detailed boundary conditions for energy markets and could turn out to be very specific. Energy market outcomes could, however, be considered to fail in terms of meeting overall energy policy objectives, or even wider government policy objectives. Governments might then choose to take corrective actions, either by further sharpening or relaxing market rules or by more or less directly intervening in market outcomes. Governments could ultimately choose to participate directly in energy markets and to organise functions themselves, such as creating state-owned companies or taking risk-sharing participations or other means of influencing market behaviour. Intervention by governments is therefore basically seen when governments do not accept market outcomes within the rules they have formulated. This could also mean the establishment by governments of specific political conditions on market outcomes that go beyond energy policy objectives in a strict sense.

The other dimension, globalisation versus nationalism, should also be clarified. A world that strongly globalises will have multilateral frameworks and tend to allow market forces and market prices to prevail. Energy consumption, energy trade and energy supplies will therefore be determined by these

³¹ Hooegeven, Femke, and Wilbur Perlot, *Tomorrow's Mores: The International System – Geopolitical Changes and Energy*. CIEP Study. The Hague: Clingendael Institute, 2005, http://www.clingendael.nl/publications/2006/20060117_ciep_study_hooegeven_perlot.pdf.

³² This approach is similar to the one used in: World Energy Council, *Deciding the Future: Energy Policy Scenarios to 2050*. London: World Energy Council, 2007.

frameworks, where legality and contractual sanctity will be the rules of the game. In this world, the WTO framework, global energy markets and other multilateral mechanisms and arrangements will set the mores for energy market participants' behaviour. The other end of the spectrum is a world where bilateralism, regionalism and nationalism are more determinant factors. Politics, geopolitics and foreign policies will be the ruling strategies, with the consequence that molecules and electrons will tend to have more and more 'flags' carried with them when travelling through the energy value chain. In this world we could expect 'divide and rule' type government policies, where energy trade and energy supplies could become instruments of strategic political behaviour by individual governments or groups of governments that have the political power, leverage and willingness to use them in this way.

Although these dimensions are about governments, it would be worthwhile to comment on the role of market participants themselves, and more particularly the energy industry. The energy industry always has and always will interact with the wider political and social frameworks in which it operates. A socially responsible company could take actions that go beyond economic rationale in a strict sense. Company strategies could be influenced by consumer preferences (for instance, with regard to 'green energy'), by environmental issues and their wider public perceptions, or even by more politically or morally inspired issues and values. These strategies will always take due account of government policies or, when they exist, public laws, rules and regulations. But company strategies and subsequent actions could be forthcoming as well on a voluntary basis, without explicit public rules or policies, or in an effort to prevent them from being formulated. In our scenarios we do not take these considerations into explicit account. However, the results of energy industry action in anticipation of heavy government involvement might well be the same as actual heavy government involvement in steering market outcomes.

5

Four conceivable storylines for EU energy policy

5.1. Introduction

Before contemplating the EU's energy future, it is important to discuss what is meant here by the EU. It should be underlined that even the EU as an entity encompasses a wide variety of sub-regions and nations, all with their own characteristics in terms of economic and energy structures and socio-political and governance cultures. Describing wider and more global regional storylines for Europe as a whole, if it were at all possible, would neglect important trends and developments that could represent crucial elements in the various European energy storylines. The choice has therefore been made to make the distinction between Russia as the large energy seller and net energy exporting region and Central and Western Europe as the large energy buyer and importing region. The question then arises if further distinction within the latter would be relevant from a government policy point of view. In terms of both emerging market integration and policy coordination and even harmonisation, it should be noted that there are important differences between the countries belonging to the European Union and those that are not (yet) members. It could be useful therefore to divide non-Russian Europe into EU³³ and non-EU³⁴ countries.

Focusing more specifically on the EU, it is also relevant to ask whether the EU should be considered as a single entity or not. This is even more relevant given the fact that the scenarios developed are differentiated according to the degree of emphasis on nationalism. Would the EU be considered as such in a world full of nationalism, or does this mean nationalism on an EU member-by-member basis? To answer this question, it might be appropriate to consider the extent of energy policy harmonisation within the EU. Or, put otherwise, do we assume a *politique énergétique communautaire* with a strong external energy policy component, or merely a *politique énergétique commune*, where the member states coordinate their national policies while complying on a case-by-case basis with specific EU instruments? From an institutional point of view, there are large differences between the two options. Of course, there are in-betweens as well. Politically plausible models could include energy policy as a shared responsibility between the member states and the EU (the model of the draft EU Convention), or a model where energy policy is approached on an intergovernmental basis with some joint understandings for dealing with common external interests. More regionally oriented approaches via coalitions-of-the-willing are conceivable as well, or a model where markets are increasingly integrated, with limited EU and national government interventions.

As a further point of reflection, the EU 'neighbourhood' policy approach also requires some consideration for the energy future. The EU is embarking on regional cooperation frameworks with neighbouring countries in which energy issues play an important role. One example is the EUROMED project, where the EU is cooperating on energy market relations and integration with the Mediterranean countries. Even more interesting is the Energy Community Treaty (ECT), which entered into operation in 2006. Through the ECT, the EU and all Southeast European countries have agreed to adhere to the 'energy acquis' with a timetable for implementation. Turkey participated in the

³³ To be more precise, for the purpose of these storylines, the EU is defined as the EU-25, together with Norway and Iceland (which have formally adhered to the 'energy acquis') and including Bulgaria and Romania, which are in the process of formally adhering to the EU. The Swiss position in this regard is still uncertain, although one might expect Switzerland to integrate more and more into the EU energy market in the next five to ten years.

³⁴ Again, for the purpose of this exercise, we define non-EU, non-Russia European countries as Switzerland, Ukraine, Belarus, Croatia, Serbia, Bosnia, Montenegro, Macedonia, Kosovo, Turkey and Moldova.

negotiating process but has not yet signed the treaty, whereas Ukraine, Moldova and Norway have applied to join. The ECT will over time result in a European market for gas and electricity encompassing 34 countries. Taking this into account, it could be argued that in the timeframe used for the scenarios, the wider European region could best be approached in a ‘bipolar’ way, that is, the Russian Federation and the EU family.

In terms of the four storylines and scenarios developed here, however, any one of them could give rise to different degrees of community action or responsibility in setting energy policy and thus somewhat determining the EU energy outcomes of that scenario. The storylines have taken these issues into account, on the basis of some simple assumptions. The scenarios characterised by greater nationalism, geopolitics, foreign policy and bilateralism between the large global players (i.e., scenarios 1 and 2) would put more weight on the EU to act as one, approaching the model of a real community energy policy. The scenarios that assume a world with multilateral frameworks would on the other hand leave much more room for individual EU member states to develop national energy policies.

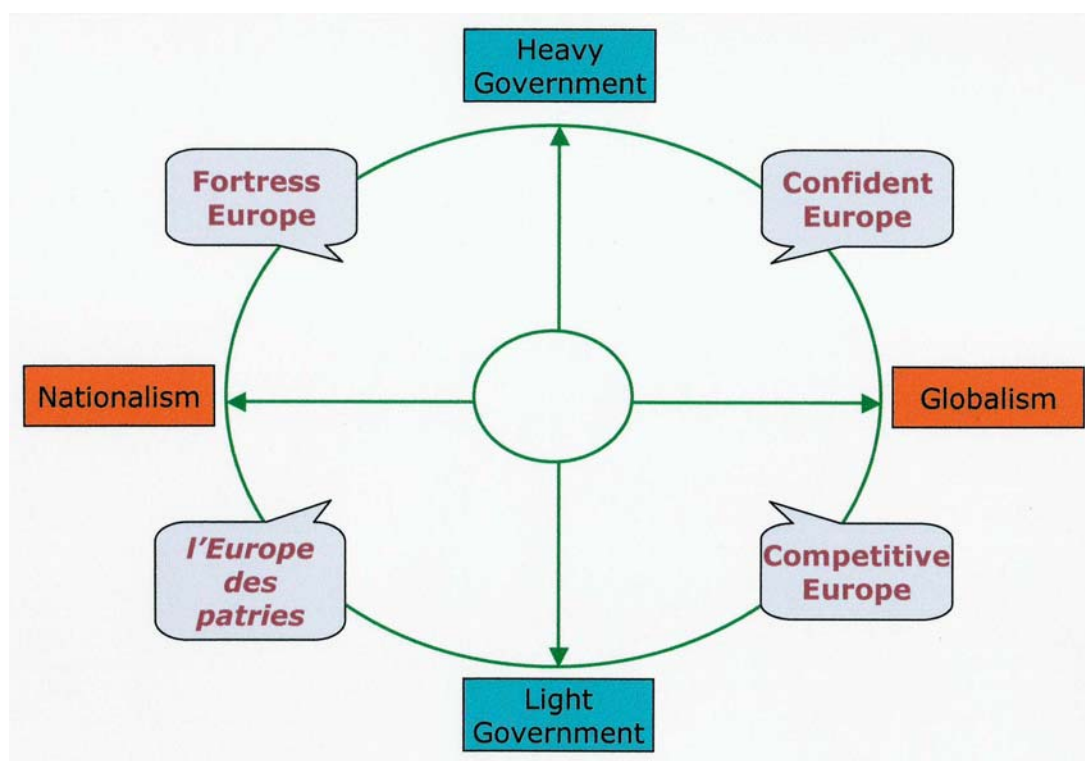


Figure 5 – The four scenarios

5.2. Storyline themes

A set of five themes or indicators have been used in developing the four storylines, in order to promote consistency and comparability among them. However, when deemed necessary, additional themes or indicators have been used, depending on the storyline. The themes are:

- *Political context:* Under this theme the EU energy policy situation is discussed, and the global situation briefly discussed above is further elaborated. This theme also covers the EU’s relations with the Russian Federation and other non-EU energy suppliers. Within this theme, therefore, the wider geopolitical considerations will be dealt with, including, as appropriate, primary energy sources as well as other parts of the energy value chain.

- *Security of supply*: Degrees of assurances or concerns about risks and reliability in energy supplies are described, with distinctions between external energy import security and energy system adequacy. External energy import is basically limited to oil and gas imports. Energy system adequacy deals with infrastructures and secondary energy capacity, such as electricity generation and oil refineries.
- *Market forces and competition*: Depending on the storyline, allowing or promoting markets to work effectively and efficiently will be an important means to achieve energy policy objectives. Economic rationale will then prevail, but will not be self-evident. Financial or other government interventions could be very likely, depending again on the scenario, influencing energy supply and demand structures and balances.
- *Environment and climate change*: Environmental and climate change issues will tend to be high on all policy agendas, but could lead to very different outcomes in the four worlds of the four scenarios. Focus could be placed primarily on local and regional issues, with different forms of government intervention. But focus could also be placed on the global issue of climate change and CO₂ emissions, which would significantly determine energy supply structures. The way in which governments are able and/or willing to manage environmental issues will be crucial for many aspects of the wider energy value chain. In addition, this theme calls for consideration of outcome as well as economic cost. Outcomes may be substantial but achieved at a high cost, with all sorts of other impacts.
- *Energy mix/energy technologies (including R&D)*: This fifth theme uses indicators traditionally employed by the energy industry to rate the outcomes of the four energy storylines. Again, government abilities and/or engagements to promote or even set the wider energy mix will be different for the four worlds and will greatly determine the specific roles of the various energy sources. Managing or (directly) funding the development of new energy technologies will be a specific characteristic of government behaviour. When market forces prevail, economic rationale will determine global outcomes, but when national sovereignty is translated into concrete and direct action, political calculations will have wider impacts. In technology terms, it should be added that despite the 2050 timeframe, it is not expected that fusion technology and hydrogen will play meaningful roles. Being a secondary energy vector, hydrogen's role would be limited for global energy balances, unless real breakthroughs occur in the transport sector. If this were to happen in a meaningful way, it would probably influence oil imports, because oil demand in Europe will be largely driven by the transport sector. Finally, with regard to the energy mix and related technologies, it would be appropriate to comment on both outcomes and economic cost in the four storylines.

5.3. *L'Europe des Patries: Nationalism and light government engagement*

The world at large has developed in a direction where governments are largely invisible in energy matters, but in a more indirect and subtle way, they are heavily involved in securing their external energy supplies. In Europe this goes for 'government' at both the EU level and the national level. More and more governments tend to openly tolerate various degrees of bilateralism in energy trade and relations, where foreign policy issues have become strong components. This tendency towards bilateralism is becoming stronger and governments allow their energy industries to engage in what is, at times, an open scramble for oil and gas supplies, resulting in heavy upward and accelerating pressures on oil and therefore energy prices.

Uncertainty is high in this world, with a negative impact on energy investments. By 2050 oil prices have reached levels around USD 120 (in 2005 prices), coupled with high price volatility. Investment tends to be concentrated on non-conventional oil production, gradually limiting the market shares of Gulf producers.

Developments over 45 years of recent history have never been straightforward in only one direction. However, in this world it is clear that in the period under scrutiny there is a persistent predominance in Europe of a preference for approaching problems in a manner that is perceived as mainly in the

national or regional interest. This also holds true in cases where the solutions reached for these problems might in the longer term be detrimental to the development of other regions and if the cost of these solutions might be high.

The European region as whole under these conditions presents a far from homogeneous picture. Russia succeeds in further developing its energy potential as a strong net exporter, also using this to successfully (re-)diversify its economy. It is gaining further political strength in global issues, using its energy supply base. The EU as such will not be able to effectively accommodate this in a strong bilateral relationship with Russia and with other energy suppliers, since these relations are relatively cumbersome due to their foreign policy components. Larger EU members are however effectively combining their foreign policies with energy trade policies and are using these in a more sub-regional context within the EU as well. When taken as a whole, the entire region of Europe including Russia is largely independent for its energy supply, especially for gas. However, the EU's energy self-sufficiency remains under 50% over the entire period, the lowest rate of all four scenarios.

EU members are frequently hesitant in setting up common policies on energy matters, further limiting the role of 'Brussels'. Noticeable tendencies towards sub-regionalisation within the area keep popping up, with cross-border energy markets integrating at regional levels, leading to the need for further energy policy coordination mechanisms. Divisions are visible between Scandinavian and Northwest European markets on the one hand and the ECT area and Mediterranean basin on the other. As the EU's energy supply basis further worsens, however, reverse tendencies will materialise within the EU family, since wider economic interests are at stake. In a global energy world driven largely by national approaches in the US, China, India and elsewhere, a common EU reaction becomes more necessary, leading to more common energy policies at the end of the period.

Energy supply/demand tensions are high, albeit more in oil than in gas, leading to a deterioration of the EU's energy self-sufficiency. This development is further aggravated because the EU has not been able to develop its own 'grand design' for its energy supply base. Russia, on the contrary, is developing as a strong energy exporter, in oil, gas and coal, and sometimes makes efforts to coordinate export policies with North African and Asian gas exporters in the Caspian Sea basin. However, as these exporters have more interest in the sub-regional approaches that are emerging in the EU, different schemes for gas supply diversification are being negotiated. The Nabucco pipeline has thus been built, bringing gas supplies from Southwest Asia and Iran to the southern parts of the EU market. This supply line has positive and negative impacts and therefore does not lead to a substantial diminishing of supply tensions in the EU.

There is considerable room for national energy giants that will develop into a few European giants, and follow a path determined by the companies' owned perceived interests. Nevertheless, competition within the EU market is rather strong, despite the relatively small number of players. Brussels sees no merit in intervening in the energy market, allowing the strongly vertically integrated energy industries to flourish further. Their stock listings are regularly beating records, making energy investments a highly profitable venture. Market accessibility is generally poor for non-EU energy companies, but due to a number of company-to-company partnerships, the role of Russian energy companies is becoming more and more visible in regional EU energy markets. The EU's national giants have different success ratios in entering the Russian energy system, depending on the adequacy of their government backing.

Government engagement in climate change matters is dwindling, on the part of both the EU government and member country national governments. The general attitude in the region is one of 'wait and see', leaving policy initiatives to other regions in the world. Energy intensities are decreasing at a relatively slow pace. Initially the region's carbon share in energy decreases only modestly, leading to a continuous though modest increase in GHG emissions. However, after a peak in 2035, the EU is finally able to decrease its emissions, following a decrease in its carbon base due especially to falling oil shares. In transport there is a continuing heavy reliance on conventional fuels, but fuel efficiency of vehicles is increasing over time thanks to fierce competition in the sector and rising emissions standards.

Although the role of electricity is strongly increasing, with consumption more than doubled, the energy sector gradually develops in a surprisingly ‘traditional’ manner: the focus remains on conventional technologies. Coal, as a national or domestic resource, is undergoing a certain revival as electricity fuel, sometimes using state-of-the-art burning conditions and a prudent development of CCS. There is a modest increase in the share of nuclear power, with a strong nuclear revival in a number of member states due to its increasing competitiveness. Despite a certain lack of government interventions and technological breakthroughs, high energy prices are still giving renewables a boost. Solar, wind and biomass see large increases in production, but overall shares in 2050 barely reach levels of more than 10%. Tables 1 and 2 and Figures 6 and 7 summarise the overall picture for *l’Europe des Patries*.

International energy prices				
	2005	2020	2035	2050
Oil (\$/bl)*	54	59	90	118
Gas (\$/Mbtu)* European market	5,4	7,3	10,6	15,3
Coal (\$/t)* European market	72	89	104	117

* : all costs are given in constant 2005\$ PPP

Oil & gas production				
	2005	2020	2035	2050
World oil production (Mbl/d), of which :	80	98	110	111
Conventional, of which :	78	90	98	91
Gulf countries	21	34	49	51
Non-conventional	2	7	12	20
World gas production (Gm3), of which :	2818	4311	5504	6195
Gulf countries	255	647	1291	2030
CIS	729	942	1380	1571

Table 1 – **L’Europe des Patries: Basic assumptions about world energy markets**

	2020	2035	2050
GDP growth (%/year)	1.80%	1.10%	0.70%
Demographic growth (%/year)	-0.10%	-0.20%	-0.40%
Energy intensity growth (%/year)	-1.60%	-0.90%	-0.60%
Diversity index (Shannon-Wiener)	1.58	1.61	1.69
Primary energy mix			
Primary prod./primary cons.	57%	53%	54%
Self-sufficiency total	48%	43%	44%
Self-sufficiency electricity	66%	60%	62%
GHG emission growth (%/year)	0.20%	0.20%	-0.80%
Oil independence ratio	33%	24%	22%
Gas independence ratio	53%	45%	36%
Supply/demand tensions			
Coal independence ratio	64%	57%	55%

Table 2 – **L’Europe des Patries: General energy characteristics**

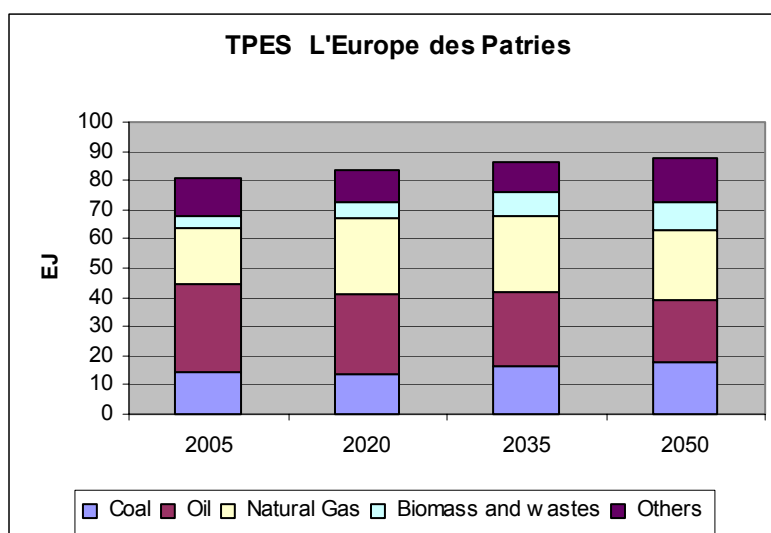


Figure 6 – L'Europe des Patries: Energy supply

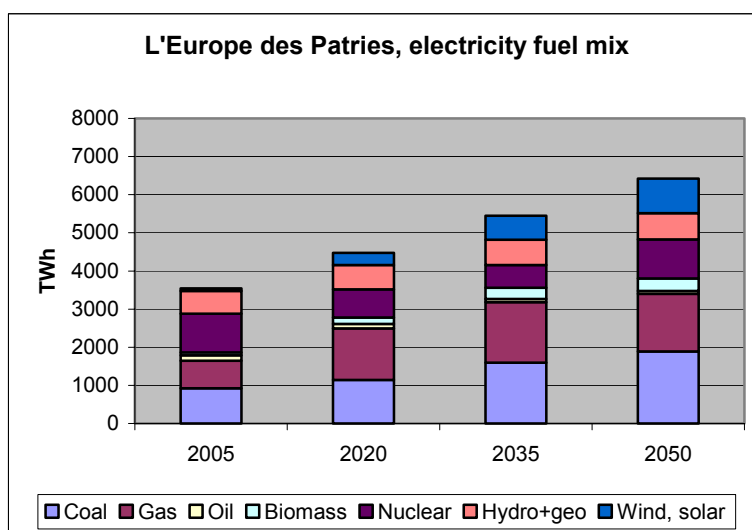


Figure 7 – L'Europe des Patries: Electricity generation by source

5.4. Fortress Europe: Nationalism and heavy government engagement

This world is confronted with a combination of actively politically driven international energy trade with a strong drive for energy efficiency, the use of national energy resources and a marked increase in the use of renewables. Governments are therefore able and willing to effectively arrange the political dimensions of energy trade, where many hydrocarbons now require a passport and tracking system.

The WTO seems at times to be on the verge of collapse and multilateral institutions are further deteriorating. The International Energy Forum continues in a more symbolic way, but the IEA is losing its role as the EU and US are increasingly turning to bilateral mechanisms. Within OPEC, the Gulf states are largely following their own course of action and are restricting the degree of 'oil addiction' by keeping their oil production at a maximum of 26 Mb/d. These developments have their price, and supply/demand tensions and price volatilities in energy markets are relatively high. By 2050, oil prices have climbed to around USD 115 (in 2005 prices).

Europe has the firm conviction that difficult risks and challenging opportunities lie ahead in many respects. Leaderships in politics and business communities are emerging, exploring ways and means and developing effective coordination and implementation mechanisms. The future of the region is at

stake and drastic policy measures are needed. In the EU, a solid energy competency is developed and implemented. Great attention is being paid to maximising energy system capacity so as to optimise energy security. Intra-European and intra-EU energy trade requires strong political actions with a common realisation that instability in energy-producing countries outside the region calls for effective political management. The EU is even developing a joint policy approach that could eventually lead to multilateral use of force where necessary. With the consent of member state governments the EU has also embarked upon some strong external approaches, where speaking with one voice has allowed it to develop bilateral energy arrangements more or less successfully. With Russia, the EU's most strategic energy partner, a mutually beneficial strategic partnership has been negotiated with a variety of political, financial and economic chapters. This partnership has contributed significantly to securing the EU's gas supply while further strengthening Russia's energy export basis. A Nabucco pipeline has not been built, as the Blue Stream and Nord Stream 1 and 2 pipelines (where Gazprom has majority equities) have weakened its economic base. Nord Stream also has important connections with Polish and Scandinavian markets. This organised supply framework has improved energy security in the EU through increased energy self-sufficiency in Europe as a whole.

EU energy markets are further integrating under strong regulatory oversight at EU level, with particular emphasis on supply security in gas and electricity. Markets are working, especially with competition in power generation due to decentralised technology applications. The internal market is further facilitated through an expansion of the transmission network, which has been fully unbundled in financial and operational terms. At wholesale and retail levels, both EU and Russian energy companies are active, including on the basis of joint ventures. Some of them are even covering the Russian upstream parts of the cycle, such as with the Shtokman field, which is being successfully exploited in a joint venture between Gazprom and (Norwegian, French and German) EU companies.

Governments are not intensively focused on a viable post-Kyoto policy, but the EU will use its Russian card to price carbon under longer-term schemes. Energy efficiency policies are high on policy agendas, but the energy intensity decrease for the region is not particularly impressive. Overall, GHG emissions are nonetheless declining mainly thanks to the burning of relatively clean fossil fuels in local and regional environmental terms. CO₂ capture and storage are not necessarily a priority, but are still getting more and more attention.

Under the circumstances, the energy sector in the region is diversifying in a defensive manner. In other words, parties are taking their chances as they are offered: gas is maintaining its position, coal has remained important as a fuel for electricity production, and nuclear energy is widely accepted as an economically and environmentally sound source. The EU, promoting fourth-generation nuclear reactor designs, sees a nuclear revival with strong post-2035 impacts. Nuclear is facilitated through a strong European nuclear industry policy, with a harmonised safety and licensing policy and a European mechanism for dealing with final nuclear waste disposal. The EU is also heavily promoting renewables. Transport remains overwhelmingly based on hydrocarbons, but fuel efficiency is increasing markedly and European-produced biofuels will gain considerable market shares.

In more general terms, the region is improving the overall diversification of its energy balance. These diversification policies are largely motivated by energy supply security concerns. However, all these efforts are taking place at a relatively high cost, triggering economic side effects. Fragmented world trade arrangements and a large energy sector share in GDP allocations have negative impacts on overall GDP growth. Tables 3 and 4 and Figures 8 and 9 summarise the overall picture for Fortress Europe.

International energy prices	2005	2020	2035	2050
Oil (\$/bl)*	54	66	87	107
Gas (\$/Mbtu)* European market	5,4	7,1	9,7	12,3
Coal (\$/t)* European market	72	88	101	112

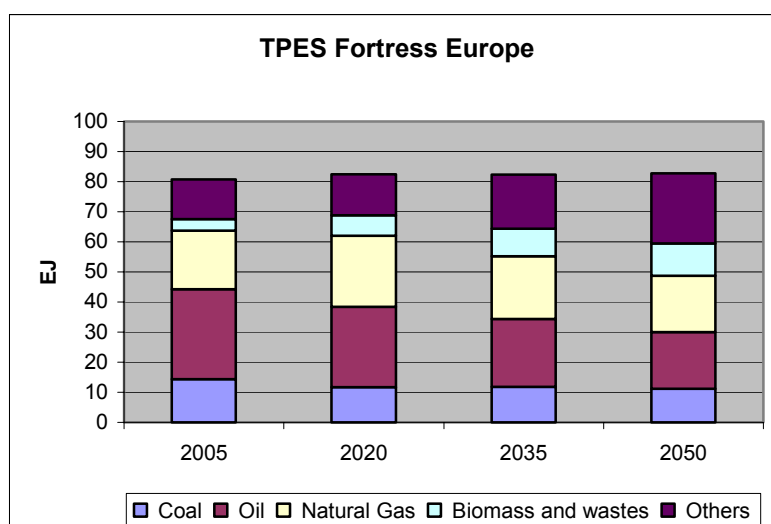
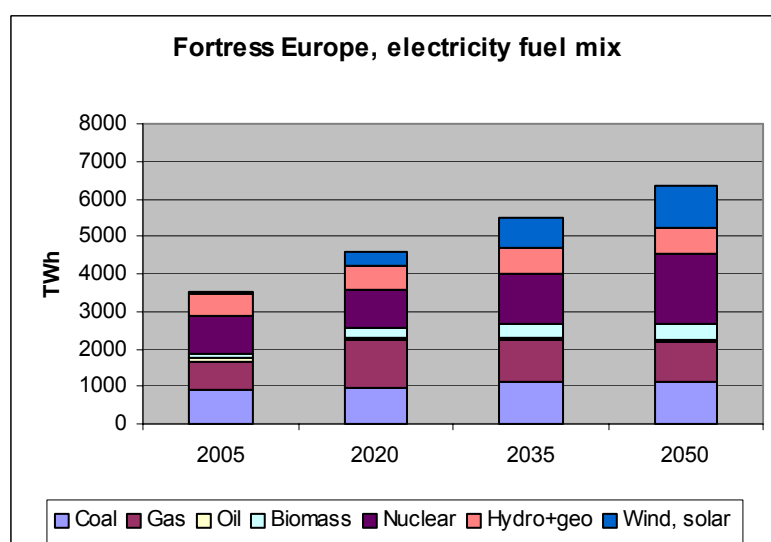
* : all costs are given in constant 2005\$ PPP

Oil & gas production	2005	2020	2035	2050
World oil production (Mbl/d), of which :	80	90	90	86
Conventional, of which :	78	77	63	54
Gulf countries	21	23	21	23
Non-conventional	2	13	27	32
World gas production (Gm3), of which :	2816	4099	4811	5116
Gulf countries	255	596	968	1438
CIS	729	819	1060	1184

Table 3 – **Fortress Europe: Basic assumptions about world energy markets**

	2020	2035	2050
GDP growth (%/year)	1.80%	1.10%	0.70%
Demographic growth (%/year)	-0.10%	-0.20%	-0.40%
Energy intensity growth (%/year)	-1.70%	-1.10%	-0.70%
Diversity index (Shannon-Wiener)	1.63	1.71	1.74
Primary energy mix			
Primary prod./primary cons.	59%	62%	63%
Self-sufficiency total	49%	52%	52%
Self-sufficiency electricity	72%	76%	77%
GHG emission growth (%/year)	-0.40%	-1.10%	-1.20%
Oil independence ratio	27%	21%	14%
Gas independence ratio	57%	55%	45%
Supply/demand tensions			
Coal independence ratio	66%	62%	60%

Table 4 – **Fortress Europe: General energy characteristics**

Figure 8 – **Fortress Europe: Energy supply**Figure 9 – **Fortress Europe: Electricity supply by source**

5.5. Confident Europe: Globalism and heavy government engagement

This world is effectively globalising and the attention of governments and industry alike is geared toward creating and promoting the accompanying multilateral measures and conditions. Both politically and economically, an effective climate exists where North and South, East and West are largely balancing their interests with their economic, political and military powers. Regional conflicts, such as in the Middle East, are being managed effectively. The UN family is involved in a serious but lengthy process of streamlining its organisations with an effective transition to balanced multilateral mechanisms for the world's main political and economic issues, including those related to climate, energy and poverty.

Enhancement of energy security is an accepted global concern. Global consultations on energy balances, supported by the IEA, are taking place between the world's major energy producers and consumers. Due to these intensive contacts, energy supply is relatively secure and energy demand is well forecasted and planned at the global level. Consumer governments, due to their heavy engagement, are willing and able to give strong assurances for demand security, sometimes in the form of legal commitments for longer-term energy mixes. Producing and exporting governments provide the necessary transparency in their resource policies, including investment schedules required to meet demand. Price volatility is therefore limited. Multilateral agreements on investment conditions

are developed so as to facilitate the financial flows needed for maintaining and developing the necessary energy sources.

In general, national oil and energy companies dominate global energy markets, applying market rules and business practices. Throughout the value chain, numerous business models are emerging, with incentives for effective competition in a global regulatory framework, and regional specifications and refinements wherever energy policies require these. Generally speaking, there is a consensus between the world's major oil and gas suppliers and their major clients about the principles for rent sharing and energy taxation policies, although this consensus has to be renegotiated quite frequently due to inevitable frictions and tensions. In this world, supply/demand tensions are manageable and the price volatility of hydrocarbons is markedly reduced, leading to the lowest price levels of all the scenarios.

In the EU, there is no direct need for a strong Brussels-based energy policy, although the EU is effectively speaking with one voice in the global consultations on energy and climate. EU governments have largely concluded that their energy policy goals will profit from wide degrees of joint approaches and instrumentation in the EU framework, especially with respect to the transition towards a low-carbon economy. An effective coordination mechanism at EU level therefore supports and guides national energy policies.

Russian energy exports are not determined by foreign policy considerations, since the prevailing Russian business models and global market conditions provide Russia with the necessary benefits. The principles of a new and renegotiated Energy Charter Treaty between Russia and the EU are being applied in practice, securing the necessary foreign direct investment for the Russian energy sector and reasonable and efficient conditions for land-based energy transit schemes. The principles of the Energy Charter Transit Protocol are applied in other regions as well. The EU is also actively pursuing the implementation of the Energy Community Treaty with neighbouring countries.

In this world, the EU plays a leading role as it is effectively combining market forces and trade arrangements with government interventions in support of meeting sustainability targets. Europe is therefore increasing its global energy diversification: the EU is decreasing its levels of energy import dependency, while Russia is undergoing strong development of its energy export base, probably facing more competition on world markets. At the same time, Europe is strongly promoting increased energy efficiency. Under EU leadership, an effective International Agreement on Energy Efficiency has been negotiated, backed by a strong EU programme to enhance its own efficiency in energy use. The 3.3% targets from the 2007 Energy Action Plan will not be met in 2020. Once the EU has embarked upon a set of EU-wide mandatory rules, a 3% to 3.5% annual efficiency target is reached as of 2030.

There is a strong global framework dealing with climate change issues in this world, with effective pricing mechanisms for carbon. In addition to solid technology and renewable energy RD&D and investment policies, GHG emissions are decreasing impressively. The EU is meeting its stated targets to decrease CO₂ emissions by 60% in 2050 in relation to 1990 levels.

This is all being realised within a global framework of reasonably well-regulated, open market conditions, creating transparent energy market pricing, along with national governments' attention to affordability and security of supply. The goal of thereby creating a strong internal market, along with strong energy companies, is being achieved. Because of particular and sustained attention from industry and governments alike, the quality of the energy system in the entire region has improved to unprecedented levels through massive investment efforts.

The EU energy mix has developed in a direction where coal's share is reduced by more than 50%, at the same time as all new coal-fired power plants are built with CCS. The share of gas remains stable, in power generation as well, but oil's share is reduced by about a third as transport is characterised by high energy efficiency and a substantial introduction of biofuels. Based on second-generation technology, the share of biofuels in the automotive sector is further increasing from its 10% target in 2020 to around 40% in 2050. More generally, renewables based on biomass and wind energy are seeing similar developments, building on the 2007 EU energy policy turnaround. Again, the 20%

share in final consumption is not met in 2020, but from 2030 onwards a gradual increase is achieved, approaching shares of 35% to 40%. After a certain decline in the first part of the timeframe, nuclear energy recovers and regains its place from 2030 onwards, reaching an 18% share in 2050. Tables 5 and 6 and Figures 10 and 11 summarise the overall picture for Confident Europe.

International energy prices				
	2005	2020	2035	2050
Oil (\$/bl)*	54	54	70	92
Gas (\$/Mbtu)* European market	5,4	6,8	8,9	12,4
Coal (\$/t)* European market	72	91	112	138

* : all costs are given in constant 2005\$ PPP

Oil & gas production				
	2005	2020	2035	2050
World oil production (Mbl/d), of which :	80	101	115	115
Conventional, of which :	78	90	97	91
Gulf countries	21	29	44	46
Non-conventional	2	12	18	24
World gas production (Gm3), of which :	2829	4351	5043	5727
Gulf countries	255	599	1003	1497
CIS	731	946	1232	1393

Table 5 – **Confident Europe: Basic assumptions about world energy markets**

	2020	2035	2050
GDP growth (%/year)	2.80%	2.20%	1.70%
Demographic growth (%/year)	-0.10%	-0.20%	-0.40%
Energy intensity growth (%/year)	-2.30%	-2.10%	-1.70%
Diversity index (Shannon-Wiener)	1.63	1.70	1.72
Primary energy mix			
Primary prod./primary cons.	62%	65%	69%
Self-sufficiency total	53%	57%	60%
Self-sufficiency electricity	74%	81%	83%
GHG emission growth (%/year)	-0.30%	-1.20%	-1.40%
Oil independence ratio	34%	25%	25%
Supply/demand tensions			
Gas independence ratio	57%	59%	50%
Coal independence ratio	69%	69%	73%

Table 6 – **Confident Europe: General energy characteristics**

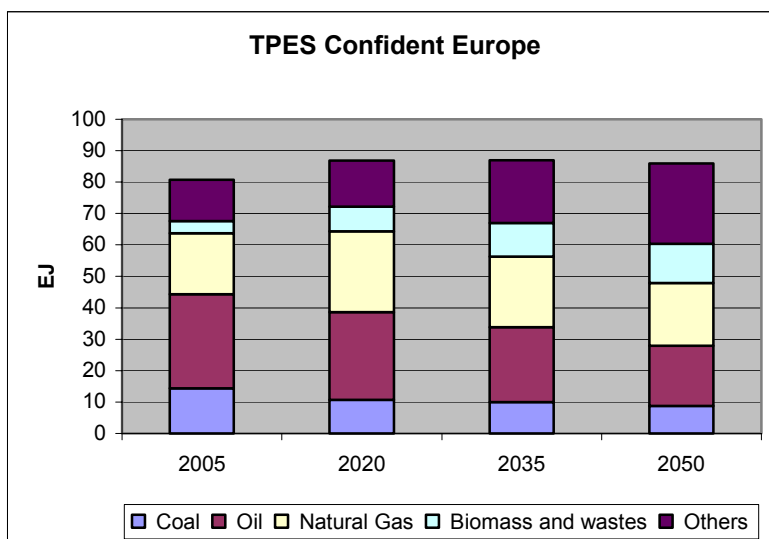


Figure 10 – Confident Europe: Energy supply

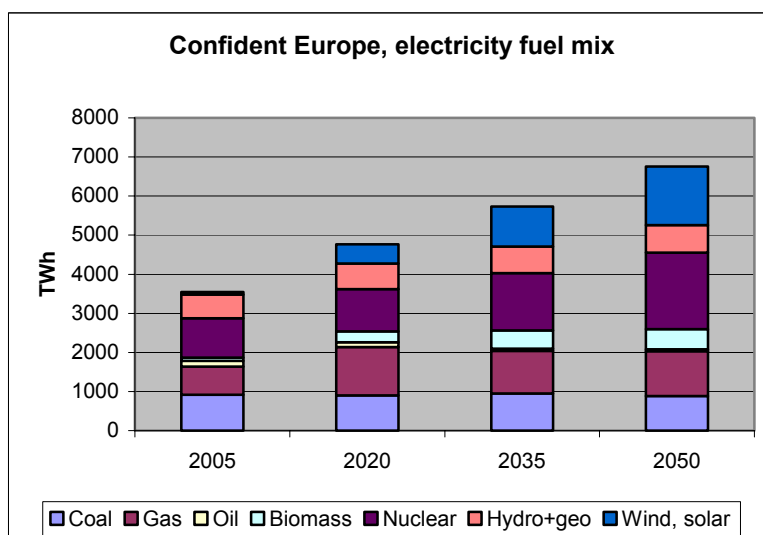


Figure 11 – Confident Europe: Electricity supply by source

5.6. Competitive Europe: Globalism and light government engagement.

This world combines effective multilateral trade mechanisms with government policies that limit interventions in market outcomes. This is also true for energy. Market forces are therefore the main driver in determining energy balances. Relatively high oil prices and efficiently working competitive energy markets decisively influence energy intensities, fuel mixes and the pace of transition towards a more sustainable energy base. Producer and consumer governments have frequent dialogues, with the EU and Russia actively participating, but they see no need for joint action since market transparency and market mechanisms are yielding adequate results. The Joint Oil Data Initiative is widely applied and strongly enhanced. Competition for energy is driving prices of oil and other energy sources to high levels. As governments are largely not inclined to intervene, market prices will not be mitigated except for vulnerable consumer households. The emphasis is clearly on economic benefits: ‘profits first, sustainability second’. It is this focus on global competitiveness, rather than binding commitments *à la* Kyoto, that has led to the dominance of CO₂ trade. Multilateral arrangements exist for market-based solutions. Carbon is coherently priced as well, giving further market incentives to deal with climate issues.

In this world, Europe has further developed its economic relations both internally and externally. It has accomplished an intra-European economic space, encompassing all, or most, European countries, including Russia. This means that free transport of persons, goods, services and capital between the countries involved is being encouraged, and economic cooperation is strongly developing. Within the EU, the legal framework based on the *acquis communautaire* is widely and prudently applied, leading to an effectively working EU energy market. As light government engagement is a dominant feature of the times to come, there is no need for an overall EU energy policy. The role of Brussels is limited to the internal market and regulatory arrangements for securing energy infrastructures. Ownership of gas and electricity transmission has been unbundled. In addition, the EU has forced some of the major energy companies into substantial divestitures. Sound and effective multilateral market arrangements have made large energy players unnecessary, as the market itself has also created the conditions for a set of reliable and adequate energy investment arrangements. An effective crisis mechanism is established as well, dealing with unforeseen supply interruptions in all energy sources.

The EU is therefore consolidating its *acquis*, and there is no strong drive to further develop on it. Globalisation is of overriding importance and weight. The EU's internal energy market is developing into one of the world's most efficient and competitive, with market forces and prices as strong drivers. The EU industrial sectors are consequently strongly increasing their efficiency. As industry and transport shares in final energy consumption are decreasing, and the service sectors especially are becoming stronger, some industry restructuring is taking place, with the replacement of basic steel, chemical and aluminium industries. This development could be interpreted as making Europe highly competitive in global terms.

The implications in energy terms are manifold. Security of supply is achieved by market forces. The EU's import dependency is further increasing, but this is not seen as a concern, since global conditions make energy imports less problematic. Governments are not entirely absent in RD&D, but innovation is mainly achieved by the industry on its own, in order to increase access to energy and reduce costs. Market forces determine technology development, and investments by the energy industry reflect this.

Energy diversification is strongly increasing all over Europe, with a significant decline especially for oil. Gas however is maintaining its overall energy market share. In the EU, carbon-based energy sources are declining and the share of electricity is further increasing. Highly efficient coal- and gas-fired power stations, with a significant new technology component as well, continue to be the basis of electricity production, with a share of more than a third. Nuclear energy has returned in 2050, taking another third of the EU's generating capacity, as its economics are further improving. Renewables, including biomass, are developing as well, but solely on the basis of cost effectiveness, without further government intervention. Generally speaking, choices between nuclear, renewables and coal with CCS are made on the basis of cost and commercial risk. Public and political perceptions, however, might sometimes lead to more direct and specific policy interventions.

The increase in energy efficiency is also determined by market forces. Energy intensity is decreasing at a relatively satisfactory pace. New energy use technologies are emerging, in electricity use, in space heating, in smart decentralised energy systems and in mobility. The transportation sector is dominated by issues around the local environment (and health) and competition based on fuel efficiencies. The latter also has impacts on the manufacturing industry. Alternative transportation fuel systems will mainly be determined by economic factors, and will only be introduced through regulation if local and global environmental or other concerns dictate action by the authorities. As a consequence, GHG emissions are decreasing in the EU, resulting in a 30% reduction in relation to 2005 levels by 2050. Tables 7 and 8 and Figures 12 and 13 summarise the overall picture for Competitive Europe.

International energy prices				
	2005	2020	2035	2050
Oil (\$/bl)*	54	57	82	117
Gas (\$/Mbtu)* European market	5,4	7,4	10,4	15,7
Coal (\$/t)* European market	72	93	115	143

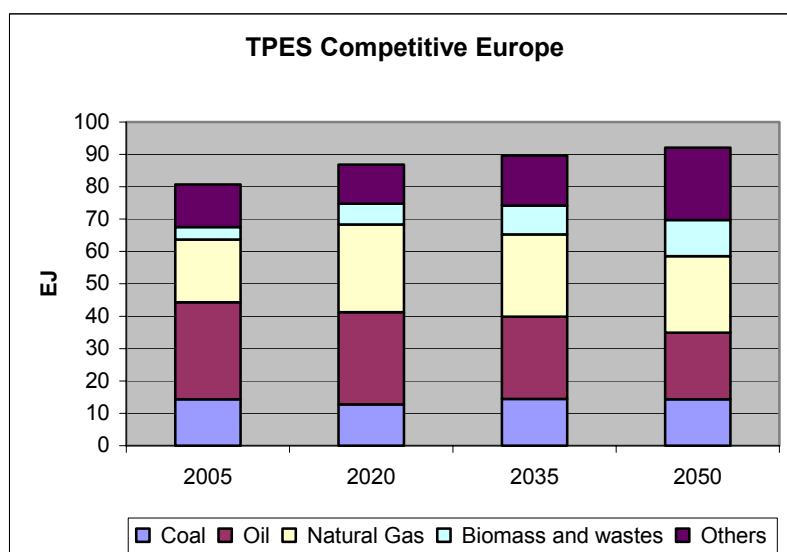
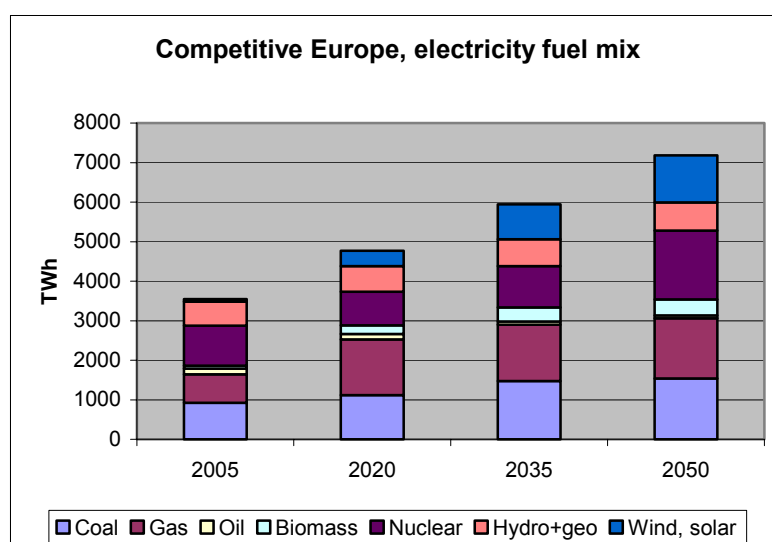
* : all costs are given in constant 2005\$ PPP

Oil & gas production				
	2005	2020	2035	2050
World oil production (Mbl/d), of which :	80	105	130	138
Conventional, of which :	78	94	106	107
Gulf countries	21	33	49	55
Non-conventional	2	10	24	31
World gas production (Gm3), of which :	2832	4543	5893	6787
Gulf countries	255	667	1411	2234
CIS	735	1049	1434	1716

Table 7 – **Competitive Europe: Basic assumptions about world energy markets**

	2020	2035	2050
GDP growth (%/year)	2.80%	2.20%	1.70%
Demographic growth (%/year)	-0.10%	-0.20%	-0.40%
Energy intensity growth (%/year)	-2.30%	-1.90%	-1.50%
Diversity index (Shannon-Wiener)	1.59	1.67	1.73
Primary energy mix			
Primary prod./primary cons.	60%	60%	64%
Self-sufficiency total	50%	50%	54%
Self-sufficiency electricity	68%	70%	72%
GHG emission growth (%/year)	0.10%	-0.70%	-1.10%
Oil independence ratio	35%	27%	30%
Supply/demand tensions			
Gas independence ratio	55%	52%	44%
Coal independence ratio	66%	62%	66%

Table 8 – **Competitive Europe: General energy characteristics**

Figure 12 – **Competitive Europe: Energy supply**Figure 13 – **Competitive Europe: Electricity supply by source**

5.7. Storyline Conclusions

A number of conclusions could be made with regard to the four storylines:

- All of the storylines are conceivable and inherently consistent; they are all labelled with a name that refers not only to the content of the story, but also to the kind of global political and societal climate that prevails in the region. Hence *L'Europe des Patries* applies to a region where nation states are still the determinant factors; Fortress Europe is predominantly inward-looking, with a strong drive towards inter-European cooperation and relations; Confident Europe actively participates in the global international system and practices what it preaches; and in Competitive Europe, markets effectively deliver and are globally accepted.
- The historical downward trend in energy intensity, illustrated in Figure 14, continues in all the storylines. However, TPES increases in two of the four storylines, is merely stabilised in Fortress Europe, and only slightly declines (-1%) in Confident Europe. In these last two storylines, one witnesses a development in the EU that is consistent with the direction of the bold and ambitious historical decisions taken by the EU heads of state in the spring of 2007.

One should keep in mind however that this development is largely due to the positive economic development in the period concerned.

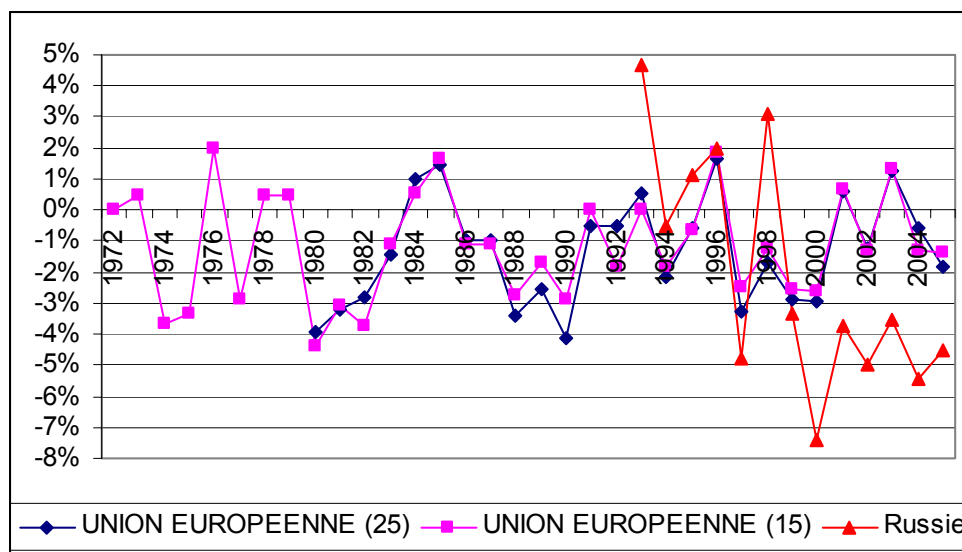


Figure 14 – Evolution of primary energy intensity of GDP in Europe at constant USD

- In the European energy mix, coal will mostly be used for electricity generation. In this respect, it has to compete with other primary sources of electricity, mainly nuclear and renewables (including biomass). Unless supported by dedicated policies, coal's participation in electricity generation is determined by the costs of the various competing technologies, the prices of inputs, if any, and the discount rate applied in the economic calculation. The Prospective Outlook on Long-Term Energy Systems might therefore be underestimating the future role of coal in Europe, since coal prices may increasingly follow global world market developments instead of more regional ones. In addition, the conditions assumed for nuclear and renewables might be too favourable, either because of overly low discount costs or overly low investment costs for nuclear³⁵ and renewables. In addition, socio-political constraints on nuclear and renewable energy development might be larger than assumed.
- All four storylines foresee a decline in the share of oil in TPES. In fact, relatively similar shares are seen in all four. This seems to be more demand driven than supply driven: "The Stone Age didn't end for lack of stone, and the oil age will end long before the world runs out of oil."³⁶ The decline is highly dependent on the mobility sectors and their rather stable levels in final energy consumption. This non-storyline-related development should be further assessed, since on the global oil supply side, there are major differences between the storylines regarding world oil production and subsequently Gulf production levels. In fact, the share of oil in TPES is determined mostly by its competitiveness in end-uses and transformation when it competes with other energies, and mostly by the sector demand level when it is more or less captive, which is the case in transport and petrochemicals. Therefore, global supply-side considerations may be involved in the first case, but almost not at all in the second. Transport alone accounts for 63% of the demand for oil in 2005 and 81% of the increase in world oil demand since 1990. In all of the scenarios, oil is no longer competitive in any market except transport, chemicals and some peak oil generation, and of course when no alternative is

³⁵ Sensitivity analysis would show the influence on coal: 1 more EJ for coal if there is an increase in investment cost for nuclear of 50%.

³⁶ Sheik Ahmed Zaki Yamani, Saudi oil minister during the 1970s.

available (in remote places in developing countries, for instance). This obviously explains only the results for Europe, whatever the global supply conditions.

- Gas, on the other hand, seems to enjoy the greatest stability, maintaining its overall shares in 2050 no matter what is happening in the world at large. It is also interesting to note that Russia is and will remain a largely gas-based economy. It is still unclear, however, what this would mean for exports, especially to the EU. Although the share of gas in 2050 is close to its share in 2005 in all scenarios, one should nevertheless notice that this share does not remain stable over time: it increases significantly between 2005 and 2020, and then begins to decline. The reason why the evolution pattern of the gas market share is similar in all scenarios relates to the competitiveness of gas in some specific end-uses and sectors, which appears rather independent of the scenarios. Thus gas is highly competitive everywhere for peak and mid-load electricity generation, particularly in complement to renewables, leading to a rather stable share of gas in electricity generation. In addition, gas is very competitive for thermal uses in residential, tertiary and industry sectors as well, leading to rather stable and high shares in these markets also. The reason behind the strong increase in the gas market share up to 2020 is the further rapid development of gas distribution infrastructures in those European countries that are not so well equipped today. The reason why it decreases afterwards is because of the less rapid development (if not stagnation) of stationary thermal end-uses as compared to electricity uses and motor fuels.
- As to the supply side of gas, up until now, no physical constraints have been put on imports of gas from Russia in any scenario, because none of the storylines contains this assumption. Gas exports from Russia to the rest of Europe consequently evolve as illustrated in Figure 15. In more general terms, however, it is questionable whether the technical/physical conditions will make it possible for Russian gas exports to adequately service Europe in the latter part of the first half of the century, given that these exports would be roughly 2.5 times today's levels, while at the same time some 200 Gm³/year of exports to Asia are to be assumed.

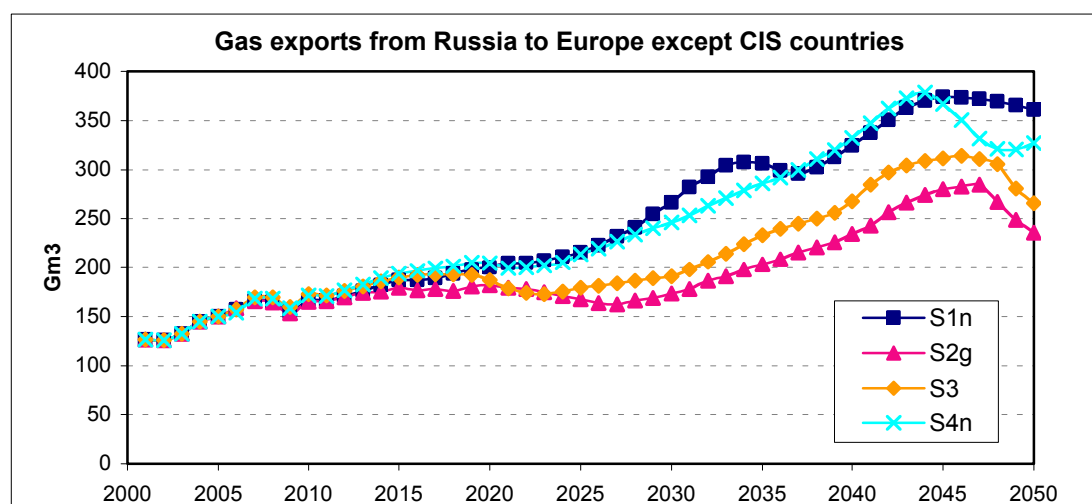


Figure 15 – Russia's gas exports to Europe (not including CIS)

- Nuclear power seems to experience a revival in the EU in all scenarios, bypassing coal in almost all the storylines. It could be worthwhile to further explore in greater depth what this EU nuclear power revival would mean in terms of building programmes and fuel-cycle facilities.
- Finally, the role of renewables may need some further explanation. For example, in the most optimistic scenario for renewables (Confident Europe) they enjoy a 'modest' 20.5% share in

the EU, which is much lower than the targets of 40% to 50% that are mentioned by some EU governments. It should be noted that the prospects for hydro are rather similar from one scenario to another. This means that almost all of the increase in renewables comes from biomass, solar and wind power (geothermal energy is included with hydro, but at a very minor level). In the Confident Europe scenario, the market share of renewables in the EU's TPES reaches 24%, while its share in electricity generation rises to 40% by 2050. This estimation is based on data on renewable potentials, assumptions on renewable investment cost evolution, and the model's calculations as to the prices of competing energies. It shows tremendous growth in electric generation from wind and solar in particular: 849,000 MWe in 2050 for wind and solar only. This is similar to the total installed power-generating capacity in the area in 2005. The only possibility of further increasing this share of renewables would be to dramatically decrease the demand for electricity and thermal uses, while maintaining the output of wind, solar and biomass at the same absolute levels, which is not the case in any of the scenario storylines.

6

The 2007 energy package: The start of a new era?

6.1. Introduction

As indicated in Chapter 2, the story of energy policy-making in the EU is not one loaded with successes – despite the fact that energy as an issue could be seen as a core business for the EU.³⁷ It would be interesting and useful to briefly outline some of the developments that have shaped or failed to shape the EU energy policy framework. This would increase understanding of the meaning of the ‘energy package’ process that began in 2007 and could be seen as an important stepping stone to further EU energy policy-making in relation to the storylines described in the previous chapter.

6.2. Some history on EU energy policy-making³⁸

The EU project started with an energy source, with the creation of the European Coal and Steel Community in 1952. The ECSC Treaty, signed in Paris in 1951 by France, Germany, Italy and the three Benelux countries, resulted from a desire to unite these countries by controlling steel and coal, which were fundamental to war industries. It therefore had a strong basis in post-WW II thinking on peace building, using a ‘peace through energy’ approach. It was originally a French idea, ensuring French economic security by perpetuating access to German Ruhr coal. But it was also meant to show the US and the UK that France could come up with constructive solutions, as well as to pacify Germany by making it part of an international project. The aim was therefore a common programme of post-war production and consumption of steel and coal. The ECSC introduced a common free steel and coal market, with freely set market prices, and without import/export duties or subsidies.

When negotiations started on the EEC Treaty (the Treaty of Rome), high expectations about the role of atomic energy and the perceived scarcity of uranium led to the establishment of a separate energy treaty for this source, the Euratom Treaty.³⁹ The purposes of Euratom were to create a market for atomic energy for peaceful purposes, to develop nuclear energy, and to sell the surplus to non-EEC states. The perceived uranium scarcity was tackled by putting all (legal) ownership of fissile materials into a Euratom body, the Euratom Supply Agency. Thus EU policy was established with respect to two energy sources, coal and uranium. The 1950s, however, saw the emergence and incipient boom of another energy source: oil. The 1956 Suez crisis, when the Suez Canal was closed, suddenly placed oil supply security on the political agenda. This raised the question of whether, in addition to coal and uranium, a comparable framework for oil would be appropriate.

However, the negotiation and drafting processes for both the EEC and Euratom Treaties taking place in the Spaak Committee⁴⁰ were so far advanced, and time was so pressing to complete them, that the incorporation of oil issues, or even a wider idea of combining the respective energy sources into an integrated energy approach, was not feasible. It was thus decided in 1957 to request the three executive authorities that were set up under the three treaties to study this option of an integrated energy policy approach. It took them quite some time to produce their report, which finally came out

³⁷ When we refer to the EU, we imply also its predecessors such as the EEC.

³⁸ This paragraph draws heavily on van der Linde, Coby and René Lefeber, 1987, *op. cit.*, and de Jong, Jacques et al., 2005, *op. cit.*

³⁹ US President Eisenhower’s 1953 Atoms for Peace programme and several already ongoing activities on uranium fuel and nuclear reactor research in France, Belgium and the Netherlands largely inspired this development.

⁴⁰ This committee chaired by Belgian Minister of Foreign Affairs Paul-Henri Spaak was the main drafting and negotiating committee on the EU treaties, reporting to the six ministers of foreign affairs.

in 1962 and recommended a true *politique énergétique communautaire*, one coherent European energy policy. By that time, however, the national interests of the six member states had already diverged too greatly. Germany and Belgium, for instance, opted for a very gradual transition from coal to other energy sources, whereas in France and the Netherlands, oil was viewed as increasingly important (the same would later be true for gas). In addition, both of these countries saw booming oil industry developments in Marseille and Rotterdam. Due to these different positions, the report was essentially rendered 'dead on arrival' in political terms. Nevertheless, a political agreement was reached on pragmatic coordination of energy policy, and when the three executives merged in 1967 into a single body, the European Commission, new momentum was created to continue on this track of coordination.

Several initiatives were undertaken in subsequent years, especially on oil and oil supply, but most of them were blocked by The Hague because of Rotterdam and Royal Dutch Shell interests, and because Dutch policy-makers were more interested in discussing global oil issues in the OECD context. This did not prevent the EU from establishing at least some legislation on oil, especially in relation to strategic stock obligations (copied from OECD-based understandings) and a mechanism to coordinate government action during an oil supply crisis. It was largely a process of trials and errors. The EU dramatically and completely failed to formulate a policy reaction to the 1973 oil crisis, although in political terms the December 1973 Copenhagen Summit did produce a statement to formulate a common energy policy approach. But this did not prevent the successful initiative by US secretary of state Henry Kissinger to establish an automatically triggered Atlantic oil allocation mechanism in case of a clearly defined oil supply shortfall. As a result, the Agreement on an International Energy Program was developed during 1974 and signed later that year, thus creating the IEA.⁴¹ The mandate of this OECD-based organisation was broader than merely responding to an oil crisis and was expanded to all energy policy issues. Initially, France refused to join and the role of the European Commission turned out to be that of merely a (silent) observer.

EU energy policies on the issues that really mattered were therefore absent for some 15 to 20 years. Most member states were happy with this situation, as they were able to manage their energy policy issues on the basis of effective coordination within the wider IEA context, bypassing Brussels on many occasions. When the EU did come to energy policy declarations and actions, they were largely based on preceding IEA conclusions or agreed actions. During the 1980s, however, new sources of momentum created new opportunities for EU energy policy-making. The 1987 Brundtland Report created a political basis for EU actions on environmental impacts from energy production and consumption, and the wider 1992 action programme for the completion of the internal market did so especially for the electricity and gas markets. In addition to these two politically important action lines, Brussels also used its mandates for research and its framework programme concepts for energy technology development. This gave rise to a variety of programmes that supported national research centres and technology institutes devoted to areas such as energy efficiency, renewable energies, fossil fuels and nuclear energy for many years.

Beginning in the late 1980s and driven basically by environmental policies, a number of EU-based actions emerged on energy and the environment. They focussed on emissions and air quality, but there were also action programmes for energy efficiency, co-generation and renewable energy. A real breakthrough on actions to mitigate climate change came during the mid-1990s. This resulted in effective EU leadership in the framework of the Kyoto Protocol and the establishment of an EU-wide trading system in carbon emission rights. All these environmentally driven energy policy-related approaches gave the EU a concrete face and voice in these areas. This was made possible because environmental policy could be legally based on a separate Treaty article.

The drive to complete the internal market and to include the network-based energy sectors also had a direct legal base in the EU Treaty. Thus there was no discussion about the Commission's mandate to move towards energy market liberalisation, creating an all-EU legal framework for the internal

⁴¹ We would like to highlight the major role that was played in this process by Etienne Davignon, the IEA's first chairman; see also his interview in de Jong et al., 2005, op. cit.

markets in gas and electricity. These actions also served as further stepping stones for the Commission, as they had major impacts on industrial structures in the energy sector and resulted in a new paradigm for the role of governments and the public sector in these key energy markets. Fuel supply in electricity generation and the more global issue of gas supply security therefore gradually entered, or rather ‘slipped’, into the domains of EU competencies.

The 1990s also saw failures, such as in the external energy component and on energy supply security. The Dutch-initiated idea of a European Energy Charter to extend East-West energy cooperation resulted in a rather absent EU institutional machinery. It was on the basis of major financial means that Brussels became visible in numerous East-West support programs, for instance, on energy and nuclear safety. Proposals for greater and more effective EU involvement in strategic oil stocks and crisis management, however, failed on a number of occasions. Energy supply security events like the California energy crisis in 2001 and the Italian blackout in 2003 began to increase political awareness of supply security issues, especially in electricity, giving rise to political momentum in and for Brussels. But an overall and integrated energy policy approach was still lacking, despite the efforts by the Commission in its 2002 Green Paper to set such an integrated approach on the wider policy agenda.

The informal October 2005 European Council meeting in Hampton Court (UK) brought some breakthroughs. Confronted with the French and Dutch ‘no’ votes on the draft European Convention and the political inability to discuss budget and agricultural policy issues, the UK chair (Tony Blair) came up with the idea to talk energy. On the basis of an interesting discussion paper,⁴² the Council invited the Commission to draft a new Green Paper with new initiatives and approaches on energy policy. The 2006 Russia-Ukraine gas incident presented an almost serendipitous opportunity for the EU machinery to set its energy policy record straight. In addition, Al Gore’s story of the ‘inconvenient truth’ about climate change added further political momentum to EU energy policy agendas. The Commission’s Green Paper⁴³ was published in early March 2006. It contained six priority areas: the completion of the internal energy market; solidarity among member states; a sustainable, efficient and diverse energy mix; meeting the challenges of global warming, a strategic energy technology plan; and finally, a common European external energy policy. The paper met with a positive reception in political and business circles. During the remainder of the year, in line with the well-established tradition of involving stakeholders in the process wherever possible, extensive consultations were held. In early 2007, this resulted for the first time in EU history in an overall integrated package for a common EU energy policy.

6.3. The energy package

The package⁴⁴ covers the three dimensions of energy policy – supply security, the environment and the market – with concrete proposals for all three, underlining the comprehensive character of the package. Its aim is ambitious: to establish a new energy policy for Europe. It even calls for a new industrial revolution to combat climate change and boost EU energy security and competitiveness. The package of proposals sets a series of ambitious targets on energy efficiency and renewable energy, and a commitment to cut GHG emissions by at least 20% by 2020. The package is based on three central pillars:

- A true internal energy market, where the aim is to offer real choice to EU energy users, whether households or businesses, and to trigger the huge investments needed in energy. The single market is good not only for competitiveness, but also sustainability and security. Analysis shows that further action is required to deliver these aims through a clearer separation of energy production and supply from energy transmission. It also calls for stronger

⁴² Helm, Dieter, “European Energy Policy: Securing supplies and meeting the challenge of climate change”, address delivered at New College, Oxford, 25 October 2005, <http://www.dieterhelm.co.uk>.

⁴³ European Commission, *Green Paper: A European Strategy for Sustainable, Competitive and Secure Energy*. Brussels: Commission of the European Communities, 2006. http://ec.europa.eu/energy/green-paper-energy/index_en.htm

⁴⁴ The documents that make up the package are available from the "Energy for a Changing World" website of the Directorate-General for Energy and Transport: http://ec.europa.eu/energy/energy_policy/documents_en.htm

independent regulatory control, taking into account the European market, as well as national measures to deliver on the EU's target of 10% minimum interconnection levels by identifying key bottlenecks and appointing coordinators.

- Accelerating the shift to low-carbon energy by proposing a binding target of 20% of its overall energy mix to be sourced from renewable energy by 2020. This will require massive growth in all three renewable energy sectors: electricity, biofuels and heating and cooling. This renewables target will be supplemented by a minimum target for biofuels of 10% of automotive fuels. Research will be crucial to lower the cost of clean energy and to put EU industry at the forefront of the rapidly growing low-carbon technology sector. The Commission will therefore put forward a European Strategic Energy Technology Plan and will also increase by at least 50% its annual spending on energy research for the next seven years. Nuclear electricity currently makes up 14% of EU energy consumption and 30% of EU electricity, and while underlining that it is up to each member state to decide whether or not to rely on nuclear electricity, the Commission warns that where the level of nuclear energy is reduced, this must be offset by the introduction of other low-carbon energy sources. Otherwise, the goal of cutting GHG emissions will become even more challenging.
- Energy efficiency, with an objective of saving 20% of total primary energy consumption by 2020. If successful, this would mean that by 2020 the EU would use approximately 13% less energy than in 2006. The Commission proposes acceleration of the use of fuel-efficient vehicles for transport, the introduction of tougher standards and better labelling on appliances, and the enhancement of energy performance in existing buildings, together with improved efficiency of heat and electricity generation, transmission and distribution. In addition, a new international agreement on energy efficiency will be developed.

The proposals centred on these three pillars will need to be underpinned by a coherent and credible external policy. An international energy policy where the EU speaks with one voice is crucial, because the EU cannot achieve its energy and climate change objectives on its own. The EU also plans to develop effective solidarity mechanisms to deal with any energy supply crisis. In addition, it will endeavour to develop real energy partnerships with suppliers, based on transparency, predictability and reciprocity. A network of energy security correspondents will be established and a whole series of concrete measures to strengthen international agreements is proposed. This includes the Energy Charter Treaty, the post-Kyoto climate regime with extensions of emissions trading to global partners, and efforts to extend bilateral agreements on energy to include third countries, especially through the European Neighbourhood Policy and a set of comprehensive Africa-Europe partnerships.

6.4. The 2007 Spring Council and beyond

This proposed energy package was discussed at the EU Spring Council, when heads of state and government had their regular meeting. For the first time at that level, energy issues were at the top of the agenda, and the discussions resulted in a stronger political commitment than had been expected. One could even conclude that the EU demonstrated that it is taking the lead: "You should join us in fighting climate change," declared European Commission President José Barroso. More generally, the Council adopted a new energy policy for Europe, which is not only aimed at boosting competitiveness and securing energy supply, but also at saving energy and promoting climate-friendly energy sources. EU leaders set a firm target of cutting EU GHG emissions by 20% by 2020.⁴⁵ They further agreed on a binding overall goal of a 20% share for renewable energy sources by 2020, compared to the present 6.5%, and a binding minimum target of 10% for the share of biofuels in overall transport petrol and diesel consumption by 2020.

⁴⁵ The EU would be willing to raise this goal as high as 30% if the US, China and India make similar commitments.

Quoting from the final conclusions,⁴⁶ the EU Council formulated its Energy Policy for Europe (EPE) underlining the usual three basic objectives of (1) increasing security of supply, (2) ensuring EU competitiveness and the availability of affordable energy, and (3) the promotion of environmental sustainability and combating climate change. This was done with an unprecedented degree of details. But it was equally stressed that member states' choice of energy mix and sovereignty over primary energy sources will be fully respected, and underpinned by a spirit of solidarity among member states. The EPE focuses on the following items and priority actions:

- *Internal market for gas and electricity.* Timely and full implementation of the letter and spirit of existing internal energy market legislation is absolutely essential. To overcome still existing flaws in the system, the need for effective separation of supply and production activities from network operations (unbundling) is fully endorsed, as well as the further harmonisation of the powers and strengthening of the independence of national energy regulators. Additional steps will be taken, such as to establish a mechanism for national regulators to cooperate and take decisions on cross-border issues; to create a new mechanism for the coordination of transmission system operators and a more efficient and integrated system for cross-border electricity trade and grid operation; to enhance relevant investment signals to contribute to more efficient and secure grid-operation; to create increased transparency in energy market operations; and to improve consumer protection through the development of an Energy Customers' Charter. Also needed is a medium- and long-term forecast for gas and electricity supply and demand in order to identify additional investments required to satisfy EU strategic needs. Perhaps even more sensitive is the assessment of the impact of vertically integrated energy companies from third countries (i.e. Russia) on the internal market in relation to the principle of reciprocity. Finally, access to gas storage in the EU will be added to the EU agenda and the development of regional cross-border exchanges and regional energy cooperation will be further promoted and strengthened.
- *Security of supply.* Key words here are the spirit of solidarity between member states, notably in the event of an energy supply crisis, together with effective diversification of energy sources and transport routes. This has to be supported by a more competitive internal energy market and the development of more effective crisis response mechanisms. In addition, a number of more specific issues are highlighted, such as the warning capacity provided by the network of energy security correspondents, the improvement of oil data transparency, EU oil supply infrastructures and the EU's oil stocks mechanisms that are complementary to the IEA crisis mechanism. As a new element, a thorough analysis of the availability and costs of gas storage facilities in the EU will be made with a view to contributing to a crisis response mechanism. Furthermore, an EU Energy Observatory will be established and specific infrastructure projects will be prioritised on the basis of specific EU actions.⁴⁷
- *International energy policy.* A common approach to external energy policy has to be speeded up, involving consumer-to-producer as well as consumer-to-consumer and consumer-to-transit country dialogues and partnerships, including through organisations such as OPEC. To that effect, the EU emphasises as essential elements for further developing its one voice model, the creation of a new partnership and cooperation agreement with Russia; intensifying its relationship with Central Asia, the Caspian and the Black Sea regions; strengthening partnership and cooperation with the US, China, India, Brazil and other emerging economies; ensuring the implementation of the Energy Community Treaty (development and extension to Norway, Turkey, Ukraine and Moldova); making full use of the European Neighbourhood Policy and further enhancing energy relationships with Algeria, Egypt and other producing countries in the Mashreq/Maghreb region; building a special dialogue with African countries

⁴⁶ Council of the European Union, "Presidency Conclusions of the Brussels European Council (8/9 March 2007)", http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressData/en/ec/93135.pdf.

⁴⁷ EU coordinators will be nominated for the Power-Link between Germany, Poland and Lithuania, connections to offshore wind power in Northern Europe, electricity interconnections between France and Spain, and the Nabucco pipeline, bringing gas from the Caspian to Central Europe.

on energy; using Community instruments to promote decentralised renewable energies in particular and energy accessibility and sustainability in this region in general, as well as energy infrastructure of common interest; and finally, continuing actions within the context of the UN system.

- *Energy efficiency and renewable energies.* The EU is aware of the growing demand for energy and rising energy prices, as well as the benefits of strong and early common international action on climate change. But it is equally confident that a substantive development of energy efficiency and of renewable energies will enhance energy security, curb the projected rise in energy prices and reduce GHG emissions in line with the EU's ambitions for the period beyond 2012. The need to increase energy efficiency is translated into the firm objective of saving 20% of the EU's energy consumption compared to projections for 2020. This objective will be implemented by the EU Action Plan on Energy Efficiency,⁴⁸ outlining priority areas in energy-efficient transport, minimum efficiency requirements for energy-using equipment, energy-efficient and energy-saving behaviour of energy consumers, energy technology and innovations, and energy savings from buildings. This action plan will be complemented by National Energy Efficiency Action Plans and by the proposal for a new international agreement on energy efficiency. On the development of renewable energies beyond 2010, a legally binding target will be set of a 20% share of renewable energies in overall EU energy consumption by 2020, supported by the 10% binding minimum target for the share of biofuels. The binding character of this second target is subject to production being sustainable and second-generation biofuels becoming commercially available. From the overall renewables target, differentiated national overall targets will be derived on the basis of fair and adequate allocation, taking account of different national starting points and potentials, including the existing level of renewable energies and energy mixes. In order to meet these targets, a new comprehensive EU-wide framework has to be developed, where it is understood that the EU system for emissions trading will have to play a central role.
- *Energy technologies.* A European Strategic Energy Technology Plan will be developed, focusing *inter alia* on substantial improvements in electricity generation efficiency and clean fossil fuel technologies, strengthening R&D, and developing the necessary framework for environmentally safe CCS deployment. This is further enhanced by the intention to develop up to 12 demonstration plants for sustainable fossil fuel technologies in commercial power generation by 2015. On nuclear energy, it was confirmed that it is up to each and every member state to decide whether or not to rely on nuclear energy, but it was also stressed that this must be done while further improving nuclear safety and radioactive waste management. To this effect, the Council supports R&D on waste management and a continuation of the internal EU discussions on nuclear safety and waste management.

All in all, the EU Spring Council meeting represents an important and interesting political step towards the development of an integrated EU energy package.

6.5. Is the EPE the breakthrough it promises to be?

As always, the proof of the pudding is in the eating, and the EU record of implementing political packages is full of 'devils in the details'. There is no reason why it should be different this time. The September 2007 proposals for a 'third legislative package'⁴⁹ for the gas and electricity markets are proving this point again. A few comments should be made in this context.

On **renewable energy** it should be noted that the ambitions of a 20% energy share in 2020 and a 10% biofuels share in transportation are very ambitious. Biofuels development is to be based on second-

⁴⁸ European Commission, *Action Plan for Energy Efficiency: Realising the Potential*. Brussels: Commission of the European Communities, 2006. http://ec.europa.eu/energy/action_plan_energy_efficiency/index_en.htm

⁴⁹ The 'third package' proposals are available from: http://ec.europa.eu/energy/electricity/package_2007/index_en.htm

generation technology if the dramatic impacts of a biomass-boom are to be avoided, such as impacts on the food chain, on food pricing and on biodiversity. However, this technology is not expected to become mature before 2015. Moreover, to achieve this 20% share, major efforts will be needed in the other two demand sectors, i.e., heating and cooling and electricity generation. As to the latter, renewables will have to compete with gas, clean coal and nuclear, and the choices that are made will largely depend on concrete economic availabilities and assurances at the time of investment decisions. The cost of carbon and the relevant mechanism to ensure forward pricing are critical in this context. Once decisions have been made, the resulting capacity will be there for several decades, influencing total capacity requirements. Similar considerations will play a role in heating and cooling. From a political perspective, it is equally important to see how the 'burden of renewables' will be shared between the member states, and if and how the EU will manage to decide on an EU-wide support scheme, including its consistency with the prevailing market designs and models. A more realistic view of this policy might therefore result in slower progress on renewables, albeit firmly aimed in the direction that is decided upon.

The role of renewables has a direct impact on the development of the **energy mix**, especially in power generation. The EPE has formulated a policy on clean coal, including a strong approach in the direction of carbon capture and storage. Here again, the road is full of policy, technical and regulatory uncertainties, but as there is a strong international dimension in pursuing this option, the EU and other industrialised countries will succeed. On the gas side we should note that, as gas is still the most attractive and the relatively fastest, most easily pursuable option, its share in power will further increase in the EU. But an external dimension comes into play here, since gas will increasingly have to be imported, notably from Russia and a limited number of liquefied natural gas suppliers. Global competition will increase in the gas market together with strong geopolitical dimensions, both in producer regions and in transport flows. This should give further rise to serious consideration of the other non-carbon source, i.e., nuclear power. It is rather deplorable that the EU has failed to include nuclear energy in its EPE. There is a need for at least an organised discussion at the EU level on this source, as its use or non-use will have major impacts on the overall EU energy mix and the effectiveness of its energy policy. In such discussions, issues related to the appropriateness of the prevailing market designs should be considered, together with more sensitive issues such as EU solutions for final waste disposal and confidence-building approaches to the sensitive technology steps in the whole nuclear fuel cycle. It is impossible to reflect on energy storylines up to 2050 if nuclear energy is neglected.

Energy **supply security** for the EU basically concerns the external dimension. External relations will dominate steady and secure energy flows to the EU, especially in oil and gas. The EPE refers to this condition by stating that a 'one voice' model for the whole of the EU is needed in pursuing reliable energy trade relations. A number of instruments are available to the EU to support this policy, but a blueprint and strategy for implementing this vision are still lacking. It is as yet unclear what the stakes are and what concrete proposals will be developed, as it is unclear if and how the globalising energy markets and energy issues will be addressed in multilateral, regional or bilateral settings. Unclear as well is the question about whose voice it is that will be heard on behalf of the EU, and what the coordinating mechanisms are to define a meaningful and effective message from this voice.

The internal market issue is perhaps the easiest one to address. The EU Commission published its so-called '**third package**' of energy market designs several months after the political declaration of the EPE. This package gives a further boost to relevant design issues, especially with regard to cross-border markets and their integration. Rules for more effective cross-border trade and enhancement of market transparency, together with expansion of independent regulatory authority, are rational and useful measures. The more controversial ideas and proposals to increase and ensure competition by the obligation of divestitures in vertically integrated industries might provoke strong political sentiments, slowing down the decision-making process. In particular, the option of ownership of unbundled transmission infrastructures or, alternatively, to have those infrastructures operated by fully independent new entities, has the potential to spark political and national sentiments both for and against. Even more sensitive in political terms is the proposal to prohibit controlling ownership of networks by non-EU entities, since this idea is interpreted as being principally directed at the Russian

state-owned gas company Gazprom. And here we see a clear linkage between internal market designs and direct energy supply security.

As a final and more general comment on the EPE, it would appear that the basically integrated character of the energy policy, covering supply security, the environment and market issues, will gradually evaporate when it comes to implementing proposals. The third package barely refers to the other two policy objectives and will largely be discussed and decided upon in a sector-oriented political setting. The environmental package is due to be proposed around 2007/2008, and will probably follow a similar path in decision-making. It is still unclear what will happen with the external dimension as such, and how the other two policy objectives will be integrated with it. Therefore the EPE, although containing a number of interesting integrating elements, does not yet provide the clear policy framework that could help in further assessing the role of the EU in the four conceivable worlds that have been described in the four storylines presented here.

6.6. The relation with the four storylines

Looking at the new Energy Policy for Europe in relation to the four storylines, it could be noted that the role of governments, be it at the EU or national levels, is strongly visible. The Fortress Europe and Confident Europe storylines in particular have important elements that are emerging in the EPE. There are however some mixed messages when it comes to the international setting. On the one hand, there are clearly still approaches based on multilateral arrangements and global markets, but on the other hand, there is also a visible tendency emerging towards exploring a more bilateral approach. Or, viewed from the perspective of national member states, there is a call for a 'single EU voice' in external energy relations, but the practical translation of that idea is lacking, leaving ample room for national capitals in the good old tradition of the earlier mentioned Brandeis doctrine. Meanwhile, a closer look at the EPE from the perspective of the two axes used for the scenarios – governments versus markets and nationalism versus multilateralism – reveals that elements of all four scenarios are found in the EPE.

Starting with the vertical axis, where governments apply heavy or light interventions in order to correct market outcomes in a preferred way, it could be said that the EPE basically has two faces. One face is concerned with continuing the development of a competitive and effective internal energy market within the EU. There is a strong drive to further enforce industry structures, market designs and the Europeanisation of regulation to promote an integrated internal market in gas and electricity. This is all done in the expectation that energy consumers will be better off, and that this in turn will contribute to the Lisbon Agenda, aimed at making the EU the world's most competitive economy in the 2010s. The other face is more devoted to market corrections when it comes to strengthening energy efficiency and the increase of renewable energy shares. The EPE does this by setting ambitious quantitative targets for cutting CO₂ emissions, enhancing energy efficiency and increasing the role of renewable energy. Market-based solutions, such as the system for tradable emission rights, energy labelling for appliances and energy regulation for houses and commercial buildings, are the preferential routes for implementation. But there are also extensive financial incentive schemes at both the EU and national levels, with direct subsidies, fiscal measures, regulated feed-in tariffs and the like. On balance, it could be argued that in its objectives and targets, the EPE tends to be more on the 'heavy' end than on the 'light' end of this axis.

Looking at the horizontal axis, ranging from nationalism and bilateralism to multilateralism and globalism, the picture is somewhat less clear. This is also a consequence of the interpretation of this axis in the EU context. The stronger the EU, and the more convincing and effective its single voice in external energy policy issues, the more its policy is being developed in a world of nationalism and bilateral deals and arrangements. On the other hand, the more the world order continues to be effectively organised in multilateral trade and finance arrangements, the lesser the need for the EU members to organise their energy policy around a strong Brussels centre. Here again, the EPE gives mixed signals. In the context of energy/climate policy, there is a desire for and faith in global solutions and arrangements. The EPE sets ambitious goals and the EU wants to take a leading position in global negotiations on this issue. Meanwhile, when it comes to external energy relations with the EU's major suppliers and other consumer partners, the EPE seems to be moving in the direction of bilateral and/or

regional approaches. The single voice paradigm is added to this approach and is also explained as a reaction to a number of bilateral deals and understandings, especially between the EU's main gas supplier Russia and some large EU members. In making an overall assessment of this axis, it could be said that on the global issue of climate change the multilateral approach prevails, whereas on energy supply issues, the EPE tends to be more bilaterally oriented.

To summarise, regarding the question of where the EPE fits in the four storylines, it could be concluded that there is more 'confidence' than 'patriotism' in the policy, and that it also reflects more 'fortification' than 'competitiveness'. On the other hand, it could also be concluded that the EPE contains elements of all four storylines, and that it is therefore an intelligent balancing act within the larger energy policy triangle, where the objectives of supply security, efficient markets and environmental friendliness are the major policy competitors. Or, putting it more bluntly, in today's terms, it all comes down to the fight between Kyoto, Lisbon and Moscow, as illustrated in Figure 16.

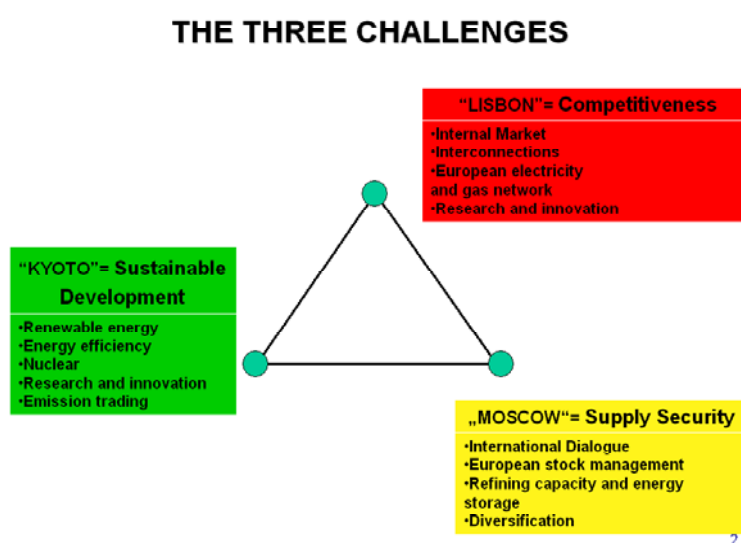


Figure 16 – The EU-EPE policy challenge

Interestingly, this apparently simple statement leads to a few final, more fundamental remarks. The EPE and the storylines alike show that strong EU policies can only be developed on the condition that member states are less reluctant to give up their sovereignty to the EU, because they are convinced that the EU can deliver to their societies either a desirable political and social contract, or external relations that suit the strategic interests of the member states.

Why is this so? In areas where the EU touches the core competencies of the national state, beyond its economic competencies, decision-making at the EU level has always been very cumbersome.⁵⁰ In the case of EU energy policy-making, the member states are not only invited to agree on a common energy framework in which the public interests of supply security and the environment are secured at the EU level. In this case they are also challenged to agree on restructuring their energy markets beyond the economic efficiency rationale alone. This is particularly true for securing oil and gas flows, where government-to-government relations are a crucial part of business-to-business deals. Since the EU is not a government, member states have fundamental doubts that the abandonment of their strategic external energy interests to the supranational level of the EU will be able to deliver security

⁵⁰ Van der Linde, Coby, "External Energy Policy: Old fears and new dilemmas in a larger Union" in Sapir, André (ed.), *Fragmented Power: Europe and the Global Economy*. Brussels: Bruegel, 2007.

for their societies. As long as these doubts are a fact of life it will not be possible to resolve the struggle between Kyoto, Lisbon and Moscow, as described in Figure 16, and replace this conflict with a straightforward, loud and crystal-clear single EU voice. Perhaps the fact that member states are more willing to speak with one voice on climate change policy matters could be seen as a precursor of change and the future cooperation of member states in all energy matters.

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