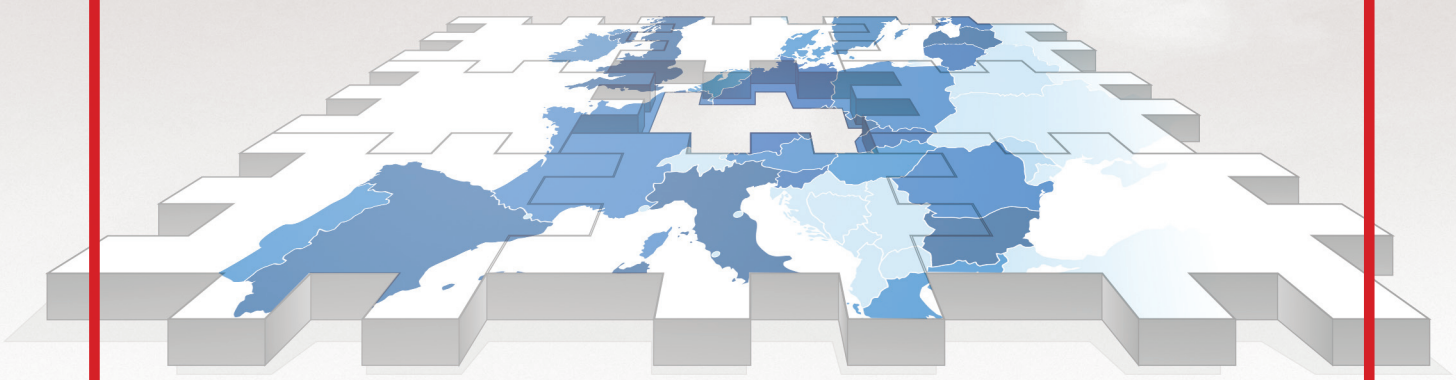
EUROPEAN ENERGY UNION

COMPROMISE FOR GROWTH AND GOOD ENERGY

VOLUME 8

FUTURE
FUELLED
BY KNOWLEDGE



EUROPEAN ENERGY UNION

COMPROMISE FOR GROWTH AND GOOD ENERGY

This report has been prepared by the Division of the Executive Director for Strategy and Project Portfolio Management at PKN ORLEN.

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LETTER FROM THE PRESIDENT **OF THE PKN ORLEN MANAGEMENT BOARD**

Jacek Krawiec
CEO and President of the Management Board, PKN ORLEN

Ensuring reliable supplies of energy at affordable prices to all Member States of the European Union is among the greatest challenges currently faced by the EU. I believe the best way to tackle the challenge would be through further sustained development of the internal energy market, entailing tighter integration and improved energy security for all Member States. More affordable and competitive energy prices will benefit not only the citizens of the European Union, but also its businesses.

It would be a sensible move to focus on certain key, attainable priorities offering a substantial transformative potential, such as bringing the efforts to establish a common energy market to a successful conclusion. Hopefully, this will chart a new energy map for Europe – one that will address the challenges currently faced by the European economy in a more effective manner. This is a much needed vision, as an integrated Europe calls not only for ambitious climate targets, but above all for an Energy Union which would support both industry and consumers. One of the root causes of decline of the European economy's competitiveness is the high price of electricity and natural gas. The revival of European industry is not possible without competitive energy prices. I hope that the price of megawatt hour will soon become at least as important in making decisions as the price of CO_2 emission allowances. However, this will be only the first step on the long path to finding the right balance of critical points in building a sustainable economy.

A variety of mechanisms must be developed and implemented to achieve the specific objectives underlying the concept of the European Energy Union. This is a complex process which will take decades to complete. There will be no quick, albeit short-lived, victories that would be easily communicable to the Europeans weary of the prolonged crises, first economic and then political. However, the results that the European Energy Union will bring will be worth every effort. Today's economy is centred around two strategic sectors whose condition has a direct bearing on the economic stability of individual countries: the financial sector and the energy sector. With the integration of European financial systems progressing, the time has come to integrate the energy sector as well.

PKN ORLEN supports the efforts to create the European Energy Union and has prepared this report

> ***Europe calls not only for ambitious climate targets, but above all for an Energy Union.***

to this very end. In it, we evaluate the European energy sector as it is today, at the starting point, and present what we believe is the most sensible way of achieving the key objectives that the Energy Union should help Europe accomplish, as the Energy Union is not an end in itself. It is a tool to strengthen the European economy, create new jobs and restore the long-upset balance between strategic, future-oriented (that is, only attainable when the EU is financially and economically robust) and tactical, immediate objectives (to make the continent financially and economically strong in the first place).

With the integration of European financial systems progressing, the time has come to integrate the energy sector as well.

The report has been prepared as part of the Future Fuelled by Knowledge project, which is rooted in our need to take active part in important public debates in Poland and abroad. At PKN ORLEN, we have accumulated vast amounts of innovative expertise which enables us to grow and to be a successful market player. We want to share this knowledge and are ready to hear the arguments of those outside our organisation. It is only through such open dialogue that solutions can be found which will not be tainted by lack of care or by single-mindedness.

The European Union has been one of the most beautiful and successful political and economic experiments in the history of civilisation. However, faced with global challenges in an increasingly demanding environment and focused on the right, though costly, objectives, it is short of breath and losing strength. Defending the status quo is no longer enough, nor are the technocratic plans whose horizon only covers the immediate future. What we need are strategic long-term solutions, based on an in-depth understanding of the complex processes shaping the modern world. Making these plans a reality will not be possible without compromise. After all, is not compromise inherent to the concept of the European community, built despite any and all differences?

Have a good read!

Jacek Krawiec

ORIGINS OF THE REPORT AND KEY CONCLUSIONS

(...) Determined to promote economic and social progress for their peoples, taking into account the principle of sustainable development and within the context of the accomplishment of the internal market and of reinforced cohesion and environmental protection, and to implement policies ensuring that advances in economic integration are accompanied by parallel progress in other fields (...)

This is one of the recitals in the preamble to the Treaty on European Union. It highlights such vital aspects as economic and social progress, accomplishment of the internal market, environmental protection, and sustainable development. All these elements are directly related to the energy sector, which until recently failed to be encompassed by the joint EU policy. The idea of the European Energy Union, which in February 2015 the European Commission concretised by proposing specific goals and a course of action, is an opportunity to finally include this strategic sector of the economy in the process of integration. The importance of the energy sector was noted by the founding fathers of the current European Union, formerly the European Community of Coal and Steel. Sixty years ago the goal was to rebuild Europe after the war and replace totalitarian ideologies with economic growth distributed in such a way that no one felt excluded. Today, the goal is to put the European Union back on the competitive front-line, to create development opportunities for millions of young Europeans, and finally to revitalise European industry. History repeats itself.

The concept of the European Energy Union (EEU) has been proposed for a reason. The EEU addresses three big challenges now faced by the European Union:

- to complete the establishment of the uniform market as a sine qua non condition to strengthen Europe's position on the economic map of the world;
- to reduce excessive energy prices, which jeopardise the competitiveness of the European industry and lead to growing energy exclusion in the EU;
- to address heightened external risks, including the risk of disruptions to energy supply.

Poland was among those EU Member States that called for creating an ambitious policy framework for the concept of the European Energy Union, believing that solutions based on compromise and combining elements of different national strategies may fail to bring about the desired change. As history has shown, reaching an agreement on the EU energy policy is an extremely difficult task and that is exactly the reason why this time every effort should be made to achieve this objective. Potentially difficult negotiation areas include practically all aspects of the Energy Union project: from its management model (division of powers between the European Commission and national governments), through approach to the energy mix, renewable energy sources (RES)

and reduction of greenhouse gas (GHG) emissions (the role of coal or nuclear energy in the EU energy strategy), to the issue of sharing the financial burden involved in the construction of the necessary infrastructure.

The Energy Union project is very important to the ORLEN Group, whose operations span four EU countries across energy, fuel production and sales, petrochemicals, and exploration for hydrocarbons from conventional and unconventional sources. All business areas of the ORLEN Group directly and indirectly depend on how the matters encompassed by the EEU project will be regulated, from supply sources and natural gas prices to the environmental objectives and the related regulations imposed on the energy sector.

Taking an overall look at the matter, one cannot fail to see that the EEU in fact means a 'to be or not to be' dilemma to many European businesses, not only to those that purchase energy, but first of all to companies like us, directly dependent on the energy and climate regulatory regime and the EU plans for the energy market. This is why we have decided to use our knowledge and actively participate in the discussion on the final shape of the EEU, its goals and ways to achieve them. All these considerations have prompted us to produce this report.

Its first part presents the current complex landscape of the European energy sector, an outcome of many years of treating energy matters as remaining at the sole discretion of individual Member States. The concurrent implementation of the EU climate policy has created a regulatory commotion which will be difficult to put in order without complications: the EU climate targets make up the underlying framework of national energy policies – this has automatically made the targets a priority, inflating energy prices across the EU. At the same time, the current structure of the European energy sector largely reflects the divisions that existed before 2004, when a large group of post-communist states, for four decades tied to the former Soviet Union, joined the EU. The differences show both in the degree of dependence on a single gas supplier (the further east, the greater the dependence), and in the stage of development of energy infrastructure in the EU (infrastructure in Western Europe is much more developed). The European Union is divided into several energy areas, with the former Soviet bloc countries forming a distinct group that needs urgent improvement in terms of energy security, while the 'old' EU countries, thanks to their location and history, have tackled the problem and have set the course for low-emission energy generation. Common to all EU Member States is the need to create a system that would produce sustainable but also competitively priced energy. The EEU project has the potential to transform this common need into a power that both drives and integrates EU economies, provided however that proposed solutions take into account the differences in the level of development and energy mixes between individual EU Member States.

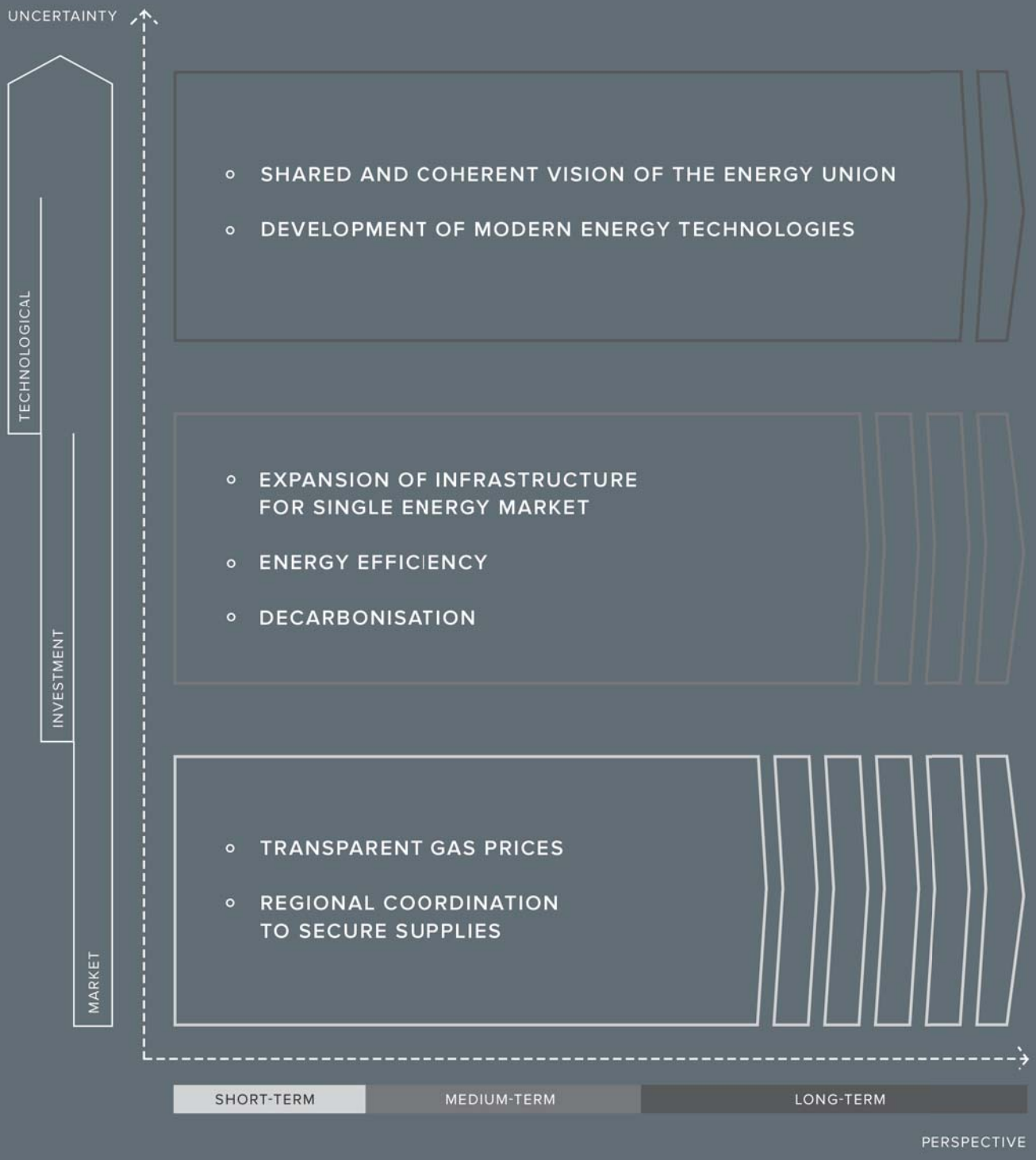
The second part of this report presents results of a research carried out by the Institute of Public Affairs with the support of PKN ORLEN in four EU states: France, Germany, the United Kingdom and Poland. These countries were chosen because each of them pursues a clearly distinct energy policy and each has a different view on the future of the energy sector. These are also countries whose economic potential makes their voices heard in the EU debate. The goal of the research was to gauge opinions on what the European Energy Union should be. The research, carried out among experts (decision makers, business community, scientists, non-governmental organisations), has confirmed that opinions on the EEU concept vary widely. However, there is something that most of the respondents in each of the countries agree on, namely the need to review and redefine the existing system of support for the development of clean energy. The current model is believed to be costly, ineffective and supporting only

existing technologies, whereas it should provide an incentive to look for breakthrough technologies of tomorrow.

The third part of the report presents our proposed approach to the schedule of EEU targets, and thus also the schedule of activities necessary to achieve the targets, in terms of the time needed to do so. The EEU project will span decades. It cannot be any other way – the sole nature of infrastructure projects and investments in energy assets requires time horizons of more than a decade. After all, we are talking about a plan where economies of an important continent are to adopt innovative technologies fostering sustainable development, many of which are yet to be born. Therefore, we propose an approach that can help mitigate potential conflicts around the EEU: the division of necessary adjustments into three time horizons (short-, medium- and long-term, depending on the adjustment cycle) and a selective approach to individual tasks, with account taken of differences in the hierarchy of Energy Union objectives between Member States. Under this approach, a possible short-term accomplishment, based on the existing infrastructure, may be an improvement in the sense of energy security in the countries that are most exposed to the risk of supply disruptions (mainly of natural gas). This can be achieved by introducing uniform standards and principles to assess supply security as well as by coordinated actions to ensure regional security of supplies. The development of a uniform energy market, higher energy efficiency and low-emission economy are the objectives whose implementation requires investment in infrastructure and new technologies. Actions taken today in these areas will take some time to bear fruit, and the time needed will depend on the length of investment cycles; therefore these actions fall into the medium-term category. We know, however, that achieving the goal of sustainable energy production requires scientific progress and technological development in areas not yet explored. To this end, we need immediate incentives to drive the development of new technologies, friendly both to the climate and to the wallets of energy consumers. These are long-term investments in developing knowledge necessary to break the existing technological barriers and in creating conditions conducive to closer collaboration between science and business. As that benefits of these actions, in the form of commercialised revolutionary innovations, will emerge probably in 15 or 20 years, steps must be taken now, just like in the case of the short- and medium-term actions specified above. A full spectrum of actions must be taken, although with intensity varying by country, and with due account taken of the stage of development of the energy sector, its risk exposure and flexibility to change.

We believe that this approach minimises the risk of national egoisms preventing the implementation of this potentially great project, the European Energy Union. And this risk looms over the project because the ‘old’ EU countries have already achieved their short-term objectives. What they are doing now (expansion of the internal energy market and development of low-emission economy) are medium- and long-term actions: results of the decisions they make today will become visible after the end of investment cycles, spanning many years. At the same time, although the EU speaks about long-term initiatives, it actually takes medium-term actions: the European Commission focuses too often on improving what is already in place and is more or less effective, be it institutions (the European Union Emissions Trading System is being improved, while a coal tax could prove a better solution) or technologies (continued support for RES although what needs support is innovations that will be effective without entailing excessive costs to the economy). Meanwhile, Central and Eastern Europe countries need immediate actions that will improve their energy security now. We are proposing a time horizon for implementing the EEU objectives that openly highlights and addresses this problem.

THREE TIME HORIZONS FOR ESTABLISHING THE EUROPEAN ENERGY UNION



SOURCE: PKN ORLEN'S ANALYSIS

I. THE EU ENERGY SECTOR – CHALLENGES AND OPPORTUNITIES

If you don't know where you are going, every road will get you nowhere.

Henry Kissinger

The union's growth is driven by crises – the phrase yields some 20 million search results about the European Union, even without clarifying what kind of union is meant, while searches related to the growth vision for the European Union, run in various configurations, return 500 thousand results at best. This is several times less than in the case of similar queries about the United States (1.7 million results)[1].

Slogans express widely-known truths or beliefs. Crises have immediate negative consequences, which can be overcome through immediate action, typically an emergency response which is expected to improve the situation as soon as possible. Growth, on the other hand, is a process which can take years or decades, and the long time frame does not elicit quite as much effort as crises. Moreover, the neoclassical theory suggests that growth does not require any special economic policies as crisis-prompted adjustments provide the driving force. If growth in between crises is a universal economic process rather than a quirk of the European Union, what is the problem?

The problem is that the European Union is more likely to be associated with crises than with the growth that follows them. Indeed, the European Union is still struggling with the aftermath of the global financial crisis, which has laid bare its structural weaknesses resulting from the excessive sovereign debt of many of its Member States, ageing societies and high energy costs compared with other, competitive economies. Returning to the path of economic growth entails economic reform, which can affect individual Member States to various degrees, putting to the test the integrity of the entire European Union.

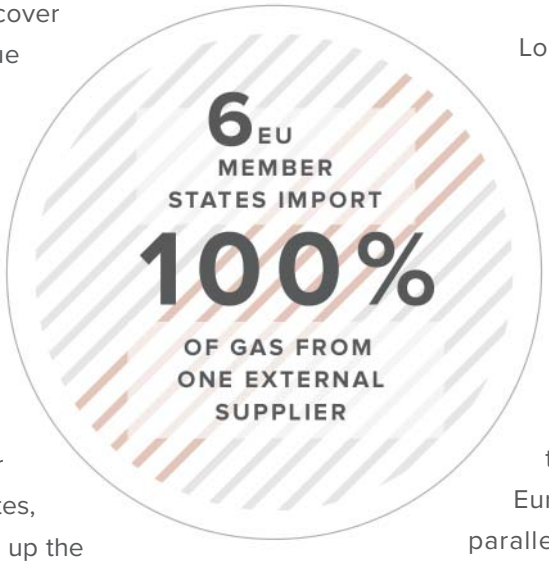
The security of natural gas supplies to EU Member States has become a significant challenge following the escalation of the conflict between Russia and Ukraine. In early April 2014, Donald Tusk, the then Polish Prime Minister, proposed six pillars for the European Energy Union: joint negotiations of gas supplies within the EU, development and financing of energy infrastructure, particularly for natural gas, better use of Europe's indigenous energy sources (such as coal and shale gas), strengthening of solidarity mechanisms to be used in case of embargo on energy supplies, and opening to natural gas suppliers other than Gazprom, as prices are lower if there is more competition and the leading supplier holds a smaller share in the market, and higher where it is the monopolist. The European Commission was quick to pick up the concept of the European Energy Union.

THE EU LANDSCAPE IS VERY HETEROGENEOUS BOTH IN TERMS OF GAS SUPPLY SOURCES AND PRICES

In the European Union, the level of energy security, measured by imports as a percentage of domestic consumption and access to alternative suppliers, varies greatly by country. No significant risk to the continuity of oil supplies exists today, as the available infrastructure and the global nature of the oil market itself make it easy to switch between suppliers. Some

[1] Google Web Search, May 20th 2015

threat comes from potential rising market prices, which reflect the risk of reduced global oil supply. In contrast, the situation on the natural gas market looks quite dramatic if we take into account the risk of supply disruptions faced by some Member States. Gas imports into the EU total approximately 300bcm annually and cover 66% of total consumption. Due to insufficient infrastructure (interconnectors, LNG terminals, etc.), six EU nations rely on Russia as their sole source of gas. Overall, the country delivers natural gas, in various quantities, to 24 Member States. Almost one-third of all gas customers in the EU have access to fewer than two alternative supply routes, which has the effect of pushing up the price paid by them under long-term contracts – prices paid by countries with access to more than two supply sources are on average 20% lower.



Today, when the concept of a pan-European Energy Union is being born, the Member States vary in opinion on the weight of the individual components of energy policy – reducing reliance on imports and cutting energy prices are key for some countries, while increasing the proportion of renewables in the energy mix to enhance energy security in the long run by lowering the share of imports in total consumption and by pursuing decarbonisation goals are key to others, mainly those that have already solved the issue of diversification of gas supply sources for themselves.

Over 80% of global conventional oil and gas resources lie within the borders of non-democratic states, which raises concerns among oil and gas importers over stability of supply and strengthens the drive to cut back on imports and take steps to increase energy efficiency, develop indigenous resources (particularly renewables) and build new infrastructure. The European Union covers over 80% of its energy demand from imports, spending more than EUR 1bn on foreign oil and gas every day. This makes the need to lower the bill for energy sourced from outside the EU all the more important.

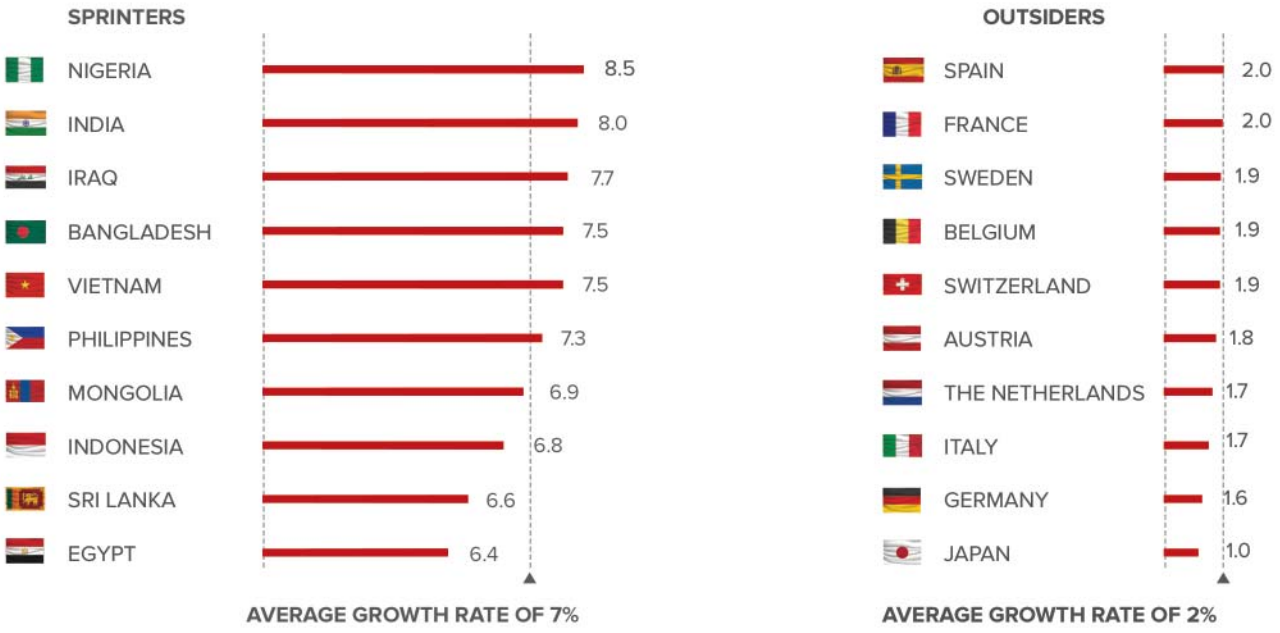
Looking at the map of gas and power interconnections in Europe, one can have an impression that the 'energy Berlin Wall' still stands tall and strong. Western Europe has access to a densely interconnected multidirectional network, with multiple independent sources to feed the system with gas. In Eastern Europe, trunk gas pipelines run parallel to each other linking the supplier and the recipient, with no connections between them.

COMPETITIVENESS MOVES TO ENERGY COSTS

Additional pressures on the EU to curtail its reliance on energy imports are coming from the global race for energy resources started by China and India as the new centres of economic growth. In two decades China alone will account for one-fourth of the world primary energy consumption. Combined with the shrinking reserves of oil and gas from conventional sources, this shift is bound to escalate prices and cause the energy imports bill paid by the EU to rise even further. The development of energy market, which the EU views as the silver bullet for the problems it has to deal with in energy security, is increasingly making energy a global commodity with a global price tag. Regrettably, the EU is poorly prepared to take part in this new race of the 21st century.

IN 2010-2050, EU MEMBER STATES WILL BE OUTSIDERS IN TERMS OF ECONOMIC GROWTH

BEST- AND WORST-PERFORMING DEVELOPING ECONOMIES WORLDWIDE IN 2010-2050
AVERAGE ECONOMIC GROWTH RATE IN 2010-2050, %



SOURCE: PKN ORLEN'S ANALYSIS BASED ON KNIGHT FRANK'S AND CITI PRIVATE BANK'S REPORT ENTITLED 'THE WEALTH REPORT 2012', P. 11

Economists agree that countries unable to secure a strong competitive position for their industry will face local production being replaced by imported products as a natural consequence of liberalisation and globalisation of trade. Research by the European Commission has shown that industry in Europe is already lagging behind the US and Japan, with some sectors also feeling the pressure from Chinese and Indian firms. Less spending on investment in industries with most added value, like electronics, precision mechanics or pharmacy, is just one of the reasons. It is energy prices, which are two or three times as high in Europe as in the US and thus undermine the competitiveness of products made in the EU, that play a major role. The European market is over-regulated, with Member States finding it difficult to keep pace in implementing the numerous new regulations under the energy and climate package. A great challenge that lies ahead the European Union today is to rebalance its climate and environmental protection policy instruments towards competitiveness. A great deal of mistakes and errors have been made by the European Commission in the past, which largely

EU'S ANNUAL OIL AND GAS
IMPORT SPENDING IS EUR
400 BN

stemmed from the overly optimistic belief that the worthy goals and determination in pursuing them is enough to inspire the rest of the world to follow the steps taken by Europe. The efficiency of research and development spending on new technologies has also been a disappointment. It did improve efficiency of the favoured technologies, but failed to deliver a breakthrough similar to that which triggered the US shale revolution. The latter's overall positive effect of lowering fossil fuel prices has had a simultaneous negative impact on RES prices, which became relatively expensive. If the European Union is to strengthen its competitive position vis-à-vis its trading partners, it must be able to produce energy at lowest possible prices and within the socially accepted standards of energy security and environment and climate protection.

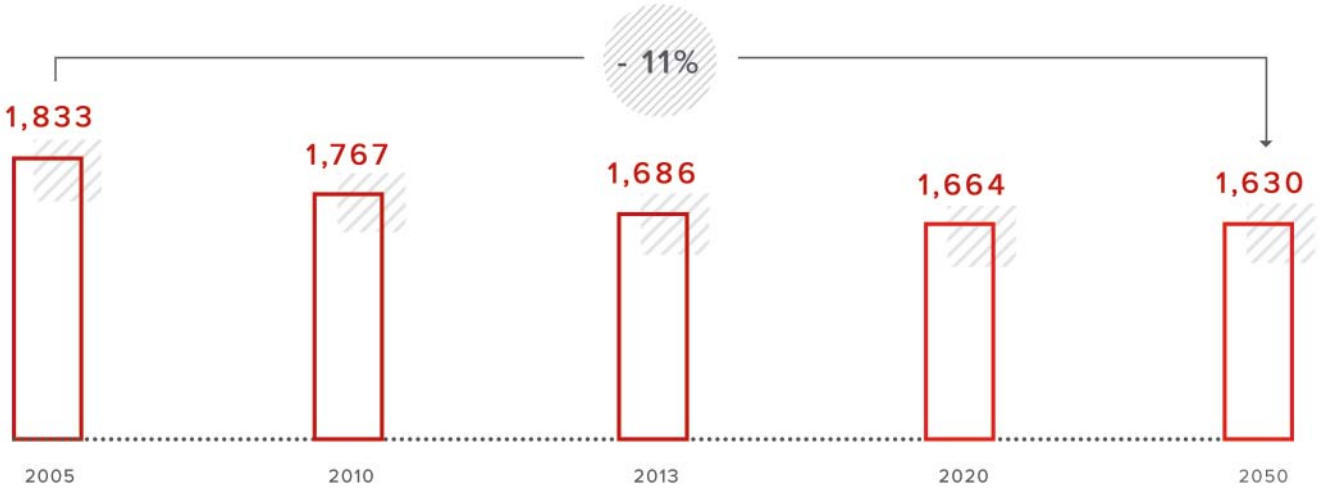
ENERGY DEMAND WILL FALL AND RELIANCE ON IMPORTS WILL RISE IN THE EU

Having dropped to the level last seen in 1996[2], the combined energy demand of EU Member States in 2013 was the lowest in 20 years, at 1,686m toe[3]. According to the European Commission's 2013 forecasts, energy demand in the EU will continue to shrink, with consumption projected to decrease to 1,630m toe in 2050. These projections are rooted in the declining GDP growth rates, ageing populations and further gains in energy efficiency throughout the EU. EC projections point to a gradual acceleration of economic growth – EU-28's GDP is expected to grow at an annual rate of around 1.6% in 2015 - 2050, but this still remains 0.6 pp below the 1996 - 2007 rate.

In terms of demographics, the 15 - 64 age group is expected to shrink in 2015 - 2050 giving way to

FORECAST DECLINE IN EU ENERGY DEMAND

ESTIMATED EU DEMAND FOR PRIMARY ENERGY IN 2005-2050
MTOE*, %

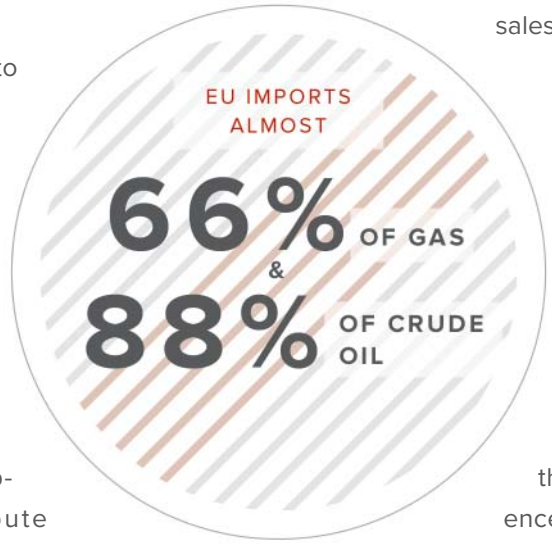


* TOE: TONNE OF OIL EQUIVALENT
SOURCE: PKN ORLEN'S CALCULATIONS BASED ON THE EUROPEAN COMMISSION'S REPORT ENTITLED 'EU ENERGY, TRANSPORT AND GHG EMISSIONS TRENDS TO 2050'

[2] PKN ORLEN's calculations based on Eurostat data: http://ec.europa.eu/eurostat/statistics-explained/index/php/Consumption_of_energy
[3] Tonne of oil equivalent (toe) – equivalent of the energy obtained from one metric tonne of crude oil with a calorific value of 10,000 kcal/kg

more people aged 65-plus, which will translate into reduced activity and more limited supply of workforce.

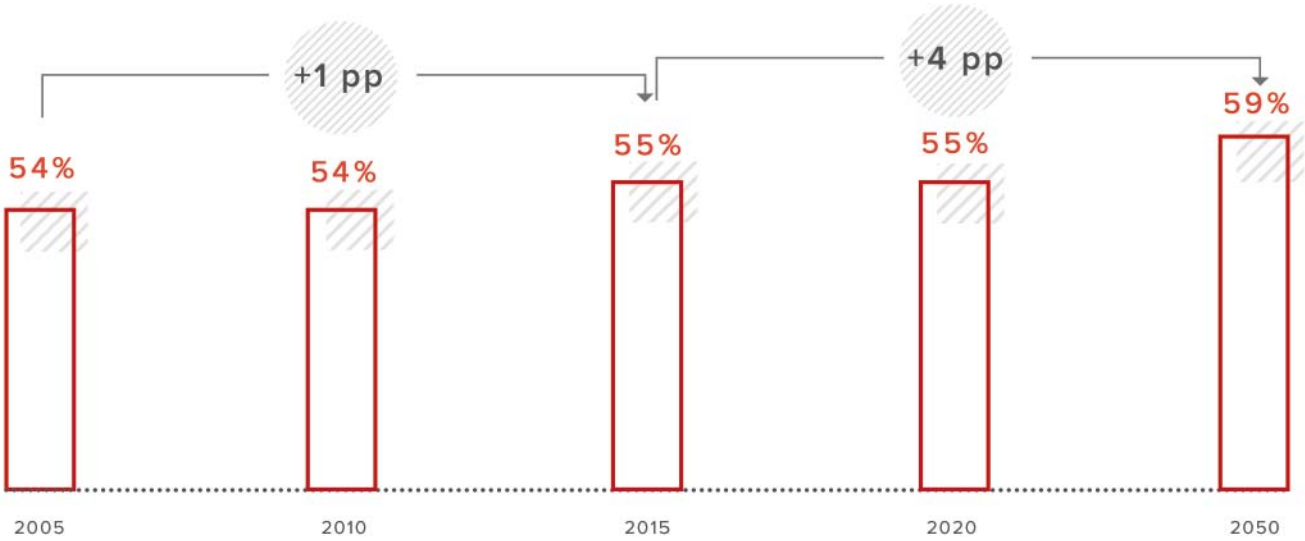
But the forecasts also point to continued gains in energy efficiency. It is expected that low energy intensity industries will grow in importance, further reducing the EU energy demand. There is also a gradual shift of focus, from quantity of energy consumed to quality of the consumption, which will contribute to reduced industrial output in the EU and, consequently, decreased energy demand. One manifestation of the shift is the proposed car-as-a-service model, consisting in shared use of cars in urban areas, which may eventually replace car ownership as we know it. Radical forecasts foresee a 50% decline in car sales by 2040.



Europe is the world's largest energy importer – the EU sources 88% of its crude oil and 66% of its natural gas from foreign suppliers[4]. Despite the current declarations that reliance on energy supplies must be reduced, it will be difficult to scale down the European Union's dependence on crude oil and natural gas imports. In 2030, imports will account for 57% of all energy consumed in the EU, with the figure rising to 59% in 2050.

EU'S DEPENDENCE ON FUEL IMPORTS FROM THIRD COUNTRIES EXPECTED TO INCREASE FURTHER IN 2015-2050

EU'S DEPENDENCE ON FUEL IMPORTS IN 2005-2050



SOURCE: PKN ORLEN'S CALCULATIONS BASED ON THE EUROPEAN COMMISSION'S REPORT ENTITLED 'EU ENERGY, TRANSPORT AND GHG EMISSIONS TRENDS TO 2050'

[4] http://www.bp.com/content/dam/bp/excel/Energy-Economics/statistical-review-2014/BP-Statistical_Review_of_world_energy_2014_workbook.xlsx

This trend means that if the European Union does not invest in developing its own commodity and production base, preferably founded on advanced, low-emission sustainable energy sources, the EU will continue to depend on natural gas and crude oil imports, which in 2050 may account for as much as 97% of its crude oil needs and 83% of its natural gas demand.

THE LEADING ROLE OF NATURAL GAS AND CRUDE OIL IN THE ENERGY MIX

Over the past two decades, the EU's energy mix has shifted towards a larger share of natural gas, which grew from 20% in 1995 to 23% in 2012[5]. The same period also saw a two-fold rise in reliance on renewable energy sources (RES), which in 2012 accounted for 11% of the mix. According to many forecasts, crude oil and natural gas will continue to play the key role in the EU's energy mix until 2050, accounting for a combined 55% of total consumption in 2050, compared with 59% in 1995 and 58% in 2012.

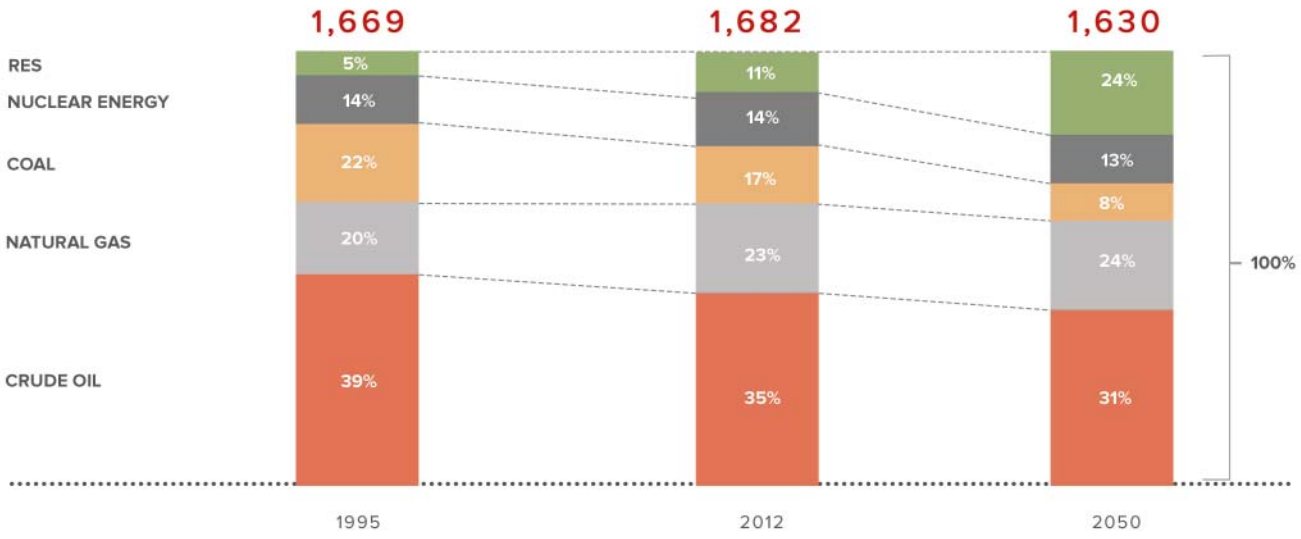
Natural gas is expected to broadly maintain its current share in total EU fuel consumption.

This is due to three main reasons:

- burning natural gas emits less carbon dioxide than burning any other fossil fuel;
- natural gas is becoming increasingly more available thanks to rapid advances in innovative techniques of gas extraction from sea floor and directly from shale rock (the shale revolution);
- unlike many RES technologies, gas extracted from unconventional sources offers fast returns on capital invested and creates new jobs throughout the economy, rather than just in the subsidised sector.

DESPITE THE GROWING IMPORTANCE OF RES, THE SHARE OF OIL AND GAS IN THE EUROPEAN ENERGY MIX IS FORECAST AT OVER 50% IN 2050

UE-28'S ENERGY MIX IN 1995-2050
%, MTOE*



* TOE: TONNE OF OIL EQUIVALENT
SOURCE: PKN ORLEN'S ANALYSIS BASED ON THE EUROPEAN COMMISSION'S REPORT ENTITLED 'EU ENERGY, TRANSPORT AND GHG EMISSIONS TRENDS TO 2050'

[5] PKN ORLEN's calculations based on Eurostat data: http://ec.europa.eu/eurostat/statistics-explained/index/php/Energy_production_and_imports

Renewables will gain the most weight in Europe's future energy mix: in 2050, the share of RES in energy consumption will double on 2015, to almost 24%, nearly on a par with the current share of natural gas. Then again, the development of RES requires heavy expenditure, and while the EU does have a policy of RES subsidies in place, the policy needs to be revised to include financing mechanisms that could be flexibly aligned with movements in prices of fossil fuels. Europe's hope of seeing returns on its investment in the RES sector may lie in the development of the global RES technology: by 2020 the value of the market will reach EUR 345bn[6] (vs EUR 79bn in 2008). At present, EU Member States derive most of the benefits from technology licensing, as manufacturing of wind turbines and solar panels for the EU market has moved to China and other Asian countries, where most of subsidised jobs are created.

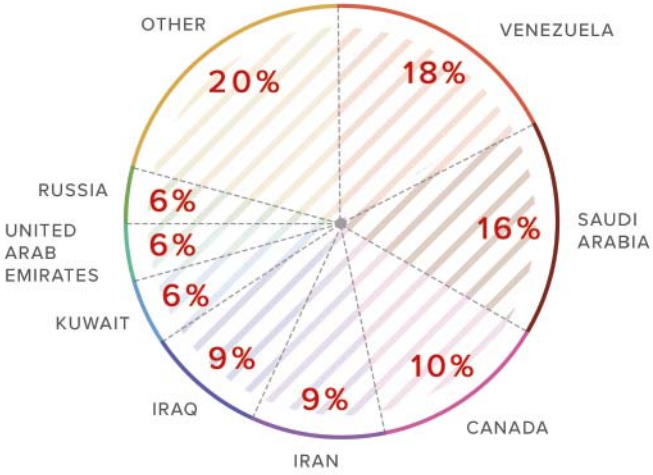
EU'S ANNUAL SUBSIDIES FOR ENERGY SECTOR EXCEED EUR

120 BN

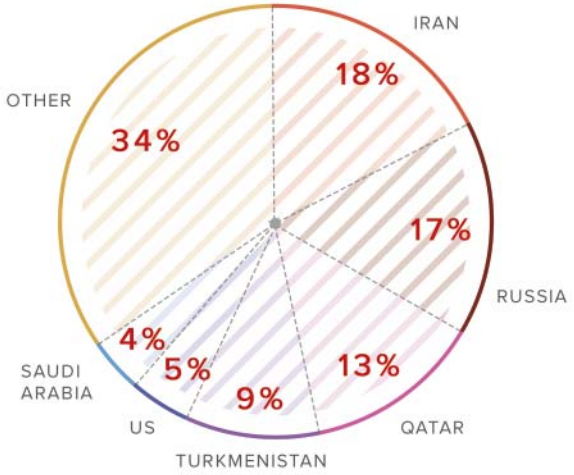
The legitimate concerns over the stability of oil and gas supplies have naturally prompted importing countries to reduce the share of imports in their energy mix, which has driven up the economic (opportunity) cost of

NON-OECD COUNTRIES CONTROL OVER 80% OF GLOBAL OIL AND GAS RESERVES

STRUCTURE OF CONVENTIONAL OIL AND GAS RESERVES IN 2013
%, BN TONNES, TCM



CRUDE OIL
100% = 234BN TONNES



NATURAL GAS
100% = 185TCM

SOURCE: PKN ORLEN'S CALCULATIONS BASED ON BP STATISTICAL REVIEW 2014 DATA: HTTP://WWW.BP.COM/CONTENT/DAM/BP/EXCEL/ENERGY-ECONOMICS/STATISTICAL-REVIEW-2014/BP-STATISTICAL_REVIEW_OF_WORLD_ENERGY_2014_WORKBOOK.XLSX

[6] McKinsey&Company, Energy: a key to competitive advantage, 2009, p. 40

energy and has adversely affected competitive position of the importing economies.

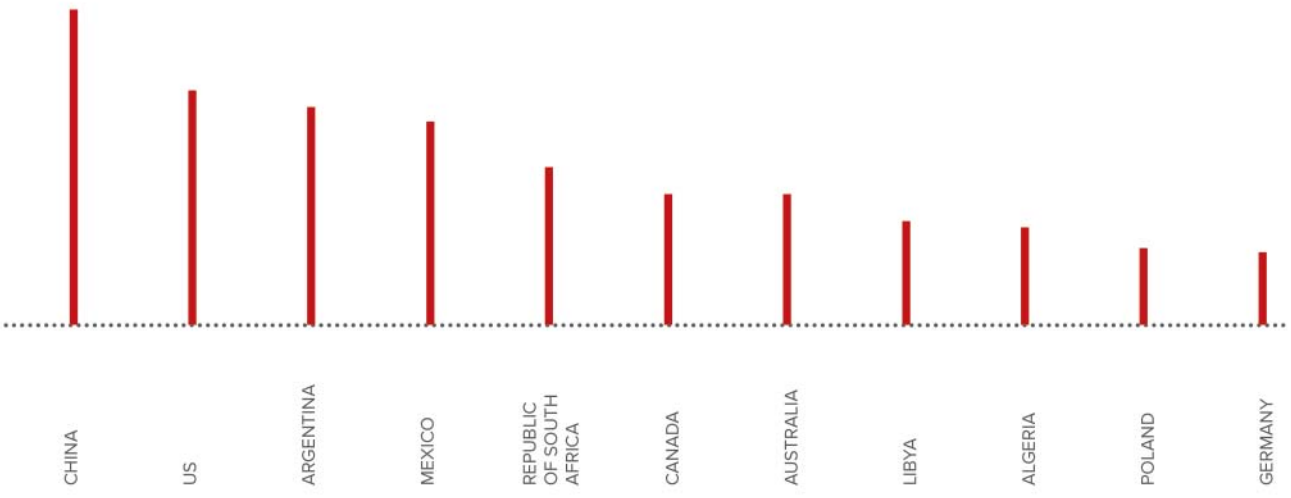
Let's not arbitrarily give up on exploration for oil and gas from unconventional sources

As for hydrocarbons from unconventional sources, the picture is entirely different, with nearly 50% of technically recoverable shale gas resources found in countries with stable political systems (more than 100tcm of a total 208tcm, including 16tcm in the EU). Similarly with shale oil, 36% of the total resources are held by democratic countries (17 of 48bn tonnes).

Poland's own shale gas resources, thought to be among the most substantial in Europe, are not so large from the global perspective. According to the U.S. Energy Information Administration, Poland ranks among the top 10 - 15 countries by shale gas potential, with as much as 0.3 - 1.0tn cubic meters. Discussions on shale gas in Poland are still laboured with considerable uncertainty as to the size and recoverability of the resources, and this is not likely to change any time soon as only further drilling can provide reliable data on the quality of the country's shale formations. Only about 70[7] exploratory wells have been drilled in Poland in search for shale gas, which is still an inadequate number for determining whether commercial production is truly viable.

When seeking experienced partners for shale gas projects, Poland and the EU must compete with non-EU economies, where the business and political climate is potentially more conducive to development of unconventional hydrocarbon deposits (compared with the EU's stringent regulations on environment and climate protection, employment,

POTENTIAL SHALE GAS DEPOSITS BY COUNTRY (FOR ILLUSTRATIVE PURPOSES)



SOURCE: PKN ORLEN'S ANALYSIS BASED ON U.S. ENERGY INFORMATION ADMINISTRATION DATA: HTTP://WWW.EIA.GOV/ANALYSIS/STUDIES/WORLDSHALEGAS/

[7] As at March 30th 2015, including 12 wells by PKN ORLEN

certification of machinery and equipment imported from outside the EU, etc., all of which drives up exploration and production costs).

The prospects for shale gas production in Poland and Europe differ from those in the US, for reasons of geology, infrastructure and law. This is why no one can promise today that shale gas will end Europe's dependence on gas imports, but the lack of a common strategy on unconventional hydrocarbons is a missed opportunity to improve the balance of Europe's own fossil fuel production and reduce imports in the medium to long term.

ENERGY SECURITY STRATEGIES IN THE EU

Apart from coal reserves, which are mainly used locally, different countries are building different paths toward energy security. The choice of key drivers in doing so depends on such factors as access to oil and gas reserves, geographical location, and the stage of development of the fuel market. The strategies applied are based on three models:

1. **Security through furthering competition** – Full market liberalisation, to ensure low prices and multiple energy suppliers. The model's success depends on whether the country has its own fossil fuel reserves or enjoys easy access to a liquid market for fuels. A good example of a country employing this strategy is the United Kingdom.
2. **Security through efficiency** – Creation of a national champion with a strong negotiating position vis-à-vis fossil fuel suppliers. Countries employing this strategy are, for example, France, Spain and Italy.
3. **Security through innovation and greater self-sufficiency** – This model concentrates on the use of alternative/renewable fuels to reduce crude oil consumption. It is pursued by advanced economies with a focus on environmental protection (for example Sweden, Japan and Germany).

Security of gas supplies continues to be determined by geography

The EU's own natural gas production covers more or less one third of the demand, with the current gap between production and demand at around 300bcm. In view of the shrinking gas output by Member States, the fuel will have to be imported from outside the EU[8]. In 1995 - 2013, the EU's dependence on gas imports rose from 43% to 66%[9].

The strategic landscape of the EU alone is highly varied when it comes to security of natural gas supply: four Member States do not import gas from Russia, while as many as eighteen countries do so, including six which buy 100% of their gas from Gazprom (Finland, Estonia, Latvia, Lithuania, Bulgaria and Slovakia), making them particularly vulnerable to potential economic and political blackmail. Lithuania has only this year gained the possibility of purchasing non-Russian gas, following the launch of an LNG terminal in Klaipeda.

Security of supply should be viewed dynamically in relation to the needs of developing economy. The European Commission expects that in 2012 - 2050 gas imports into the EU will increase to 330bcm[10]. The EU countries now import gas principally from Russia (32%), Norway (31%), Algeria (14%), and Qatar (8%).

Those EU Member States that use several gas suppliers and alternative supply routes pay on average 20% less for their gas than the states which currently depend on a single source of gas. In 2014, the price of 1,000 cubic meters of natural gas was

[8] http://www.bp.com/content/dam/bp/excel/Energy-Economics/statistical-review-2014/BP-Statistical_Review_of_world_energy_2014_workbook.xlsx
[9] http://www.bp.com/content/dam/bp/excel/Energy-Economics/statistical-review-2014/BP-Statistical_Review_of_world_energy_2014_workbook.xlsx
[10] European Commission: "EU energy, transport and GHG Emissions trends to 2050", p. 86

ACCESS TO NATIONAL RESERVES OF PRIMARY ENERGY CARRIERS

ACCESS TO LARGE NATIONAL RESERVES
OF PRIMARY ENERGY CARRIERS (OIL, GAS)

LIMITED OR NO ACCESS
TO PRIMARY ENERGY CARRIERS

LARGE — SMALL

SOURCE: PKN ORLEN'S ANALYSIS

GEOGRAPHICAL LOCATION RELATIVE TO COUNTRIES RICH IN ENERGY CARRIER RESERVES OR TO TRADING HUBS

COUNTRIES CLOSE TO OIL RESERVES
OR OIL TRANSPORT ROUTES

COUNTRIES DISTANT FROM
OR PERIPHERAL TO OIL RESERVES
AND OIL TRANSPORT ROUTES

LARGE — SMALL

SOURCE: PKN ORLEN'S ANALYSIS

LEVEL OF DEVELOPMENT AND LIBERALISATION OF ECONOMY AND ENERGY SECTOR

SOURCE: PKN ORLEN'S ANALYSIS

USD 496 in Lithuania, USD 442 in Estonia, USD 422 in Bulgaria, USD 392 in the Czech Republic, and USD 313 in Poland, compared with USD 308 paid by Germany, USD 307 by the UK, and USD 304 by the Netherlands and Belgium as countries with a diversified supply structure [11].

This reflects the lack of European solidarity, with not one, but at least three 'energy Europes':

- **Central and Eastern Europe** heavily depends on oil and gas from Russia.
- **Southern Europe** relies on deliveries from North Africa. The extent of this reliance was sharply brought into focus during the Arab Spring and the recent tensions in Libya.
- With the most diversified supplies, including from own sources in the North Sea, **Western Europe** enjoys the highest level of energy security.

This is why European countries have different views on the importance of the individual components of energy policy. Inasmuch as there is a consensus that creating the internal energy market should be completed and energy security strengthened, the approaches to how these goals are to be achieved, or even to how they are defined, clearly differ. Reaching a compromise will not be easy, as even the word 'energy' has different associations in different countries: green energy in Germany, nuclear power in France, coal in Poland, and for the European Commission – reduction of CO_2 emissions.

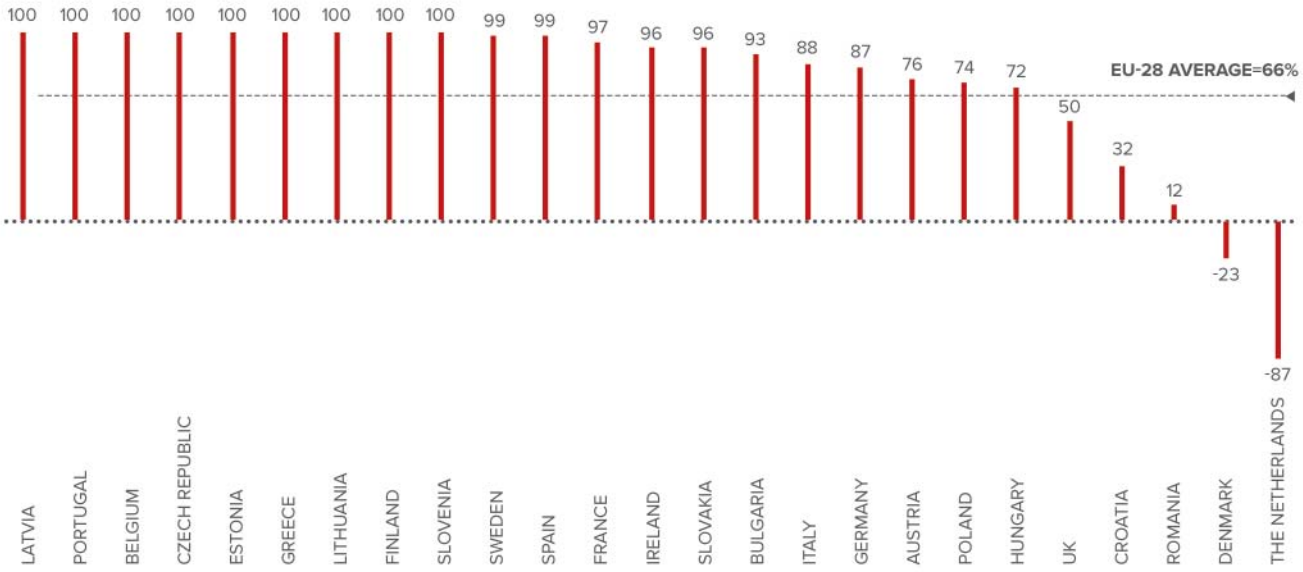
To assess the EU's preparedness for supply disruptions, the European Network of Transmission System Operators for Gas (ENTSOG) was requested by the European Commission to carry out energy security stress tests assuming a six-month disruption in gas supplies from Russia.

[11] H1 2014 wholes gas price, PKN ORLEN'S analysis based on Notre Europe Jacques Delors Institute and IHS CERA data

DEPENDENCE ON GAS IMPORTS VARIES WIDELY ACROSS THE EU

DEPENDENCE ON GAS IMPORTS IN EU-28, 2013

%

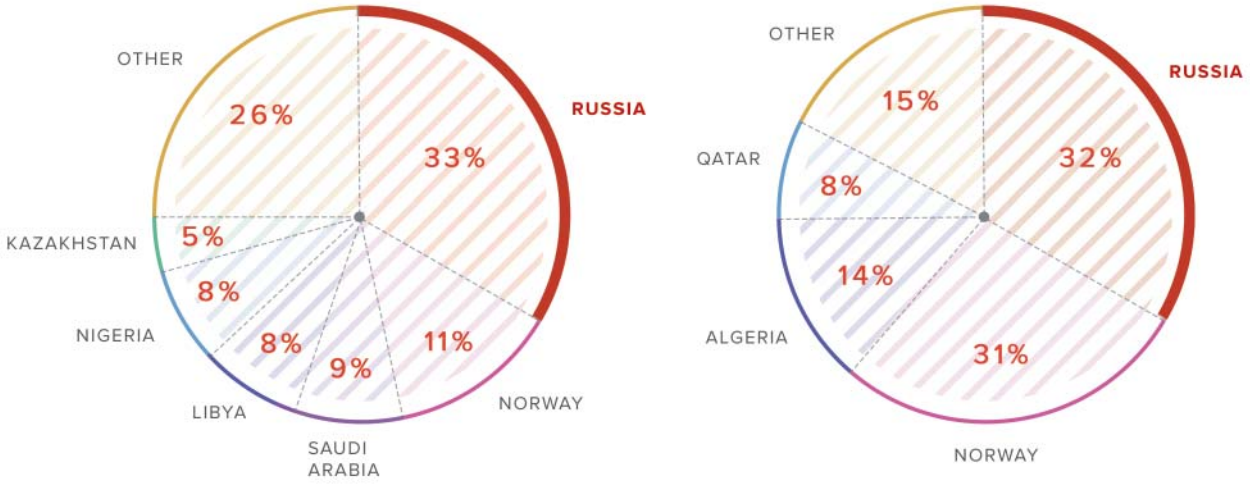


SOURCE: PKN ORLEN'S CALCULATIONS BASED ON EUROSTAT DATA:
HTTP://EC.EUROPA.EU/EUROSTAT/STATISTICS-EXPLAINED/INDEX.PHP/ENERGY_PRODUCTION_AND_IMPORTS

ALMOST ONE THIRD OF EU'S OIL AND GAS IMPORTS COME FROM RUSSIA

ESTIMATED STRUCTURE OF UE-28'S OIL AND GAS IMPORTS, 2012

% M TONNES, BCM



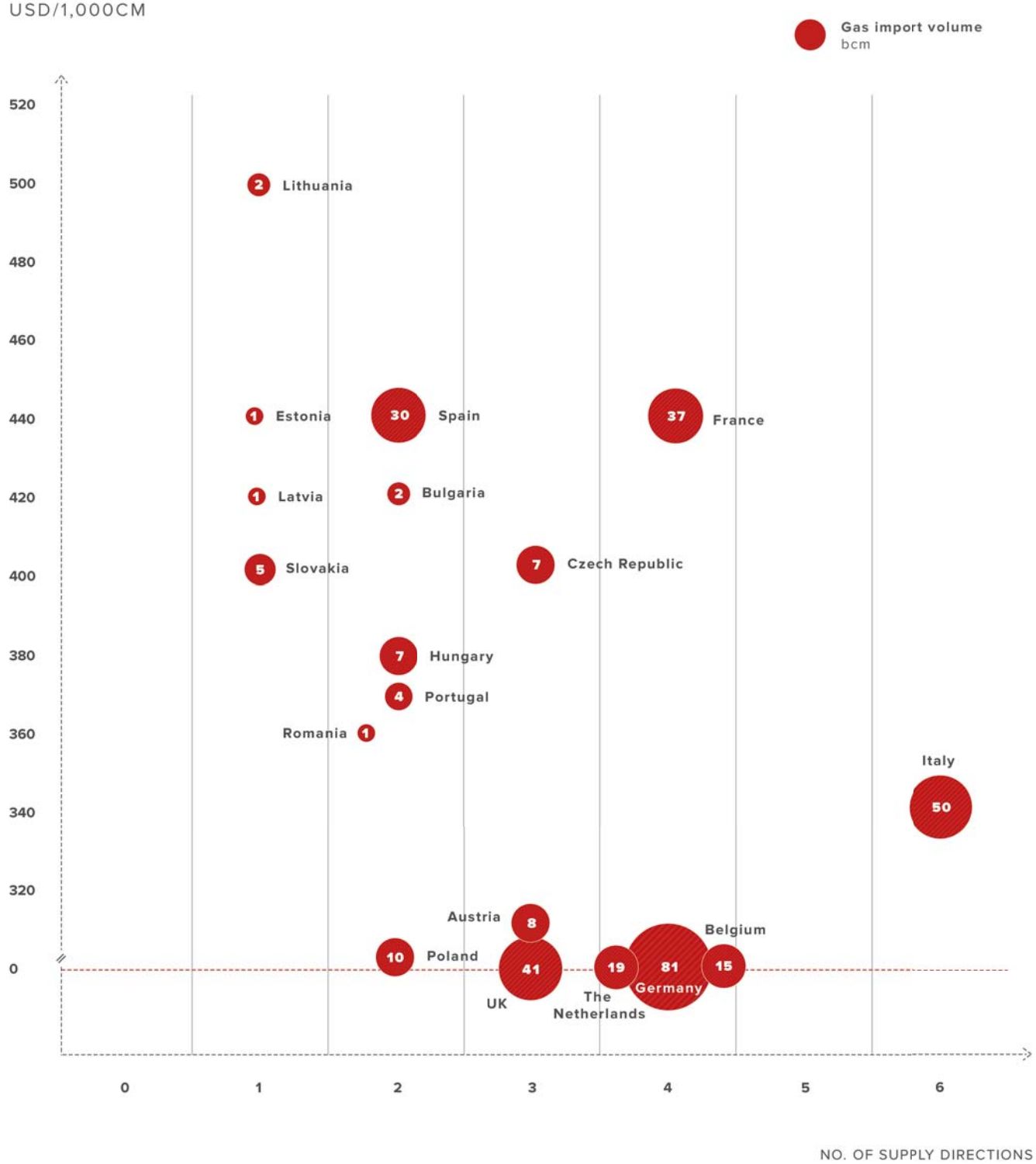
OIL
100%=536M TONNES

NATURAL GAS
100%=292BCM

SOURCE: PKN ORLEN'S CALCULATIONS BASED ON BP STATISTICAL REVIEW 2014 DATA: HTTP://WWW.BP.COM/CONTENT/DAM/BP/EXCEL/ENERGY-ECONOMICS/STATISTICAL-REVIEW-2014/BP-STATISTICAL_REVIEW_OF_WORLD_ENERGY_2014_WORKBOOK.XLSX

THE HIGHER THE NUMBER OF GAS SUPPLY ROUTES, THE LOWER THE PRICE

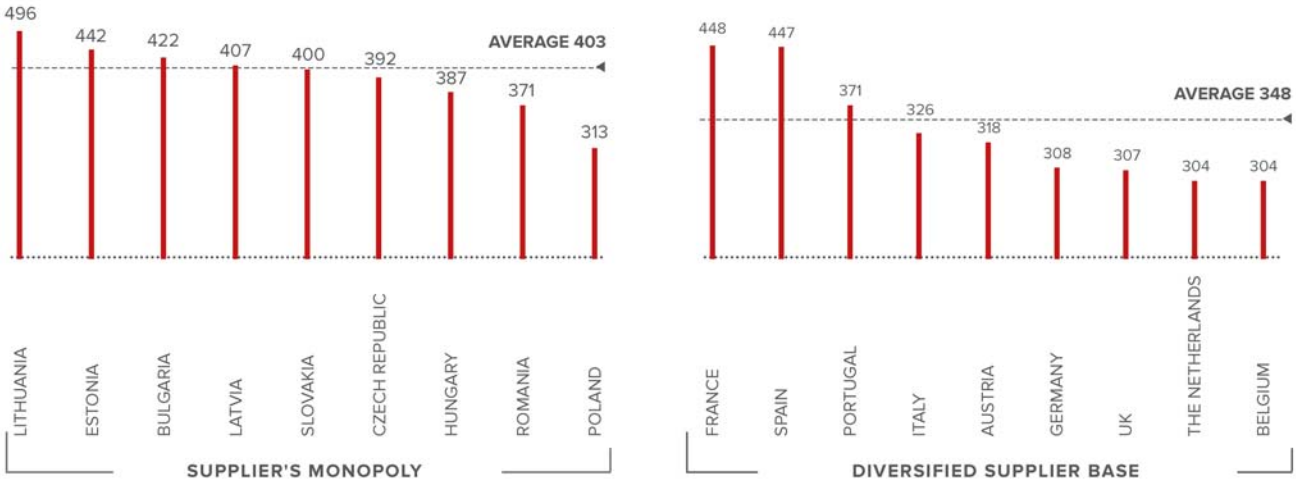
GAS PRICE*, H1 2014
USD/1,000CM



* AVERAGE WHOLESALE GAS PRICE
SOURCE: PKN ORLEN'S ANALYSIS BASED ON NOTRE EUROPE JACQUES DELORS INSTITUTE DATA:
HTTP://WWW.DELORSINSTITUTE.EU/011-20721-FROM-THE-EUROPEAN-ENERGY-COMMUNITY-TO -THE-ENERGY-UNION.HTML

PRICES PAID BY COUNTRIES WITH A DIVERSIFIED GAS SUPPLIER BASE ARE ON AVERAGE 16% LOWER THAN PRICES PAID BY COUNTRIES WITH ONE OR TWO SUPPLIERS

AVERAGE WHOLESALE GAS PRICE IN SELECTED EU COUNTRIES, H1 2014
USD/1,000CM



SOURCE: PKN ORLEN'S CALCULATIONS BASED ON NOTRE EUROPE JACQUES DELORS INSTITUTE DATA:
HTTP://WWW.DELORSINSTITUTE.EU/011-20721-FROM-THE-EUROPEAN-ENERGY-COMMUNITY-TO -THE-ENERGY-UNION.HTML

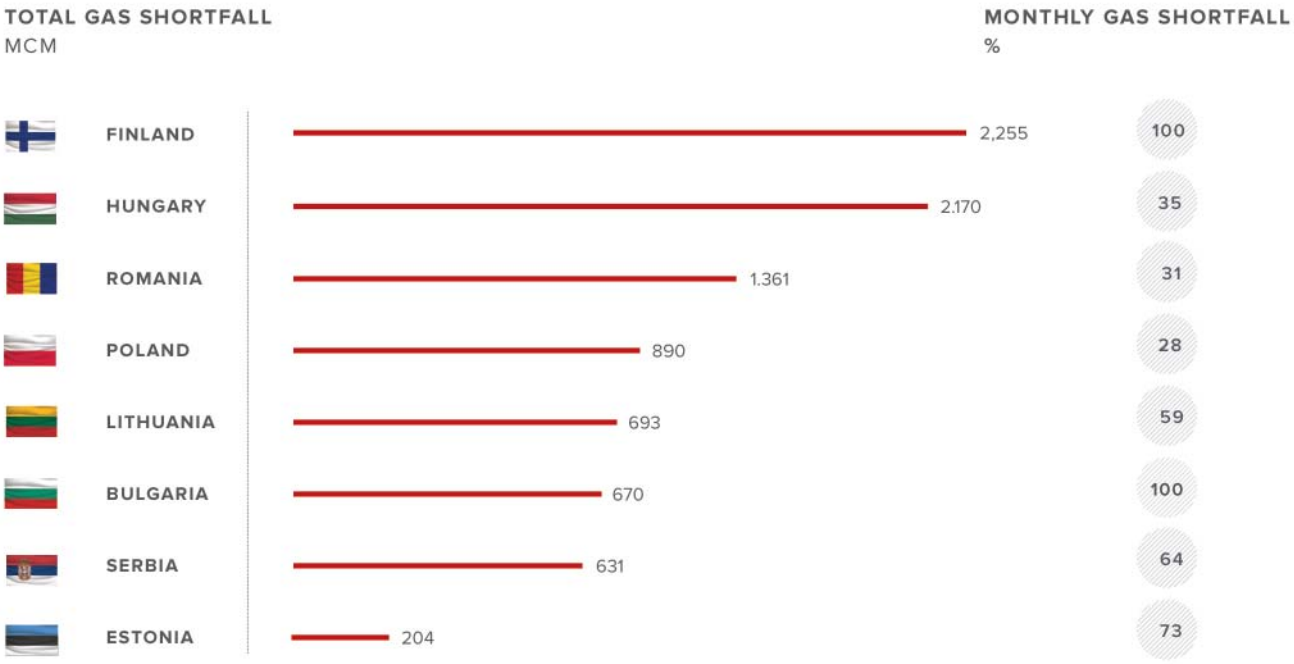
The tests involved analysis of scenarios with three differentiating factors:

- degree of cooperation between countries, and joint and coordinated actions for energy security. These scenarios assume different degrees of solidarity in sharing the burden of supply shortages. The 'zero-cooperation' scenario assumed a reduction or complete discontinuation of exports between European countries if their own domestic demand could not be satisfied;
- scale of supply interruption. These scenarios involved 'disruption of all Russian gas flows to Europe', as well as 'disruption of gas supply to Europe via the Ukrainian transit route';
- weather conditions. Scenarios for both 'typical weather conditions' and 'cold spells' were tested.

In the full Russian supply disruption scenario, the lack of cooperation between Member States can create serious supply shortfalls of from 30% to even 100%, depending on the country. Finland and Bulgaria run the highest risk of supply disruption. High-magnitude shortfalls would occur in Estonia, Serbia and Lithuania. Hungary and Poland would also be affected, but to a much lesser extent – 35% and 28%, respectively.

In the 'cooperation' scenario, the impact of supply disruptions would be significantly lower, with Bulgaria, Estonia, Bosnia and Herzegovina, and the countries of the former Yugoslavia most affected. Gas supply interruptions would also have significant consequences for Greece and Lithuania. The Member States would not be directly affected by the disruption of gas supplies from Russia. These are mostly EU-15 countries for which the security of gas supply is not currently high on the agenda.

GAS SHORTFALL IN CASE OF SIX-MONTH CESSATION OF RUSSIAN GAS SUPPLIES INTO EUROPE



SOURCE: PKN ORLEN'S ANALYSIS BASED ON THE EUROPEAN COMMISSION'S MATERIALS: HTTP://EC.EUROPA.EU/ENERGY/SITES/ENER/FILES/DOCUMENTS/2014_STRESSTESTS_COM_EN.PDF

As regards oil supplies, only 20% of Russian oil is exported via pipeline infrastructure to the EU, and these volumes can be relatively easily substituted with sea deliveries. Moreover, given the global nature of the oil market, effects of a hypothetical disruption of Russian supplies could be quickly mitigated and the shortfall replaced with oil from other countries.

REDUCING ENERGY COSTS IS INCREASINGLY MORE IMPORTANT

Debate is necessary in the EU on how environmental and climate protection targets can be achieved without compromising the competitiveness of industry, as reindustrialisation based on competitive energy prices and development of new technologies is Europe's only chance of returning to the path to dynamic growth.

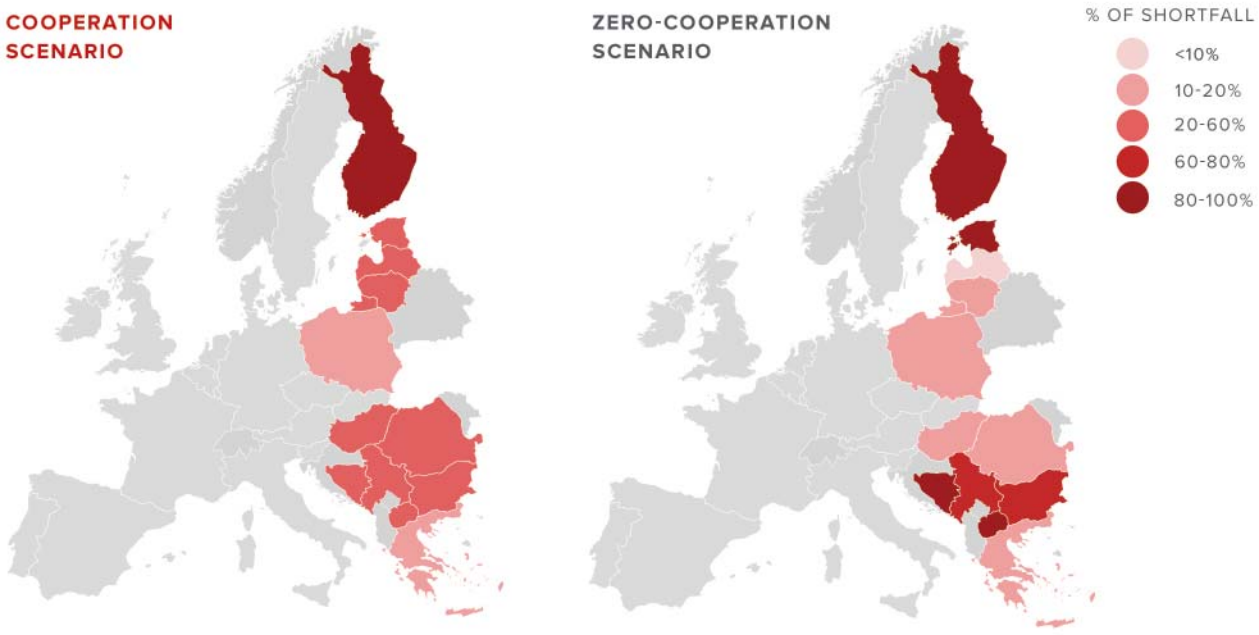
The price of electricity paid by end users in the EU countries is 2.7 times higher than in the US (USD 0.16/kWh vs USD 0.06/kWh in 2014). At the beginning of 2015, the price of natural gas was USD 100 per 1,000 cubic meters, while in the European Union the same amount of the fuel cost an average of USD 280[12]. In terms of energy prices, US businesses are therefore almost three times better off than their European competitors, and failure by the EU to secure access to cheap energy may permanently dull the competitive edge of the European economy. European goods will not only be pushed out of the global markets, but their manufacturers could also lose customers on their home markets.

Why else is it so important to ensure that industry stays competitive? Because apart from labour costs and tax charges, the price of energy is also a key factor in deciding where to invest in energy-intensive processing industries and service sectors. Energy prices can both attract foreign investors, and compel domestic investors to take their money abroad. The global economy's centre of gravity is shifting

[12] Price at the National Balancing Point (NBP) hub

LIKELY SUPPLY INTERRUPTIONS IN 'COOPERATION' AND 'ZERO-COOPERATION' SCENARIOS

SCENARIOS FOR SIX-MONTH CESSATION OF RUSSIAN GAS SUPPLIES



SOURCE: HTTP://EC.EUROPA.EU/ENERGY/SITES/ENER/FILES/DOCUMENTS/2014_STRESSTESTS_COM_EN.PDF

towards China, India, Brazil, and back to the US, away from Paris, Berlin and Brussels. And although Europe remains an attractive market for now -- 500 million EU citizens still have greater purchasing power than 1.3 billion consumers in China – this will change over time. Ensuring that industry remains competitive is also important for other reasons:

- industry determines purchasing power in an economy – to a large extent, the condition of a country's processing industry and the demand it generates determines the level, productivity and salaries of its service sector;
- industry can be an important source of innovation – the processing industry accounts for 60% of R&D spending in Europe;
- Industry creates jobs – directly, also in supporting services, and indirectly in the entire economy -- by increasing incomes and stimulating demand.

Higher energy costs erode competitiveness

The situation in the refining industry is an excellent illustration of the problem of high energy prices and the danger of European companies losing the global competition game. Five years of the economic crisis had to pass and nearly 20 refineries were closed down before the European Commission finally began examining the problems faced by the European refining industry. Like most of its businesses, Europe's refineries are constrained by a regulatory regime which affect their competitive strength. Among the factors responsible for the deterioration of the European fuel industry's competitiveness are high natural gas prices, which have created a serious gap between the US and European refineries: according to the International Energy Agency, energy represents 20% of total production costs in the US, and as much as 60% in Europe.

One consequence of the EU's existing energy policy is the high cost of electricity, also for households, and it is projected that energy bills and related levies and charges for consumers in the EU will continue to rise. The root causes of the increase are the high cost of developing renewable energy technologies and the continent's ageing energy infrastructure. On top of this, the EU's policy of passing on the cost of subsidising RES to end consumers, through taxation and tariffs, has amplified the effects of the rising energy prices. In the EU, levies and charges accounted for 40% of final energy prices in 2014, which is 17 pp more than in 1998[13]. There are countries, such as Denmark, where taxes and charges represent a staggering 50% of the final bill paid by some groups of electricity and gas consumers.

Although people in the EU countries are highly aware of the economy's impact on emission levels, they know little about the effect that subsidising RES has, through generation costs and energy prices, on the economy and labour market.

The preferential treatment of renewable energy sources by the European Commission has caused worry for the economies with large, energy-intensive industries and service sectors, developed on the basis of coal-fired generation (which still remains the cheaper option), about their increased reliance on electricity imports. Unable to fund the required development of new renewable generation capacities internally, but at the same time concerned about their energy security and distrustful of energy solidarity, these economies have no choice but to plan for further development of conventional, coal-based generation. When planning specific solutions for the European energy market, the European Commission should therefore take into account that the key to overcoming the resistance shown by some EU states to restructuring their carbon-intensive energy mix lies in making energy solidarity happen.

What the European Union needs is robust economic growth, to facilitate the advancement of less affluent Member States, as the continued large income gaps between the countries of Southern, Eastern and Western Europe will only exacerbate existing economic, social and political tensions. In 1960 - - 1980, economic growth in EU-15 roughly kept pace with global growth (4.2% vs 4.4%). In 1980 - 1999, the gap widened: 2.2% in the EU vs 2.9% globally. In 2000 - 2013, the global economy grew at twice the rate of Europe's economy (2.7% vs 1.4%)[14]. The rate of growth in the US in the same three periods was 4.0%, 3.2%, and 1.9%, respectively. In comparison with the US, the EU is losing the race for economic prosperity. The underlying causes include lower spending on innovation in the EU than in the US and the related brain drain phenomenon, and Europe's higher energy costs.

The Global Competitiveness Report 2014 - 2015 shows that despite undisputed potential for creating innovation, the European Union still lags behind the US and other countries in this respect – of the world's top 20 competitive nations, only seven are from the EU – and the EU will soon be overtaken by countries from Asia. The Lisbon Agenda of 2000, whose primary aim was for Europe to beat the US in technological leadership, has been hardly a success. Today, the EU's spending on scientific research averages 2.0% of GDP (compared with 2.8% in the US), and has been growing only very slowly in the past few years, despite the Lisbon Agenda's target of 3% of the EU's GDP being invested in R&D projects by 2010. The climate package and the attempts to reduce carbon emissions, at the expense of the European economy's competitiveness, may be expected to produce similar, hardly positive outcomes.

[13] PKN ORLEN's analysis based on the Eurostat data: http://ec.europa.eu/eurostat/statistics-explained/index.php/Energy_price_statistics
[14] PKN ORLEN's calculations based on World Bank data

INDEX OF RELATIVE COMPARATIVE ADVANTAGE* OF INDUSTRY IN THE EU VS OTHER ECONOMIES

* BALASSA INDEX = (EXPORT OF PRODUCT X FROM COUNTRY Y/ TOTAL EXPORT FROM COUNTRY Y) / (EXPORT OF PRODUCT X FROM REFERENCE AREA/ TOTAL EXPORT FROM REFERENCE AREA). IF HIGHER THAN 1 (BL>1), THE COUNTRY REVEALS COMPARATIVE ADVANTAGES. THE INDEX MAY RANGE FROM ZERO TO INFINITY.

SOURCE: PKN ORLEN'S ANALYSIS BASED ON THE EUROPEAN COMMISSION'S REPORT ENTITLED 'EUROPEAN COMPETITIVENESS REPORT 2013'

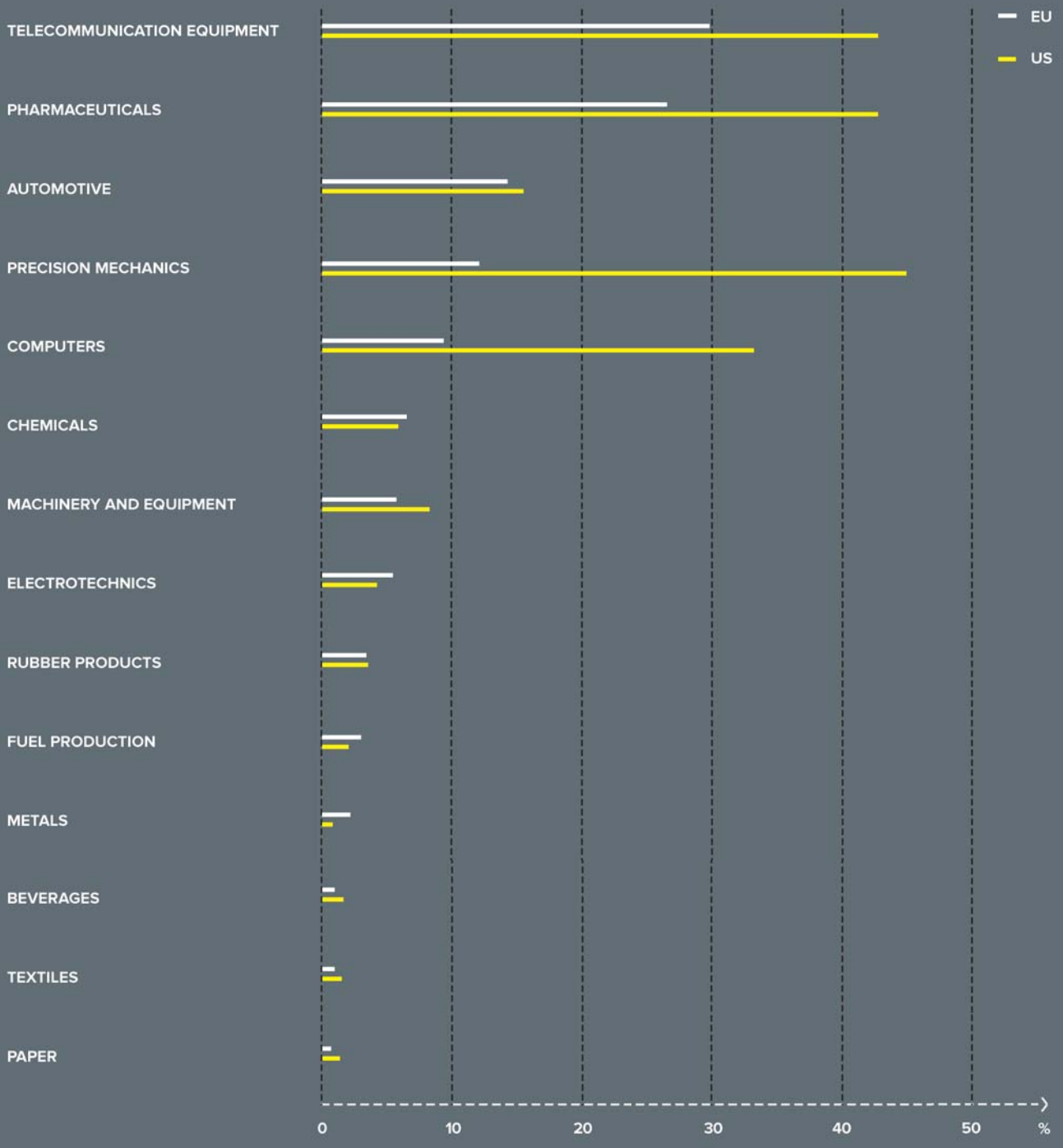
Since 2000, the US has been reporting growth in shale gas output, enabled by the shale revolution. In 2000 - 2013, the nation cut its natural gas imports by 60% (from 118bcm to 49bcm)[15], claiming the lead as the world's largest gas producer. In 2000 - 2013, the US increased its natural gas production by almost 150bcm from 543bcm to 688bcm, outdistancing Russia and other leading gas producers[16]. US crude oil output is on track to exceeding the processing capacities of the country's refineries in the next two to three years, and the US may overtake Russia and Saudi Arabia as the world's largest oil producer by the end of the decade.

[15, 16] http://www.bp.com/content/dam/bp/excel/Energy-Economics/statistical-review-2014/BP-Statistical_Review_of_world_energy_2014_workbook.xlsx

EUROPEANS INVEST IN HIGHEST VALUE-ADDED INDUSTRIES LESS THAN AMERICANS

R&D INTENSITY OF INDUSTRY* IN THE EU AND THE US

%

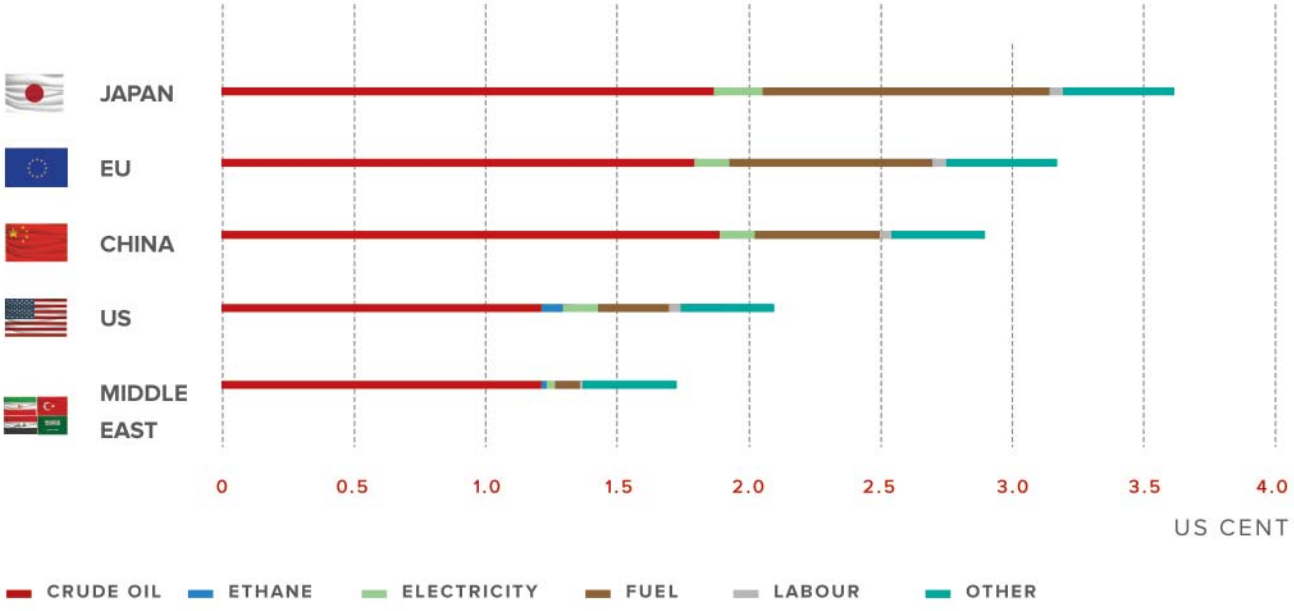


* R&D INTENSITY = R&D EXPENDITURE TO SALES

SOURCE: PKN ORLEN'S ANALYSIS BASED ON THE EUROPEAN COMMISSION'S REPORT ENTITLED 'EUROPEAN COMPETITIVENESS REPORT 2013'

THE PRODUCTION COST OF PLASTIC BOTTLES IN THE US IS MORE THAN 1/3 LESS THAN IN THE EU

PLASTIC BOTTLE PRODUCTION COST IN SELECTED COUNTRIES, 2013

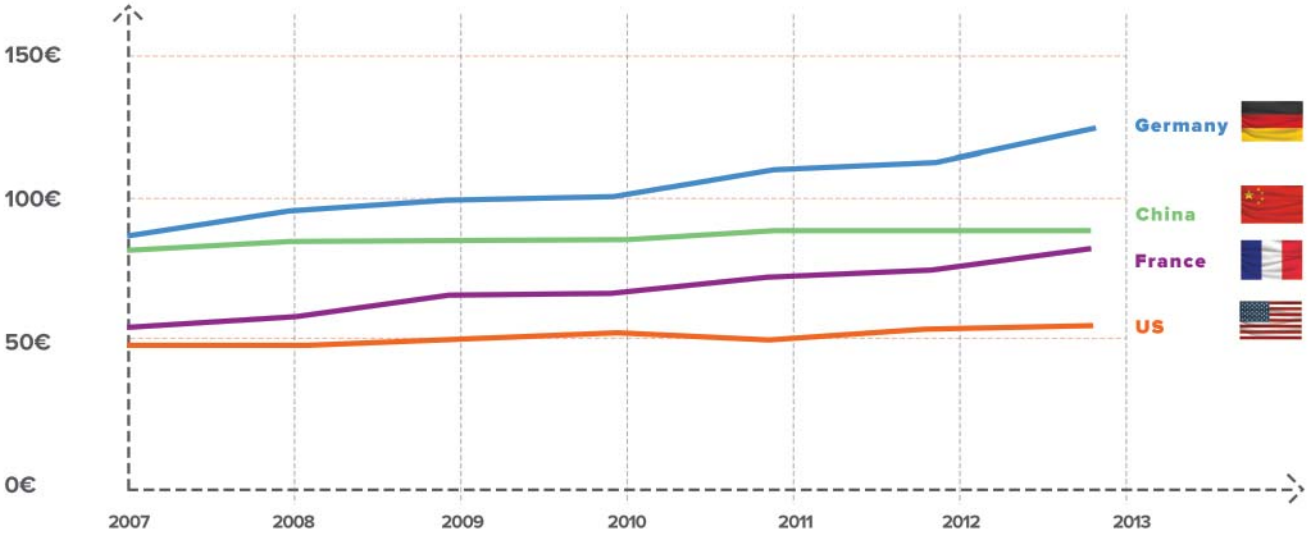


SOURCE: HTTP://WWW.ECONOMIST.COM/NEWS/ECONOMIC-AND-FINANCIAL-INDICATORS/21632569-PRICE-MAKING-PLASTIC-BOTTLE

ELECTRICITY PRICES PAID BY INDUSTRIAL CUSTOMERS IN GERMANY ARE ALMOST THREE TIMES AS HIGH AS THE PRICES IN THE US

ELECTRICITY PRICES PAID BY INDUSTRIAL CUSTOMERS IN GERMANY, CHINA, FRANCE AND THE US, 2013

EUR/MWH



SOURCE: HTTP://WWW.WSJ.COM/ARTICLES/GERMANYS-EXPENSIVE-GAMBLE-ON-RENEWABLE-ENERGY-1409106602

These developments have a bearing not only the geopolitical situation, but also on economics of business. In the US, cheap natural gas is replacing coal as a leading fuel in power generation[17], and excessive production has led to a slump in coal prices. This has had consequences on the other side of the Atlantic Ocean, in the EU, where power plants are coal-fired. Despite ambitious climatic targets, imports of coal and coal products into the EU rose 10% in 2013, while coal consumption fell by just 4% and still remains higher than in 2009 - - 2010[18]. Needless to say, this has led to higher emissions and greater dependence on imports, and not to lower electricity prices in Europe (or at least not to a price drop as significant as the drop attributable to the shale gas revolution in the US). According to geological estimates, EU countries have approximately 16tn cubic meters of gas in unconventional sources. Pursuing a coherent and environmentally sustainable policy of developing these resources would help reduce gas imports. It is important as the EU's dependence on gas imports is rising. By developing its own gas deposits, at least to an extent allowing gas imports to be reduced to 60% of demand in 2025 - 2050, the EU would save almost EUR 1tn.

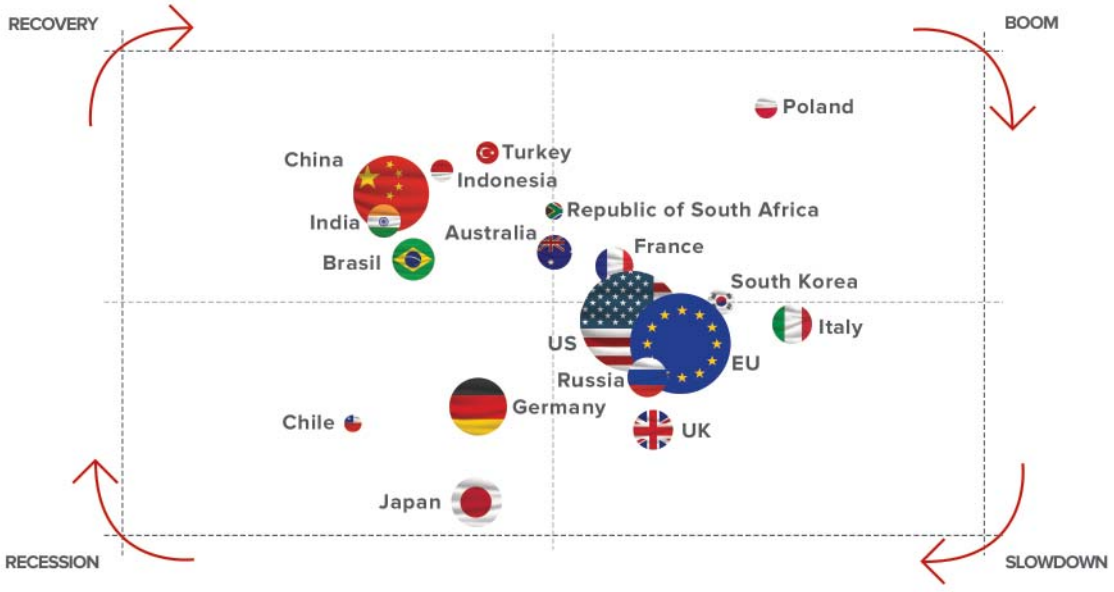
EU ENERGY SECTOR NEEDS INVESTMENTS OF EUR

1 BN

BY 2020

WILL THE EU ECONOMY REBOUND IN THE COMING YEARS?

ECONOMIC CYCLE



SOURCE: PKN ORLEN'S ANALYSIS BASED ON WWW.OPPENHEIMERFUNDS.COM

[17] Given the available capacities at coal- and gas-fired power plants, the energy mix quickly adjusts to new price relations.

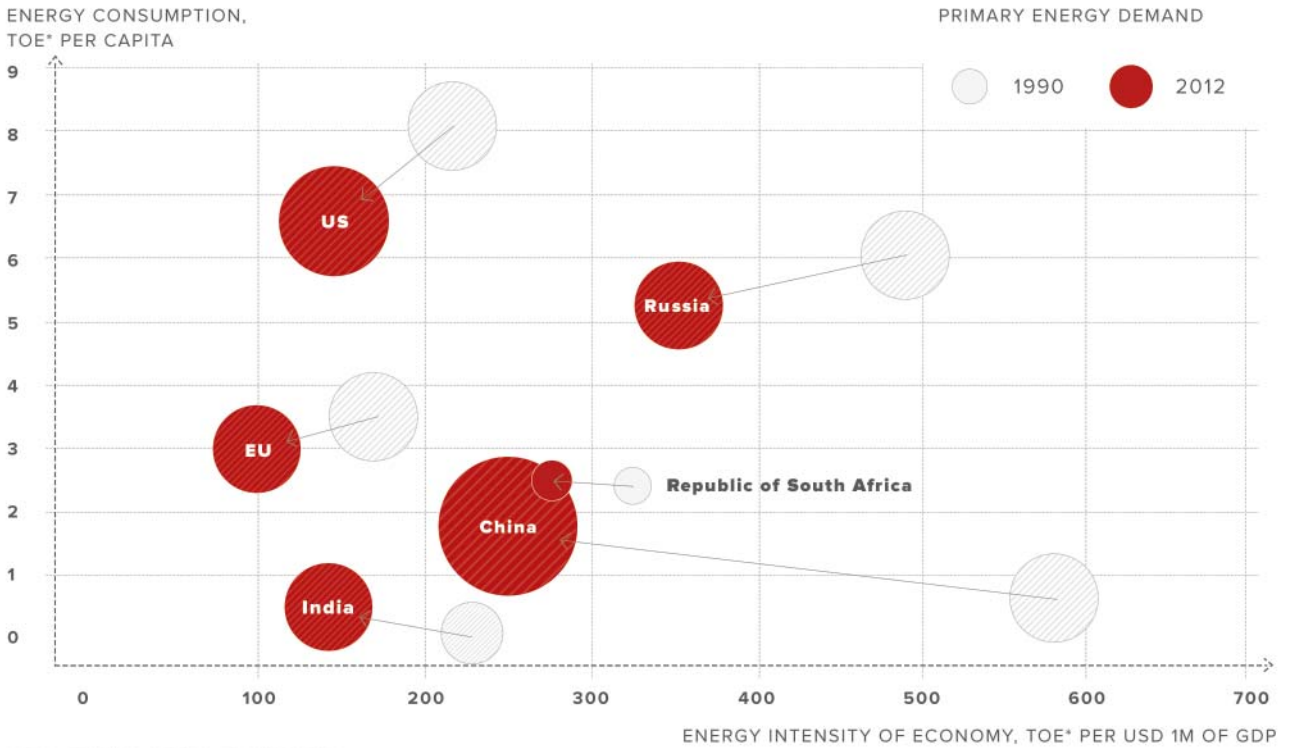
[18] PKN ORLEN's calculations based on Eurostat data: http://ec.europa.eu/eurostat/statistics-explained/index.php/Coal_consumption_statistics

Because of delays in development of energy infrastructure, the energy sector in some of the Member States is very disadvantaged. According to EC studies, the major challenge for some EU states is their inability to transmit renewable energy from its sources to where the actual demand occurs, which prevents full utilisation of that energy. According to the Commission, investments in energy infrastructure necessary to overcome the problem will drive up costs to end-users by a mere 1%, as energy efficiency will be further enhanced, differences in energy prices will decrease on the back of market integration, and energy from renewable sources will be better managed.

The EC's Energy Strategy until 2050 assumes that transformation towards safe, competitive, low-emission energy generation will require high expenditure on construction of production capacities, transmission networks and other infrastructure, development of new transport technologies, and improvement of energy efficiency. These efforts will consume approximately 1.5% of EU-28's GDP until 2050. Already until 2020 the EU should invest approximately EUR 1tn to improve the security of supplies, reduce energy intensity, and improve energy competitiveness and efficiency.

EU ECONOMY IS A LEADER IN TERMS OF ENERGY INTENSITY COMPARED WITH OTHER LARGE ECONOMIES

EU'S PER CAPITA ENERGY CONSUMPTION AND ENERGY INTENSITY COMPARED WITH OTHER ECONOMIES



* TOE: TONNE OF OIL EQUIVALENT

SOURCE: HTTPS://WWW.IEA.ORG/NEWSROOMANDEVENTS/GRAPHICS/2014-08-19-ENERGY-CONSUMPTION-PER-CAPITA-AND-ENERGY-INTENSITY.HTML

Despite the urgent need to modernise its generation assets, the uncertainty of economic growth, combined with oil and gas price fluctuations, has discouraged investments in generation capacities – the current level of energy investments in the EU is among the lowest in ten years. But investments must not be postponed. Lower oil and gas prices and the influx of cheap coal from the US have had an effect on the pace of EU RES investments, which in 2014 grew by as little as 1% on 2013, and even fell in some Member States. By contrast, 2014 RES investments worldwide grew by as much as 17%, to USD 270bn[19]. This clearly shows that an environment conducive to such investments must be created. However, large amounts of subsidised energy have adversely affected the mechanisms of wholesale market in the EU, and conventional power generation struggles to compete with subsidised green energy, which has priority access to the power grid. On the other hand, however, backup for renewable sources, in the form of more stable power sources such as gas-fired plants, is necessary. Neighbouring Member States are reluctant to accept temporary oversupply of foreign green energy, and this does not help further market integration.

The overall energy intensity of the European economy has been reduced mainly as a result of energy efficiency improvements (by both end users and the power generation sector), the larger share of RES in the energy mix, and structural changes in the economy. These changes involve shifting the EU's economic focus from the manufacturing to services, and from highly energy-intensive sectors of the economy to more energy-efficient industries. This is important because energy efficiency is frequently referred to as a 'hidden' fuel – reducing energy consumption per unit of GDP not only improves the competitiveness of an economy, but also contributes to lower CO_2 emissions per unit of output.

According to a 2014 research by the American Council for an Energy-Efficient Economy, of the 16 regions and countries that had delivered the most effective energy efficiency improvements, five were EU Member States, with Germany being number one and Italy – number two. However, although the EU's economy is less energy-intensive compared with the US or Chinese economies, it still loses out on final energy prices.

[19] FS-UNEP Collaborating Centre for Climate and Sustainable Energy Finance, Global trends in renewable energy investment 2015, p. 13

GERMANY IS A GLOBAL LEADER IN ENERGY EFFICIENCY

COUNTRIES WITH HIGHEST ENERGY EFFICIENCY SCORES

ENERGY EFFICIENCY SCORE

ACTIVITY DIMENSIONS

TRANSPORTATION

INDUSTRY

BUILDING TRADE

NATIONAL EFFORTS

SOURCE: PKN ORLEN'S ANALYSIS BASED ON AMERICAN COUNCIL FOR AN ENERGY-EFFICIENT ECONOMY DATA

II. TOWARDS A MORE EFFECTIVE AND SUSTAINABLE ENERGY POLICY

There is a general consensus that the European Union should take effective steps at the internal and international levels to reinforce its position on the energy market as a whole. Implementation of the European strategy towards a secure, competitive and sustainable energy market is a pre-requisite for ensuring economic growth in the EU and enhancing its competitiveness. A united Europe must further improve its energy efficiency, build a robust RES market, diversify the supply of energy carriers, promote more active approach to using its own conventional and alternative fuel sources, enhance joint coordination of the climate and energy policy, and adopt a consistent strategy vis-à-vis third-party energy suppliers.

The need for coordination is of particular importance. Over the past decade, implementation of the energy and climate package has become a cornerstone of the EU's economic policy, but it has never been thoughtfully coordinated with other key areas such as the single market, price competitiveness, or security and diversification of energy supplies. Rising international tensions have only accelerated the inevitable: namely, the need to adopt a comprehensive energy strategy.

The European Union is built on four cornerstones -- the free movement of capital, people, services and goods. Of these, the last one, at least with respect to the free movement of key energy resources, encounters a number of infrastructural obstacles, which only now are being slowly eliminated. Further successful development of the common EU energy market will hinge, to a large extent, on whether the EU is able to address the vast disparity between the levels of development of market infrastructure, which still persists in the energy sector between Western and Eastern Europe. The scale of the disparity is evident on the gas market. In the 'old' EU 15 countries, nearly 80% of the total natural gas volume is purchased on the internal market, while only 20% is delivered under long-term contracts. In the countries which joined the EU in 2004, the proportions are reversed, with 80% of the total gas volume covered by long-term contracts.

Security of the European energy market will also require transparency of contracts signed by individual Member States, with special emphasis on gas contracts. It will also require understanding of the importance of European solidarity in this strategic area. The desired outcomes should include higher flexibility in selecting energy suppliers, strengthening of the European Union's negotiating position, as well as higher price competitiveness and effectiveness of European economy. In business, the Chinese word for 'crisis' is often quoted, as it consists of two characters: one signifies 'danger', and the other one stands for 'opportunity'. Today's geopolitical situation in Europe is extremely complicated, with one crisis evolving into the next since 2008. However, as the Chinese ideogram suggests, a crisis drives change, which offers an opportunity for the better: namely, for a fresh start.

The European Commission has adopted the strategy for building the European Energy Union and declared that the overriding objective of the new energy package is to ensure secure, sustainable, competitive and affordable supply of energy to European consumers. There is a general consensus that this will require a profound transformation of the European energy sector. We should take the plans adopted by the European Commission in good faith, including the plan for accelerating construc-

tion of infrastructure connections, ensuring full implementation and strict enforcement of the legal facilities supporting infrastructural projects in the energy sector, and ensuring that all contracts signed with non-EU suppliers comply with the EU objectives. However, those plans do not provide for the establishment of an institution which would be responsible for joint gas purchases across the EU, as proposed by Poland. Instead, the EU will 'consider the options concerning the voluntary mechanisms of demand aggregation, ensuring full compliance with the regulations of the WTO and the EU regarding competition'. Even though this provision is by no means a breakthrough, it has still raised protests in some Member States which choose to stay focused on their short-sighted economic interests. Joint gas purchasing would mean that the European Union represents a single large European market in negotiations, thus bringing benefits for the entire Community in the form of lower prices, but a single price might be still higher than the prices currently secured by the Member States with highly diversified sources of supply. Against this backdrop, the concept of joint gas purchases proposed by Poland should be given a thought in a broader context of energy solidarity, which precludes a situation where certain Member States gain benefits at the expense of others. It is of key importance that EU institutions change their standpoint on the European energy sector and adopt a more holistic view, embracing also Central and Eastern European countries. This would offer more opportunities for building alternative routes for importing energy resources to Europe and would facilitate growth of the internal energy market.

ORIGINS OF THE EUROPEAN ENERGY UNION

The energy sector has been at the centre of attention since the very beginning of the European Communities. In 1951, the European Coal and Steel Community was established, followed by the European Atomic Energy Community (Euroatom) in 1957. At the heart of early EC policy was the need to secure the supply of strategic energy resources necessary to rebuild industry in Europe. This was the same reason that prompted European integration in the first place – the strategic importance of the energy sector to the Member States. Most electricity and gas markets in Europe had been monopolised for decades, and governments were reluctant to relinquish control. Due to divergent interests and the perception of energy policy as a key element of national sovereignty, governments were loath to permit EU institutions to interfere with their own energy plans. Each member state created an energy mix and built transmission infrastructure of its own, limiting the EU's ability to work as a community and further entrenching the divergence of interests.

The oil shock of the early 1970s provided an incentive to start thinking about energy as a matter of supranational importance. The crisis brought to light the challenges posed by the entire Community's dependence on external energy supplies. However, despite the establishment of the International Energy Agency (which stands independently of the European Communities), and the unanimously professed need for cooperation, the Member States would still reject any ideas of close cooperation. Despite attempts by the Commission to include a separate chapter devoted to the energy sector in the Maastricht Treaty, Europe came no closer to reaching a common position than before, in either this or the two treaties that followed (of Amsterdam and Nice).

Nonetheless, successive EU directives implemented since the mid-1990s have gradually opened and integrated the gas and electricity markets. As a result, laws regulating the common EU market have slowly increased the interdependence of the Member States' energy supplies and have helped achieve a common energy policy in this important

area. However, despite implementation of further electricity and gas directives – including adoption of the Third Energy Package, which deregulated energy trade in the EU and established the European Agency for the Cooperation of Energy Regulators (ACER), barriers to full market integration still remain, including not only the lack of appropriate transmission infrastructure, but also the short-term interests of the Member States, which prevent transposition of the Third Energy Package into their respective legal frameworks.

Even so, the next time that the supply of gas was interrupted, the EU Member States were unable to speak with one voice and support each other. Following the gas crisis in 2006, when Russia cut gas transit via Ukraine, the then Polish Prime Minister Kazimierz Marcinkiewicz proposed a 'musketeers' pact', wherein EU members would unite in the face of threats to their energy supplies, including those caused by the political motivations of energy suppliers. The proposal failed to win support, as the 'old' EU states decided that negotiations with such suppliers would be more effective.

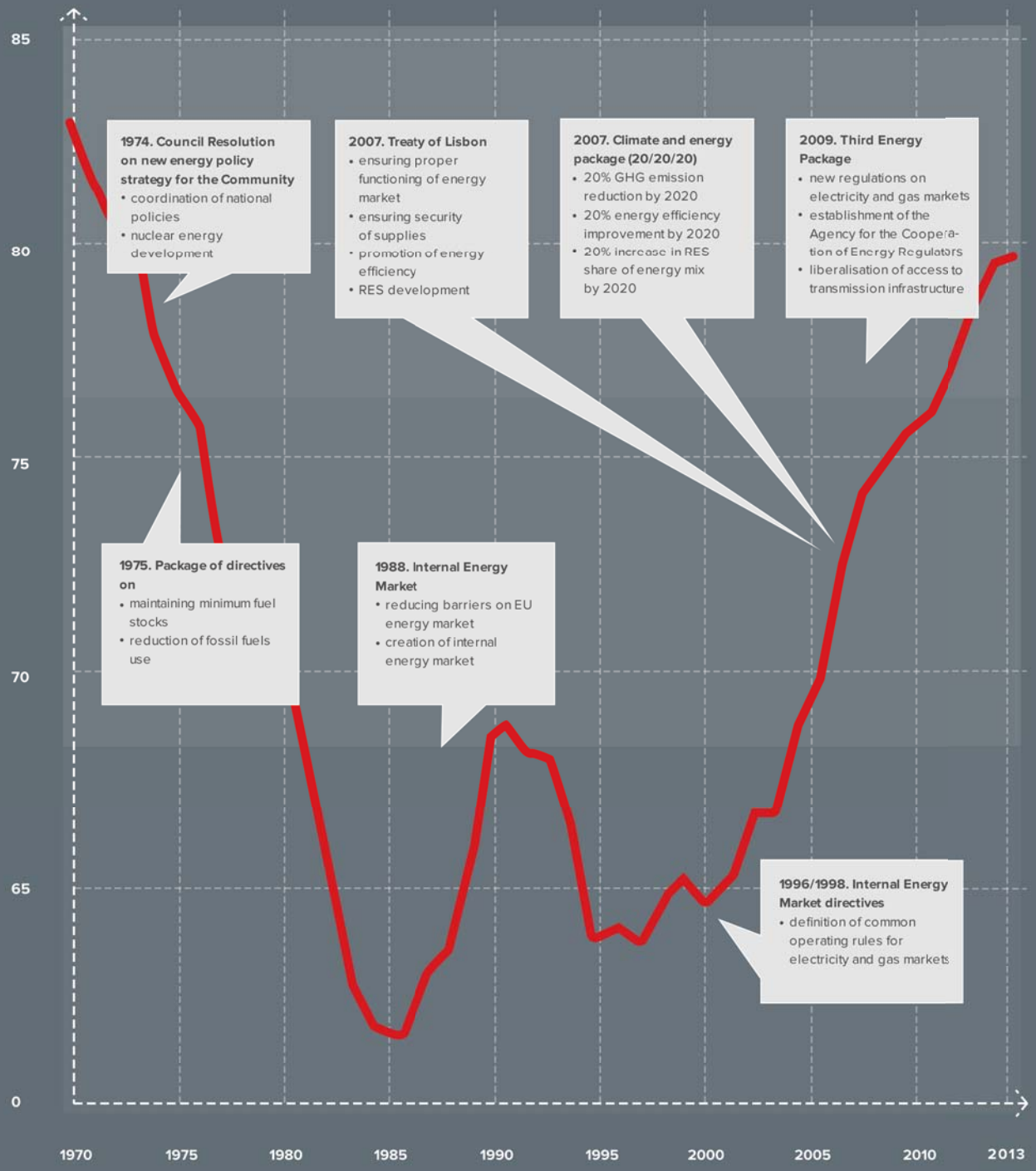
Still, the 2006 crisis did accelerate the preparation of a new energy policy. The same year, the European Commission presented the Green Paper, in which six priority areas were agreed upon: competitiveness and an internal energy market, diversification of supply sources, solidarity and prevention of supply crises, coping with climate change, technological progress and innovation, and uniform external energy policy. In 2007, the heads of the EU's governments accepted a new European energy policy, which provided for strengthening of the common market, joint work on expanding electricity interconnections, and promotion of renewable energy sources. Specific regulatory proposals were then approved at the Euro summit held in 2008 in the form of the highly expensive energy and climate package, designed to reduce greenhouse gas emissions by 20% by 2020, raise the share of renewable resources in the EU energy mix to 20%, and improve energy efficiency by 20% (hence its alternative name, '3x20%'). Each member state was assigned an individual RES target, and different greenhouse gas emission reduction targets were specified for sectors covered by the EU ETS scheme (power generation and industry), as well as for sectors outside the scheme.

Another gas crisis in January 2009, when gas deliveries trans-shipped through Ukraine were cut off by Russia for two weeks, prompted the European Union to introduce first legislative mechanisms to enhance gas market security, including standards governing reserve stocks, infrastructure, and mandatory national action plans in case of supply disruptions or gas demand hikes, which were enacted in parallel with a stepping-up of investments in LNG terminals and the establishment of reverse flow arrangements. But the Member States continued to work independently of each other on new gas transit routes from Russia – Germany launched gas imports through the Nord Stream pipeline, while Italy, Bulgaria, Hungary, Serbia and Slovenia embarked on the South Stream project[20]. These moves sparked controversy as their sole purpose was to change the transit routes.

[20] The South Stream project has been put on hold in 2014

THE DIMENSION OF THE EU ENERGY POLICY HAS EVOLVED SINCE 1970

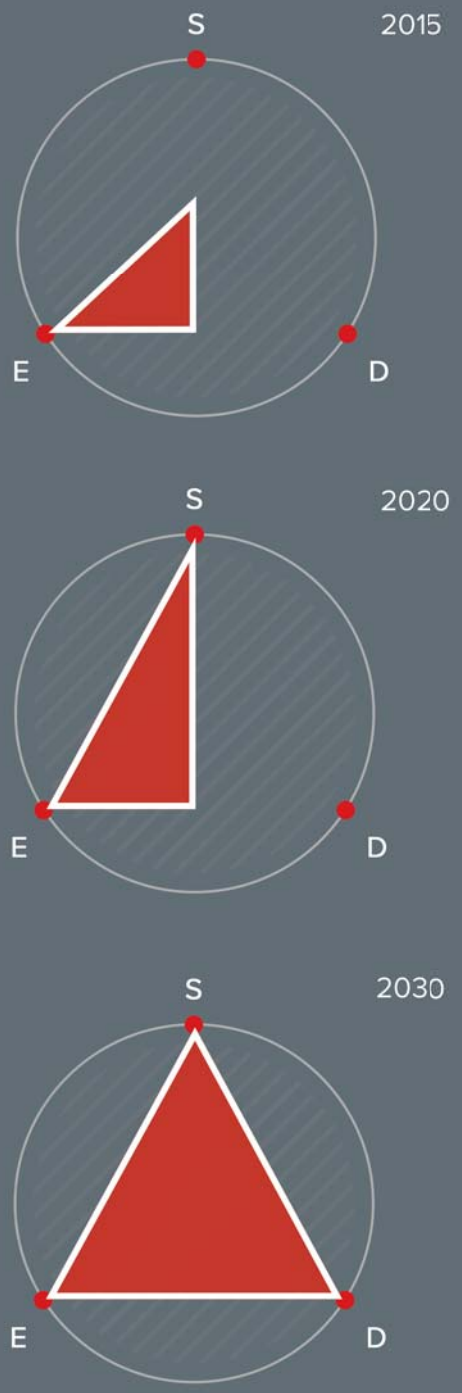
DIMENSION OF EU ENERGY POLICY COMPARED WITH THE LEVEL OF DEPENDENCE ON OIL AND GAS IMPORTS IN 1970-2013



SOURCE: PKN ORLEN'S ANALYSIS

EVOLUTION OF EU ENERGY POLICY DIMENSIONS

SECURITY
ENVIRONMENT
DEVELOPMENT



SOURCE: PKN ORLEN'S ANALYSIS

The introduction of a separate chapter on energy in the Lisbon Treaty marked the symbolic beginning of a new stage in European integration. The pursuit of deeper integration of EU energy markets and expansion of its transmission infrastructure in a spirit of solidarity between Member States was written into the document. The Lisbon Treaty was the first important document to contain a general statement of the EU's joint responsibility for ensuring energy security, although the individual Member States reserved the right to define their energy mix policies independently, and to freely use indigenous energy resources. It was a general, yet landmark, statement on security, largely spurred by growing concerns among Member States over stability of the gas supplies from the east of Europe following the Russian-Ukrainian gas crisis of 2006. The crisis and subsequent gas disputes had laid bare the stark lack of cohesive energy security mechanisms, and had caused many European capitals to take renewed interest in the matter. Besides rising energy prices in the EU and the widely-recognised need to cooperate on climate protection, it was the recent security of gas supplies that became the trigger for various proposals to tighten the energy partnership between Member States, and to adopt a pan-European energy policy. The 2010 proposal to establish a European Energy Community by the then President of the European Parliament Jerzy Buzek and former EC chief Jacques Delors should be interpreted in this context. Critical of the EU's previous efforts in this area, they called for creation of 'a community designed to deliver a strong and effective common energy policy'.

EXCERPT FROM ARTICLE 194 OF THE LISBON TREATY

In the context of the establishment and functioning of the internal market and with regard for the need to preserve and improve the environment, Union policy on energy shall aim, in a spirit of solidarity between Member States, to:

a) ensure the functioning of the energy market;

b) ensure security of energy supply in the Union;

c) promote energy efficiency and energy saving and the development of new and renewable forms of energy;

d) promote the interconnection of energy networks.

Presented below are the priorities of each stage of the EU energy policy's evolution[21]:

Objectives defined in the 1960s (scheduled for implementation by 1985):

- to increase the share of nuclear power in the energy generation and consumption mix;
- to increase coal and gas production capacities;
- to reduce dependence on imported energy resources;
- to increase the share of electricity in total energy consumption.

Objectives defined in 1979 (scheduled for implementation by 1990):

- to reduce energy consumption (per unit of GDP);
- to reduce the share of oil in the energy consumption mix;
- to increase the share of nuclear power in the energy mix;
- to promote renewable energy sources.

Objectives defined in 1986 (scheduled for implementation by 1995):

- to keep oil consumption at current levels and to reduce dependence on oil imports;
- to keep gas consumption at current levels;
- to reduce the share of hydrocarbons in the energy generation and consumption mix.

Objectives defined in 2007 (scheduled for implementation by 2020 – known as the climate and energy package):

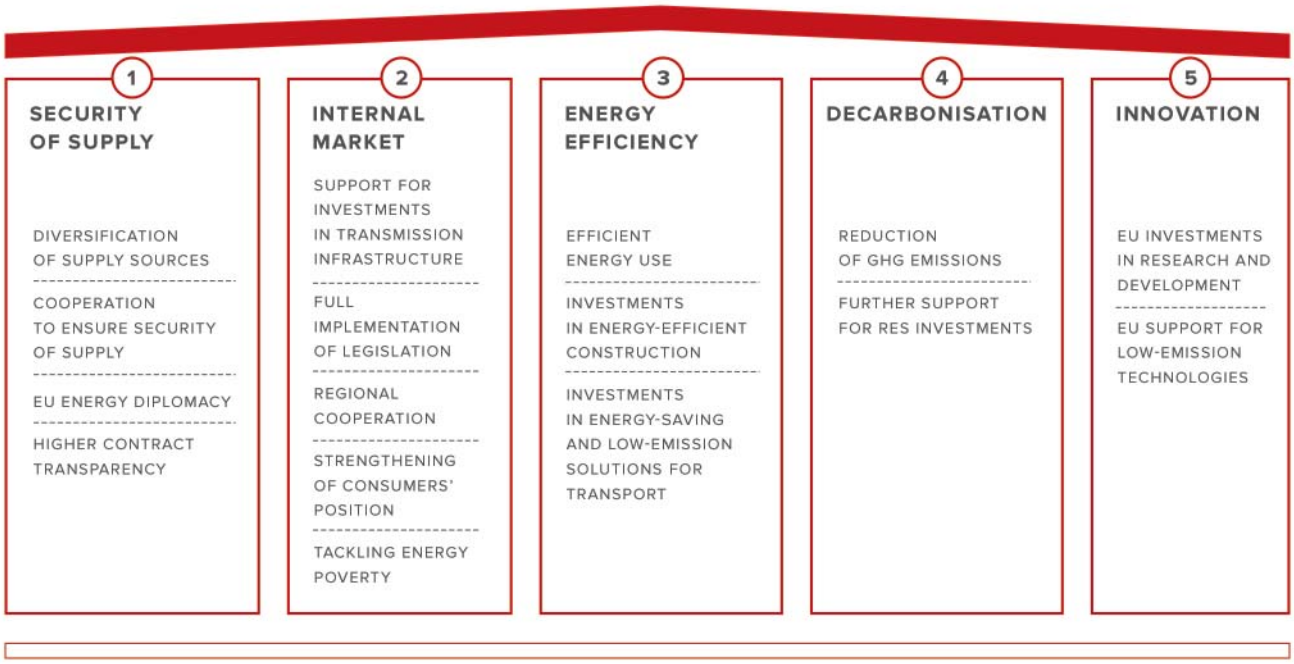
- to create an internal energy market;
- to improve energy efficiency;
- to increase the share of renewable energy sources in the energy mix;
- to pursue environmental protection, with the primary goal of reducing carbon emissions;
- to further secure fuel supplies.

THE EUROPEAN ENERGY UNION

The solutions adopted and investment projects initiated after the 2009 crisis have provided the EU

[21] Rafał Riedel, Supranationalisation of Energy Security in Europe. Theoretical study, Centrum Europejskie Natolin, File 40, Warsaw 2010, pp. 28-30

ENERGY UNION PILLARS



SOURCE: PKN ORLEN'S ANALYSIS

with better protection against potential gas supply disruptions. However, fast-paced changes in the global economic and geopolitical landscape have put Europe under pressure to take further steps to enhance its energy security.

Poland has again been an active participant in the debate. In April 2014, Donald Tusk, the then Polish Prime Minister, put forward an initiative to create an Energy Union founded on six pillars: development and financing of infrastructure; creation of a mechanism of solidarity; strengthening of bargaining power with external suppliers; development of indigenous energy sources; diversification of oil and gas supplies; and strengthening of the Energy Community.

In response to the growing criticism of the existing inadequate policy and the challenges facing the EU in its efforts to improve energy security, in February 2015 the European Commission unveiled a draft strategy for a European Energy Union. Although the draft varies from what Mr Tusk had first in mind, it still presents an opportunity to improve energy security in Europe. Compared with the Polish proposal, this new concept shifts its focus from security of supplies toward higher energy efficiency and a low-carbon economy, which stands for security of long-term growth. But it contains one critical point which is likely to undermine the position of the dominant energy suppliers – the European Commission is to be granted the right to inspect gas contracts with external suppliers. Initially, 13 Member States objected to the proposal and wanted the contract transparency to be limited solely to intergovernmental agreements (some did so because of their free market-oriented agendas and aversion to the idea of bureaucrats reading confidential documents, others did so in service of their own particular interests). Ultimately though, everyone agreed to the provision, and this has opened the way for the European Commission to have increased oversight

of commercial contracts. The legislative details of the proposal will be announced by the European Commission in the next few months, which are also bound to see the EU Member States fighting the decisive battle for what the Energy Union will ultimately look like.

The goal of the Energy Union proposed by the European Commission is to enhance long-term energy security based on thorough modernisation of the single market by eschewing the narrow focus of national interests in favour of broader cooperation, removing barriers to the free flow of energy between Member States, and bringing of consumer interests into the equation by introducing competitive energy prices. On its part, the European Commission has supported a weakening of the market position of the EU's gas suppliers, and a focus on development of alternative energy sources. Five key, and interconnected, areas have been identified:

1. Security of supply;
2. Uniform internal energy market;
3. Energy efficiency;
4. Decarbonisation;
5. Innovation in the energy sector.

One cannot but notice that these areas cover all five targets of the 2007 Energy and Climate Package listed at the end of the previous section. Only the order of priority has changed, with energy security advancing up to the top of the list, from its bottom. Fears that the European Commission's new approach to energy policy is merely a superficial change should therefore not come as a surprise, and the issue at stake is worth fighting for.

The energy sector could be the key driver of the European economy, provided that we Europeans recognise technology's leading role in the process and introduce appropriate measures to support its development. The rules of economics are unrelenting. In a globalised world, even the most affluent economies cannot afford to tolerate the threat to their competitiveness from excessive energy prices, regardless of whether their citizens mind paying them. As a result of the globalisation of the economy and the energy sector, prices of globally-traded products, as well as energy prices set on international markets, are similar for everyone – the differences lie in the energy and labour costs. Countries with lower cost-effectiveness will invariably face erosion of their competitive position. True, the position can be defended if higher energy costs per unit of output are offset by lower labour costs, but this can only be achieved if the rate of growth of nominal wages is controlled so that it remains optimally below the productivity growth rate. This measure is unlikely to win long-term social acceptance. In the globalised economy and energy sector, the economic and social consequences of the choices we make are not determined solely by our decisions; they are also strongly affected by the actions of others. This problem is perfectly illustrated by the revival of the American industry in recent years, fuelled by low energy costs made possible with the extraction of natural gas and crude oil from shale.

Although the majority of the Energy Union's components can already be found in EU legislation and the commitments of individual Member States, the real breakthrough comes in the form the Commission's appeal to turn away from narrow national interests in favour of closer coordination and cooperation -- a consequence of the growing awareness of the enormous costs and risks associated with the lack of an integrated energy framework.

THE EUROPEAN ENERGY UNION FROM THE PERSPECTIVE OF MEMBER STATES – RESULTS OF QUALITATIVE RESEARCH

The concept of the Energy Union as presented by Donald Tusk in spring 2014 was met with differing opinions. When the European Commission looked at the proposal again, making it one of the key items on its agenda for the coming years, it became clear that the project would be an important subject of negotiations in the forthcoming months. As is often the case in such situations, various groups in individual Member States present their own views on the project, often evaluating the views of other members on the basis of speculation, stereotypes and incomplete information.

Together with PKN ORLEN, the Institute of Public Affairs in Poland (Instytut Spraw Publicznych or ISP) conducted a research project entitled 'Energy Union -- the perspectives of Poland, Germany, France, and the United Kingdom', to assess the chances of implementing a common Energy Union in Europe[22].

The concept

The project comprised several in-depth expert opinion polls, conducted in France, Germany, Poland and the United Kingdom in the period from February to April 2015 among representatives of the public administration (ministries of foreign affairs, economy, environment), the energy industry (energy companies and industry associations), and environmental protection groups. Surveys were also carried out among analysts representing independent research institutions, scientists and journalists specialising in the field. The researchers took steps to ensure the involvement of the broadest cross section of respondents in all of the countries, to obtain a meaningful spectrum of opinions from all key players in and around the energy sector. Although respondents did not provide their personal details, they were asked to specify which group they represented. This methodology highlighted the differences between the individual respondent groups and the issues of most importance to them, without prejudice to the interests of the other groups.

Energy security

The research project has revealed striking differences in how the objectives set before the Energy Union are perceived. Respondents from Western European countries (Germany, France and Great Britain) do not share Poland's concerns regarding the diversification of supplies, since their own energy infrastructure is better developed and they already have diversified sources and energy resource supply contracts executed on favourable terms, including flexibility in natural gas purchases. The Western European states focus chiefly on completing the establishment of a single energy market, which is expected to result in greater availability of energy to all users. In Poland, however, respondents emphasise the importance of security of supply of energy resources, especially natural gas. They do recognise the potential benefits of a single energy market, but they do not view it as a priority.

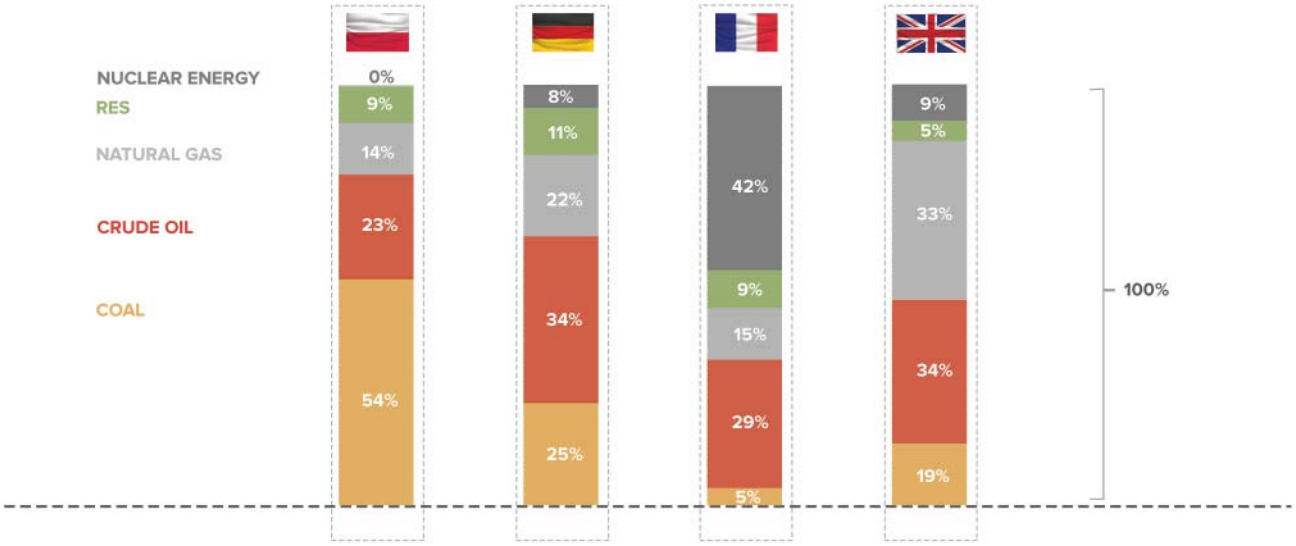
According to German respondents, energy security means uninterrupted supply of electricity, but this is understood mainly as a technical concept rather than a geopolitical one. The country's concerns lie in the fact that due to, for instance, the poor performance of RES, or unpredictable weather conditions, there may occur periodic energy deficits. Hence Germany prioritises the development of infrastructure, interconnectors and technologies to ensure their energy supply. Germany does not feel threatened by the risk of interruption to its oil and gas supply, especially to the extent that the amounts of energy supplied to consumers would be adversely affected.

[22] The complete findings are presented in the report 'Energy union – the perspectives of Poland, Germany, France and the United Kingdom', Institute of Public Affairs in Poland, Warsaw 2015

ENERGY MIX IN POLAND, GERMANY, FRANCE AND UK

ENERGY CONSUMPTION BY FUEL TYPE

%



SOURCE: PKN ORLEN'S CALCULATIONS BASED ON EUROSTAT DATA:
HTTP://EC.EUROPA.EU/EUROSTAT/STATISTICS-EXPLAINED/INDEX.PHP/CONSUMPTION_OF_ENERGY

Germany's approach to diversification is twofold. Firstly, as far as diversification of energy suppliers is concerned, Germany believes that its gas supplies are already diversified, with the share of gas in total primary energy consumption at 22%, and in electricity generation – at 9%. This is why this issue is absent from German political debate. On the other hand, the Germans are aware of how their country differs in this respect from others, for instance Poland. Therefore, they point to the development of infrastructure (construction of interconnectors, reverse flow capacities, LNG terminals, and gas storage facilities) as a way of expanding the portfolio of suppliers. Based on this standpoint, Germany also calls for partnering with other gas suppliers, such as the US, preferring greater dependence on this source of supply than on the Caspian Sea countries. The other aspect of diversification is about the energy mix and involves replacing fossil fuels with renewable energy sources.

The French respondents emphasised that ensuring secure supplies of energy carriers is not merely an economic issue – it also has a geopolitical dimension, requiring wide-ranging negotiating and diplomatic efforts. Thanks to its extensive nuclear power infrastructure, France is largely self-sufficient, although does import oil, natural gas and coal. The position of the French authorities is that energy independence should be built by increasing energy efficiency, limiting fossil fuel imports and developing RES.

According to France, countries with a single strong supplier must take urgent diversification efforts. The French believe there is no serious risk of interruption of gas supplies from Russia because the EU has plenty of gas suppliers to choose from, while Russia may find it difficult to secure new customers if it decides to cut its customers off. Secondly, in their

PKN ORLEN EXPERTS' OPINION

- Energy security depends on the quality of international relations between the EU and rest of the world, but also within the EU.
- Trust, the key to security, is won through energy solidarity.
- There is a co-relation between security of supply and energy price (the price includes the cost of security). The oil market is an example at hand.

opinion, when interruptions did occur in 2006 and 2009, Europe rose to the challenge and learned its lesson, which resulted in the drafting of an action plan to be followed in case of further interruptions to its gas supplies. However, French experts point out that the European Commission should make greater effort to ensure that every country exposed to the risk of gas supply interruptions not only has an effective action plan in place, but also the necessary tools (LNG terminals, gas storage capacities, trans-border interconnections). According to the French, Russia will remain a key supplier to the EU states and in a longer term trade relations with this country can be improved. France also points to the need to carefully plan expensive infrastructure investments that are to increase the diversification of natural gas supplies. Some proposals receive criticism as financially unviable and offering little in the way of effective use (e.g. the proposal to build a gas pipeline running through France to supply gas from LNG terminals in Spain to Germany and Central and Eastern Europe).

UK experts interviewed by the ISP welcomed the more active discussion on the future of a common energy policy in the EU, and thought that it too would help in this area. **The UK believes that further energy market liberalisation and decarbonisation of the EU economy should be the key objectives of the EU's energy policy.** Although natural gas accounts for 30% of the UK's energy mix, half of the demand is satisfied from domestic sources, with imports coming mainly from Norway, a predictable partner. Moreover, having built three LNG terminals already, for several years now the UK has been able to wield considerable discretion in selecting its gas suppliers. As a result, it is rather distanced from most of the proposals put forward in the Energy Union debate on enhancing security through joint gas purchases, or getting the European Commission involved in gas contract negotiations.

The British respondents strongly approved of further expansion of energy infrastructure in Member States as a key element of energy market liberalisation in the EU, which should result in practical energy security. The UK experts believe that a free market and the absence of technical barriers will lead to the unlimited flow of energy streams, more competition, and consequently – affordable energy in the EU. The idea of joint energy purchases is treated with restraint, as it is seen as a potential threat to liberalisation of the energy market, instead tying it back to fossil fuels.

In Poland, energy security, particularly the security of gas supplies, was described by respondents as one of the priorities. This position follows from the belief, prevalent in Poland and the CEE region, that neither bilateral agreements nor a free market can guarantee secure energy supplies. The principal

idea advocated as a security measure is to make energy supplies partly the responsibility of the entire Union. Poland also highlighted such matters as the expansion of energy infrastructure, stable and reliable energy purchases from EU partners, and energy efficiency.

According to representatives of Poland's public administration, security policy is more about the security of energy supplies from third countries, and less about climate policy. Similar opinions are voiced by representatives of the energy sector, for whom the link between energy security policy and climate policy is not seen to be as strong as it is by the EU institutions. Poland emphasised the security of physical supplies achieved through diversification of energy sources, infrastructure development, and maintenance and expansion of domestic sources, with a particular focus on the modernisation of its coal production sector.

Poland attaches great weight to the diversification of energy sources, suppliers and import channels, as reflected in its policy of gradually reducing Russia's role as its main gas supplier. 'We are known in Europe for our advocacy of diversification', remarked one Polish government representative engaged in EU-level negotiations. In this area, Poland also points to the need to create solutions that would foster cooperation among the Member States in their dealings with external partners, and calls for an increased role of the European Commission in diversification-oriented initiatives. The Polish respondents identified energy efficiency improvements as a source of great potential in improving Poland's energy security. In line with EU documents, energy efficiency is to be increased 27% by 2030, and in 2014 - 2020, individual EU Member States are expected to demonstrate a year-on-year decline in energy consumption of not less than 1.5%.

Uniform energy market

The opinions presented during the ISP interviews built a picture of the European energy market that falls way short of the Member States' expectations. Respondents from all of the countries and surveyed groups stressed the need to complete the implementation of the Third Energy Package. Many expressed the view that it would be sufficient to put into effect the existing laws on the single energy market and its liberalisation to achieve meaningful progress in the operation of the energy markets.

The way the EU energy market is currently run is a subject of severe criticism in German business circles. Too much state intervention in areas which should be fully controlled by companies on the one hand, and the lack of a uniform framework for energy trading on the other, make the European energy market uncompetitive, and this undermines Europe's energy security. Licensing, assistance provided to fully depreciated power plants, and unjustified subsidies all spoil the market, and call for the introduction of transparent support rules across the EU. Other sources of obstacles to free energy trade within the EU are national regulations, making free trade in gas between countries possible only in theory. Much discontent was expressed about the obstacles created by various EU climatic and environmental requirements.

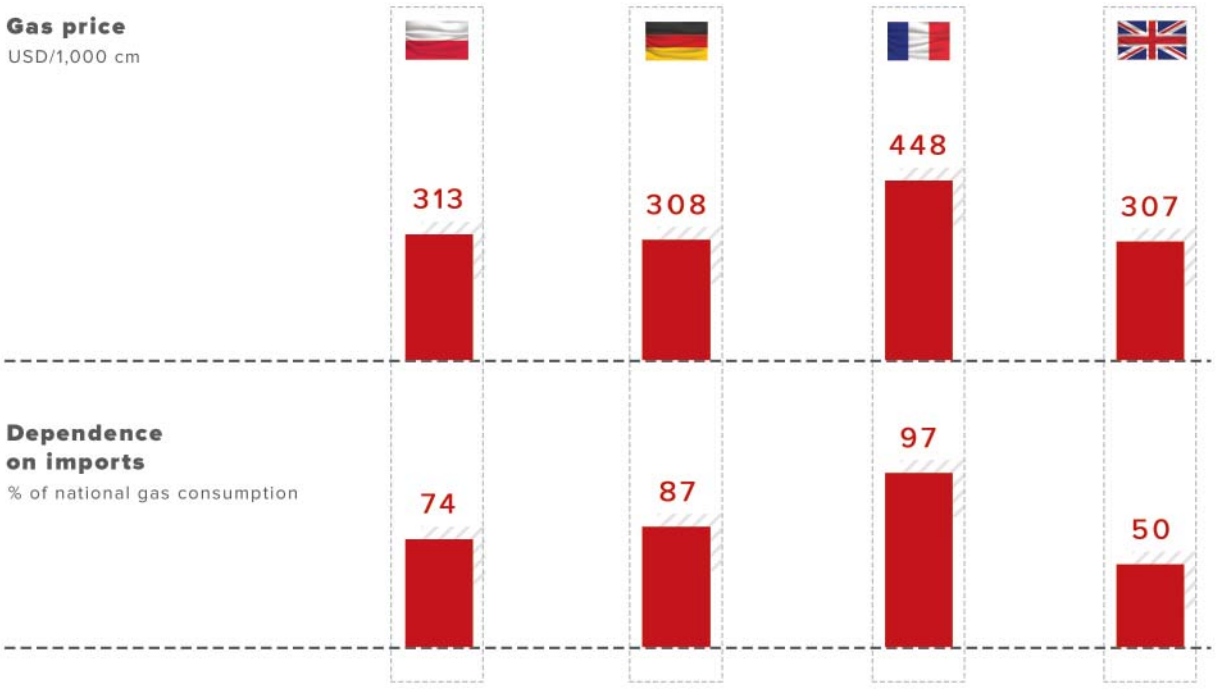
The Germans favour full implementation of the common electricity market, but are against the concept of centralised gas purchases, as this contravenes the principle of competition. Additionally, they pay relatively low prices for Russian gas, and see no threat to the security of gas supplies to their country. The German respondents thought that security in the EU gas sector could be achieved primarily by developing the infrastructure to help finalise the common EU gas market, which has already been developing for a few years, rather than through centrally-man-

aged joint gas purchases. They also believe that extension of LNG terminals, interconnectors and gas storage facilities will strengthen the EU's position in its negotiations with external partners. This is also why they say that gas purchase contracts should continue to be negotiated by national companies. The Germans also pointed out that a centralised purchasing procedure would be too bureaucratic and would ultimately translate into higher prices for consumers. Moreover, the price charged by Gazprom for joint EU gas purchases could end up being higher than that currently paid by Germany. However, with energy security improvements in mind, the EU should ensure that contracts include provisions that guarantee a reverse flow option and discretionary use of the gas post purchase. The EU should also ensure that the terms for which the contracts are executed are not excessively long.

The German respondents generally agreed that European energy infrastructure needs to be expanded. The proposal to expand power grids, along with technological and IT networks, was endorsed by all groups. Except environmentalists, who advocate reducing the use of natural gas, the other interviewees would also gladly see expansion of the gas pipeline network. However, the economic experts continue to find fault with excessive EU co-financing of investment projects, especially those that benefit only one country.

Germans opt for the EU to give priority to investments in gas and power infrastructure development,

GAS PRICES AND DEPENDENCE ON GAS IMPORTS IN POLAND, GERMANY, FRANCE AND UK



SOURCE: PKN ORLEN'S ANALYSIS BASED ON THE EUROPEAN COMMISSION'S REPORT ENTITLED 'EU ENERGY, TRANSPORT AND GHG EMISSIONS TRENDS TO 2050'

which will contribute to further integration of the EU market and prevent gas and power shortages in the event of supply disruptions or grid downtime. According to Germany, developing the power transmission infrastructure will also help better integrate RES generation capacities in the EU. As a result, it will be possible to offset power shortages caused by adverse weather conditions in one location with supplies from other EU regions, within a single network.

Representatives of the French energy sector are in favour of a single energy market, but point to several obstacles to implementation of this plan, particularly energy 'nationalism' and countries making unilateral decisions without wider consultation with their neighbours or the European Commission. The French energy sector representatives, similarly to the Polish and British ones, expect that stability on the energy market should be ensured.

The French are more conservative in their approach to investments in the transmission network, especially on the gas market. According to the French experts, interconnectors should facilitate the functioning of neighbouring countries' markets without upsetting their balance (e.g. through uncontrolled flows of energy from renewable sources). They also pointed out that costly investments in gas infrastructure may seem controversial given the long-term objective of abandoning fossil fuels.

The French respondents thought it necessary for individual countries to better coordinate their actions and consolidate their contingency plans, and that this is one area where EU institutions and organisations, such as the European Commission and ACER, could play a greater role. According to the French respondents, there is also a need for extensive international dialogue, which would take into account the interests of all countries and parties involved. The French experts argued that by sharing information about their energy plans, European countries could solve their regional problems.

To the United Kingdom, the development of transmission infrastructure, including interconnectors, is an inherent part of market liberalisation. **For the British, interconnected markets where energy flows from lower to higher prices is the perfect model fostering competition and offering prospects for price decline.** While the UK is in favour of developing infrastructure that connects markets, it also sees the need to coordinate investments at the EU level.

According to the British respondents, energy solidarity could be achieved through market consolidation, which would facilitate transmission of energy whenever supplies are interrupted to one of Europe's states or regions. The United Kingdom supports development of infrastructure in Eastern Europe, but also emphasises that each country is responsible for improving their own energy security, for example by pursuing higher energy efficiency.

Representatives of the Polish energy sector claim that the European Commission promotes a single energy market only on paper. They allege that EU institutions, primarily the Commission, are once again moving forward and proposing new solutions before there has been sufficient time to comply with the previous legislative obligations, and without thorough assessment of the effects of the existing regulations. The legislative solutions proposed by the Commission have not won much acclaim from the Polish energy sector as it still has concerns about giving more power to the EU institutions.

The proposal to fully integrate the energy market by eliminating infrastructural constraints and standardising laws and regulations was also strongly advocated by the Polish respondents. Institutional and financial support for investments in industrial

PKN ORLEN EXPERTS' OPINION

- Development of industrial infrastructure, including interconnectors, is invariably connected with the concept of a single energy market.
- Uniform energy trading rules are another cornerstone of a single energy market.
- Energy nationalisms – where countries make unilateral decisions without a wider consultation with neighbouring countries or the European Commission – are the most challenging obstacle.

infrastructure (gas pipelines, connectors, and LNG terminals) would be the best safeguard against the risk of supply interruption. Joint development of EU gas infrastructure would not only make it easier to further diversify supplies and improve security, but would also give countries such as Poland a stronger hand when negotiating better prices with their main gas supplier. Likewise, Poland is greatly interested in full implementation of the internal energy market regulations proposed by the EC. The energy security of Poland, as well as other CEE countries, has been greatly improved in recent years by the adoption of the Third Energy Package, which liberalised the European gas market. However, the Polish respondents pointed out that it may be a long time before the proposal to integrate EU energy markets goes beyond mere intentions – 50 years from the establishment of the European Union, a common energy market is still non-existent. The respondents believe that this is due to the strong nationalism demonstrated by the Member States when energy policy comes into play. For many states, a common energy policy is only relevant if they can build their energy sectors on the basis of their own energy resources, and export their surplus energy to neighbouring countries. But this 'solidarity' disappears when it comes to actually accepting exports from their neighbours. This is why Polish energy experts believe that for the time being, the creation of a common energy market seems hardly probable. They suggest that a good approach could be a policy of small steps, providing for the development of interconnections on the electricity market, enabling 10% interconnection rates by 2020. Currently, the interconnection rate between the Polish system and the power systems of its neighbouring countries is 2%. This is why development of interconnections with the German and other EU systems should be actively pursued.

Energy efficiency

Energy efficiency and managing demand for energy is where a broad consensus across the EU can be achieved. Environmentalists and public administration and business circles from all Member States covered by the survey pointed out that energy efficiency and demand management projects are low-cost yet highly effective measures based on innovative solutions such as smart metres and smart grids.

Decarbonisation

In the German approach to the idea of the European Energy Union, the current 2030 climate targets are maintained, the shift from fossil fuels to RES is continued, the Member States remain autonomous in determining their own energy mix, and the degree of the European energy market integration varies.

The German view is that Europe should address the risk of supply shortages by making large investments in RES, which would help the EU to effectively limit its dependence on imports from third-party suppliers. Determined to continue its Energiewende project, Germany voiced definite support for the climate part of the strategy proposed by the Commission – energy efficiency, decarbonisation and promotion of innovation.

On this point, Germany believes that energy security can be achieved when all Member States comply with the provisions of both energy policy and climate policy and adhere to a single consistent framework. In this context, environmental circles perceive the proposed Energy Union concept as a step backward, because of the excessive focus it places on fossil fuels as energy source. On the other hand, the German business community and Christian Democrats are of the opinion that support should also be provided to new low-emission conventional energy technologies, which means 'no' to hard coal and 'yes' to lignite and CCS technology. Nevertheless, 60% of Germans are staunch supporters of the current Energiewende framework, and as much as 92% believe that the development of RES solutions is still important.

Respondents from the French energy sector expressed great disapproval of RES regulation, both with respect to the infrastructure development and coordination of the support systems. **They pointed to the need for a more pragmatic approach to renewable energy,** including support for the most efficient projects and technologies, and even called for gradual downscaling of RES subsidies. Some proposed that the power market mechanisms should be regulated at least at the regional level, rather than individually by each state as they are now. France, with its nuclear-based energy, points out that high subsidies for selected sources create a significant risk of destabilising market prices. With an already well-developed transmission infrastructure, the French have no enthusiasm for the proposal of joint action by the Member States on further integration of the energy market, fearing the costs involved in interconnection development projects. Furthermore, in the context of strong pressure from environmentalists on prioritising the dispatch of 'green energy' in transmission systems, integration of the energy market could actually constrain the potential of the French nuclear power sector. France also strongly believes that the unilateral decisions of the Member States (including the German Energiewende revolution) are causing further disintegration of the European energy markets.

Politicians and businesses are of the opinion that decarbonisation of the energy generation system should be among the principal goals of the Energy Union. Some of the French respondents argued that the excess of instruments and targets provided

PKN ORLEN EXPERTS' OPINION

- Establishment of the internal EU energy market will globalise energy prices. If in the meantime the EU does not take care to reduce energy prices, it will lose competitiveness, thus jeopardising one of the three priorities of sustainable development – sustainable economic growth.
- Steps must be taken to reduce the cost of energy vis-à-vis competition.

for in the 2020 climate package had produced unexpected and inconsistent results. Other energy sector representatives emphasised that an outflow of industry is a dangerous possibility, not only given the requirement to cut CO_2 emissions, but also in light of high RES development costs. The French respondents believed that the EU energy policy must not jeopardise the interests of European energy companies. The concept of the Energy Union should be coherent and accommodate the interests of all Member States. Like the Germans and the UK, some of the French respondents spoke out against consolidating the EU energy mix, claiming it was impossible due to each member state's having a different resource base. A suitable remedy for the diversity of opinions on the common energy policy within the EU should therefore involve increasing the activity of the European Commission in moderating and coordinating the debate and work on the energy policy, finding a common position on key issues, and ensuring effective monitoring and implementation of decisions made and consistency of regulation.

In the United Kingdom, there is a consensus that environmental protection measures should be treated as a priority. **The British respondents argued that each country should be free to pursue its emission reduction targets in accordance with the objectives set under the climate and energy package until 2030.** There is also consensus among all surveyed groups on the necessity of decarbonising economies and making the ETS system more effective so as to increase the price of CO_2 emission allowances and make low-emission technologies a more viable option. The UK is prepared to develop renewable energy sources, but side by side with other low-emission technologies, so as not to tip the balance but to continue ensuring the security of their own sustainable energy mix.

The Polish experts believe that not all EU countries are able to put RES at the heart of their energy policy, as not all of them have appropriate climate conditions to support the development of certain technologies, such as solar and wind power generation. Although this does not mean that Poland should abandon all investment in renewable energy, it should not be linked directly with energy security. Some also suggest that the EU energy policy represents an opportunity for radical action in the Polish energy sector, including its modernisation with a view to enhancing both the sector's economics and energy security. Representatives of Poland's public administration surveyed by the ISP took a neutral stance, aware that a strong focus on climate policy is a necessary condition for finding compromise in

PKN ORLEN EXPERTS' OPINION

- Energy security is a core priority, but it is practically impossible to have it all: security, global climate protection, and low prices. Reducing the cost of environment and climate protection does not have to lead to abandoning the mission of EU's leadership in low-emission economy. But it does require acceptance of the fact that adjustments must be made at a pace suited to the capabilities of individual economies.
- The time horizon for strategic thinking on sustainable development and energy and climate policy must be extended.
- The vision of low-emission economy should define the planned result without, however, imposing the ways of reaching that result.

other areas of the energy sector. The Polish standpoint in this respect is close to that of the French. At the same time, in both countries environmentalists and some of the independent experts and journalists emphasise that there is no turning back from the development of RES, and believe that it is necessary to intensify efforts to pursue this goal.

Poland is playing an important role in the current ETS reform negotiations, as it is set to benefit the most from free CO_2 emission entitlements, which is why the Polish respondents, especially those in public administration, business and politics, had a guarded opinion of the reform. The difference between the European carbon emission market and other markets with similar CO_2 emission allowance prices is a powerful argument. Opposing the idea of stricter environmental protection obligations, Poland instead favours a low-emission economy, as opposed to decarbonisation.

III. ESSENTIAL TOOLS AND ACTIONS

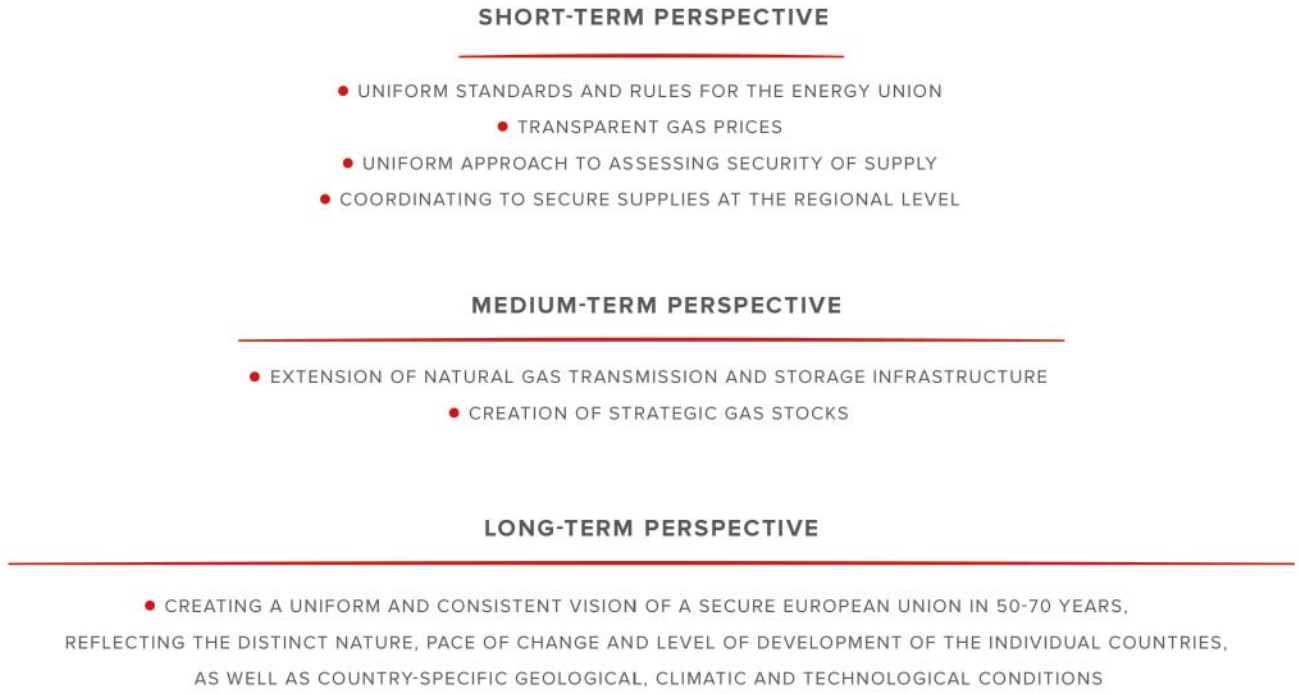
The key objective of the European Energy Union is to ensure access to reliable energy at affordable prices, i.e. the overall energy security, and the EEU provides a sound and solid framework for achieving that goal. However, efforts should focus on selecting adequate and effective tools that would deliver desirable outcomes in emergencies and crises. Care should also be taken to prevent a situation where the goals articulated for the EEU are distorted or dismissed in pursuit of narrow national interests, or in other words the solutions designed for the EEU compound the risk of the EU falling apart. Also, given the very ambitious and cost-intensive climate policy, reduction of energy costs across the EU is a serious challenge.

The planned European Energy Union is based on the single European market, but a successful achievement of this strategy will be nothing but easy. Both the governments and representatives of industry in individual Member States believe in the strengths of their own energy models and generally disapprove of excessive European Commission's intervention in internal energy policies; moreover, they are typically critical of any decisions taken in energy-related matters by their neighbours. They are willing to cooperate only if it brings concrete benefits for them.

In the survey, representatives of the business sector, especially the energy market, have proposed specific measures to be taken in the short-term horizon, including primarily the need to complete implementation of the Third Energy Package, introduction of all grid codes, implementation of the REMIT Directive, and creation of a common power market at least at the regional level. The ETS reform was also listed as one of the short-term targets. Truth is, the European Union has been working on those measures for quite some time, and they are hardly part of the new strategy towards the European Energy Union. Both the business sector and public administration representatives included the need for RES regulation in the list of short-term goals – namely, the rules for RES subsidies, the flow of energy across the EU, and the weight attached to RES energy (currently assigned a priority status). This applies both to large RES producers, such as Germany, and to countries which will bear the brunt of the surplus of green energy on the market. The energy sector is also concerned about further energy price cuts, given that RES energy is produced from free and subsidised sources. However, analysts need to see through a lot of contradictory information and data regarding the cost of energy production, which is distorted by subsidies.

Successful achievement of the European Energy Union will require a number of measures, which we suggest should be broken down into three time horizons based on the degree of flexibility of the energy sector's potential. In the short-term horizon, the proposed adjustments will focus on the available capacities and on the degree of their utilisation. Medium-term actions will include expansion and upgrade of the capacities; the economic factor which will distinguish the medium-term from short-term measures will be the need for capital expenditure. Medium-term plans are therefore in line with the investment cycle, which takes from several up to twenty years, depending on the type of investment project. In that context, long-term measures resemble those defined as medium-term, as they also involve implementation of investment projects; the difference lies in the type of investments. In the medium-term horizon, investments are made in known technologies, whereas long-term projects include the research and development phase followed by the actual launch and commercialisation of new, break-

THREE TIME HORIZONS IN ESTABLISHING THE EUROPEAN ENERGY UNION



SOURCE: PKN ORLEN'S ANALYSIS

through technologies. Experience shows that the full cycle of investments in innovations, from the initial concept up to commercial product launch, takes from 15 to 30 years.

Generally speaking, short-term actions will include certain regulatory changes, investments and modernisations are classified as medium-term projects, and the long-term perspective starts where we invest in the development of brand new technologies which are not yet known. All those horizons share the same starting point, since the achievement of the European Energy Union will require a number of measures included in different time horizons, yet they differ in terms of the time to complete and the degree of uncertainty as to expected outcomes.

Short-term actions include mainly adoption of common standards for import contracts between the EU and third countries, improvement of transparency of gas prices, introduction of a uniform approach to assessing supply security as well as coordination of the activities to secure supplies at the regional level.

Medium-term measures include mainly enlargement of the single European gas market to embrace the CEE region through extension of the transmission infrastructure (the effects of which will be visible only after some time, depending on the investment cycle), as well as expansion of the internal electricity market which should be open to innovations such as new energy storage technologies.

Long-term measures focus primarily on incentives for the development of new, breakthrough technologies, considering that currently available solutions are insufficient to rise to the challenge of building a low-carbon economy. They may bring certain effects over 10 to 15 years, but the only already known technology which would result in a considerable growth in the supply of low-emission energy is nuclear power. Therefore, the European energy and climate policy should drive the development of innovative technologies. We must remember that building a low-carbon economy is essentially a technological challenge.

The remaining part of this report contains proposals for specific actions which we believe are in keeping with the European Energy Union concept. We have focused primarily on short-term measures for two reasons. Firstly, the need for such measures is certainly visible in the CEE region; therefore, CEE countries should present their concrete proposals and rationale to the European Commission, given that no aid or support can be expected from other Member States in that regard, which was clearly highlighted in the above-mentioned survey. Secondly, the proposed measures are a promise for closing the energy security gap resulting from the risk of gas supply interruptions, thus paving the way towards the development of a single energy market in the region. Once the problem of gas supply security is solved, CEE countries can turn their attention to medium- and long-term energy security issues, which are the main area of interest for Western European states, namely the creation of a single energy

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market and development of innovative technologies which will drive energy efficiency of emission-reducing solutions.

SHORT-TERM ACTIONS

Uniform standards and rules

Poland and the other 'new' Member States of the European Union are strongly exposed to the risk of interruptions in their gas supplies from Russia. Mitigating this risk requires urgent action, which has to be taken now. The 'old' Member States are in a much better position when it comes to supply security, as their extensive import infrastructure (import pipelines and LNG terminals) and dense, interconnected transmission networks allow them to pipe their natural gas in from multiple alternative sources. Countries that view the already-implemented idea of a liberalised European market as the means of delivering increased supply security consider common natural gas purchasing to be a step backwards, as it could adversely affect the terms of their business, secured over years of trading with their suppliers. On the other hand, a lack of integrated transmission infrastructure and the absence of market trading mechanisms, yet to be implemented in the 'new' Member States, are still limiting their access to mature and liquid gas markets. For this situation to change, a sizeable amount of investment is required, which will only have a tangible effect years from now.

Despite the practical challenges, the overriding goal of common gas purchasing could be quickly attained by introducing uniform contract standards for gas brought into the EU from third countries, and by requiring both public and privately-owned gas importers to abide by them. To this end, introduction of the following rules seems justified:

- mandate uniform contract standards for contracts of one year or longer;
- provide the supervisory authorities (EC/ACER) with the right to review contractual provisions on an ex-ante basis during negotiations, to check the contract's compliance with EU law, analyse the impact of its execution on EU gas supply security, and ascertain whether the parties to the contract have properly applied the uniform contract standards;
- ensure enforceability by setting up a list of sanctions to be applied in the case of failure to notify the EC/ACER of a negotiated contract or of the signing of an import contract containing provisions that are in breach of EU law (such as no re-export clauses).

A robust European Energy Union would also require:

- implementation of uniform rules of indemnity for gas suppliers from third countries, against unauthorised suspension or reduction of gas supply to a member state under an import contract, where such suspension or reduction could pose a threat to the supply security of that member state, region (group of Member States in a given geographical area), or the entire EU;
- implementation of uniform rules for terminating import contracts, split into fixed-term and indefinite contracts;
- a restriction on the use of ToP (Take or Pay) arrangements under import contracts.

Transparency of gas prices

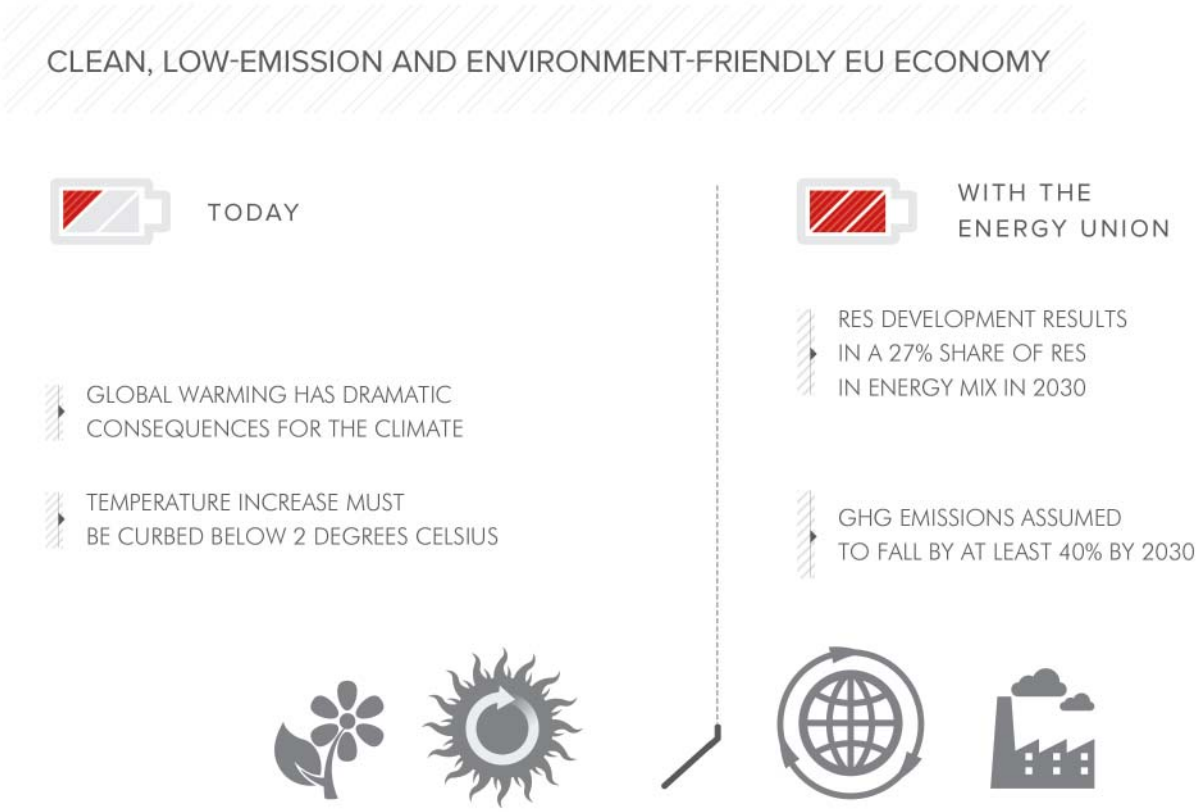
The European Commission and Member States should avail themselves, to a greater extent, of the solutions offered by existing laws, such as Decision No. 994/2012/EU of the European Parliament and of the Council establishing an information exchange mechanism on intergovernmental agreements between Member States and third countries in the field of energy (IGA decision), dated October 25th 2012. This solution would considerably bolster the negotiating position of Member States

vis-à-vis external suppliers, prevent dominant suppliers from differentiating the offered terms of trade and enhance transparencyof the EU energy market. A mechanism to accomplish this goal would be to set minimum transparency requirements for existing import contracts by making disclosure of key contract terms to the European Commission obligatory, which would significantly curtail gas producers' ability to abuse their dominant position.

Uniform approach to assessing supply security

It is necessary to further develop the methodology for assessment of security of gas supply. In autumn 2014, the European Commission carried out a stress test to analyse the resilience of the European gas system, which demonstrated that a more integrated approach to assessment of gas supply security gives a more accurate result. A new assessment standard/ methodology should cover both the adequacy of the infrastructure and the trading conditions affecting the ability to apply the standard to the transmission of gas supplies. This would facilitate comprehensive evaluation of the balance between supply and demand, and help identify any remaining bottlenecks in infrastructure.

It might also be advisable to set new targets for cross-border gas infrastructure, with a view to promoting further integration of markets at the regional level. Such targets have already been proposed by the



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European Commission for power infrastructure. The targets are 10% interconnection of electricity grids across borders by 2020, and 15% by 2030. Similar targets should be set for gas grids to further the integration of markets, with a particular focus on bi-directional (reverse flow) capacities.

Coordinating to secure supplies at the regional level

It is vital that individual countries coordinate their actions, and this should also include sharing information on their energy markets. This is often proposed by public administration circles. But while Germany, France and the United Kingdom agree that information sharing would help determine how to complement each country's potential and achieve positive effects at the lowest possible costs, Poland, which recorded considerable energy imports last year, is slightly less supportive of the idea. There are fears in Poland over self-sufficiency in terms of energy supplies. Although the European Commission argues that regional initiatives can be beneficial, actual practice (e.g. electricity market regulation) shows that Member States still determine their energy policies by themselves.

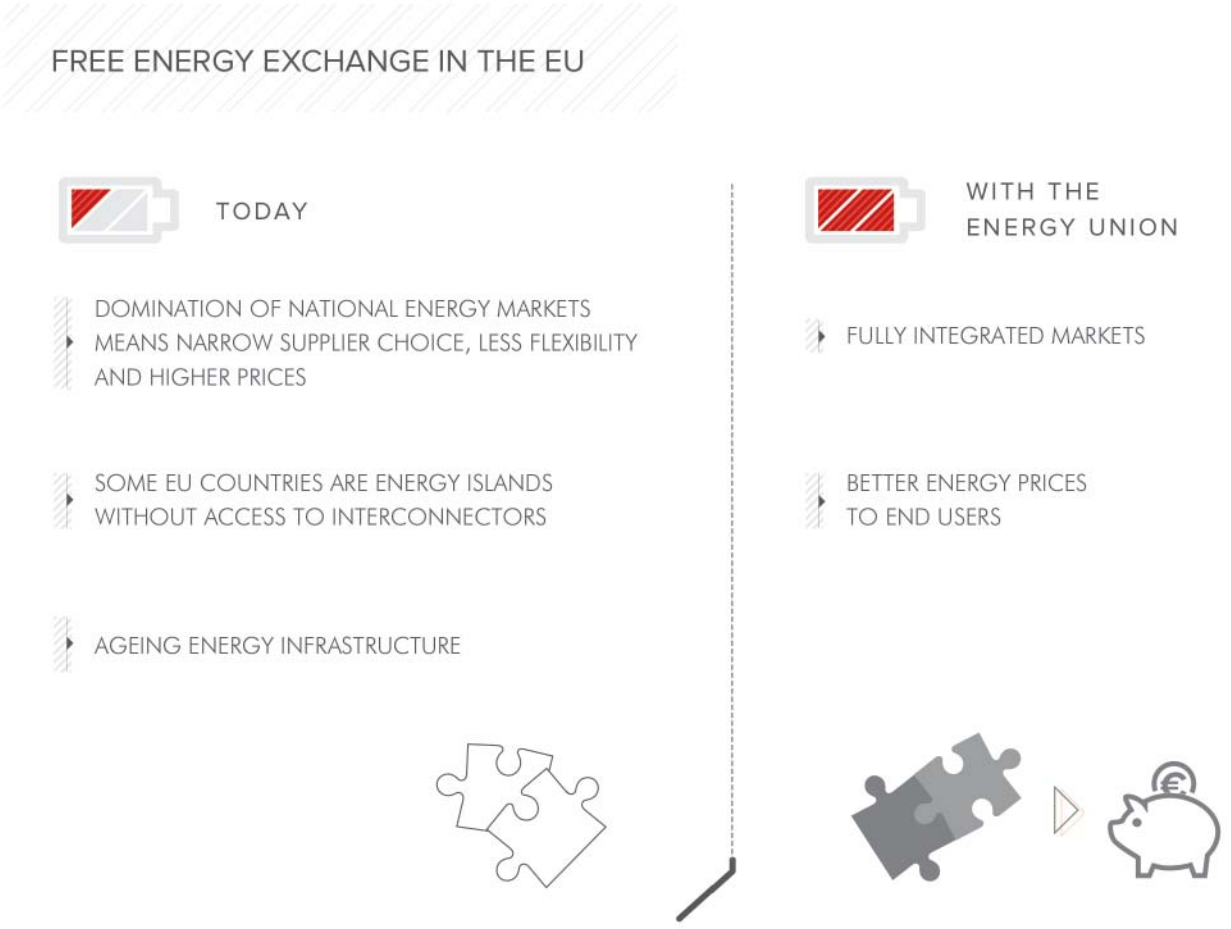
As the ISP's survey demonstrate, it will be extremely difficult for Member States to reach an agreement on creation of a uniform European energy market. Environmentalists point to the need to take a broad, holistic view of how energy should be imported and produced, as well as on how to use it efficiently and reduce demand for it. Experts and economists underline the relationship between the energy sector and transport, economy and fiscal policy, drawing attention to one of the weakest elements in today's politics – the lack of coordinated action in various aspects of energy policy, such as decarbonisation, security and competitiveness.

Naturally, effective coordination and consistency would also entail a certain consolidation of policies. But are the Member States ready? Just at it is able to impose sanctions for having an excessive budget deficit within the Monetary Union, the European Commission should also penalise delays in implementing energy strategy within the Energy Union. It is necessary to define common objectives and establish a system for monitoring their implementation, integrating the energy market and giving Member States some degree of freedom in creating energy policies best suited to their own particular natural, economic and social conditions. The choice of appropriate measures for ensuring security of energy supply should remain within the purview of the individual Member States, as only they can accurately evaluate their respective situations and choose the right steps to take in the event of a gas supply interruption. But regional coordination of risk assessment and emergency planning would help each Member State consider all of the relevant circumstances and external constraints in making their decisions.

Also, the security procedures should be adapted to the specific features of the gas systems of the Member State/region in question, which means that in fact they need not be standardised. Additionally, operators should work out common procedures for interconnections in case supplies are reduced.

MEDIUM-TERM ACTIONS

The process of building a common natural gas market within the EU requires gradual integration of individual regional markets, taking into account the specific qualities of each. Gas markets in the new Member States and the CEE region are currently undergoing a profound transformation, and are veering away from market monopolies and long-term contractual arrangements. A liberalised



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and competitive market built on a broad base of supply sources and competing suppliers, combined with highly liquid regional markets, will improve their bargaining power and spur growth of regional gas trading hubs.

Gas market liberalisation means enhanced market competitiveness through improved liquidity and transparency. It also means lower risk from reliance on a single supplier that abuses its position to pursue monopolistic practices or a political agenda.

The gas market is infrastructure-driven, as it relies on infrastructure for its effective operation, security and stability, and this is why Member States should strive to build infrastructure that supports diversification of gas supplies and free trade, in both internal and regional markets. A key condition for building a secure, competitive and liquid market for natural gas is diversification of supply sources, based on well-developed and interconnected transmission grids. Since 2009, Europe has seen considerable growth of gas transmission networks and installed reverse flow capacities. LNG regasification capacities have also been on the rise. In this respect, however, the 'old' EU 15 are still far better off than the newer Member States.

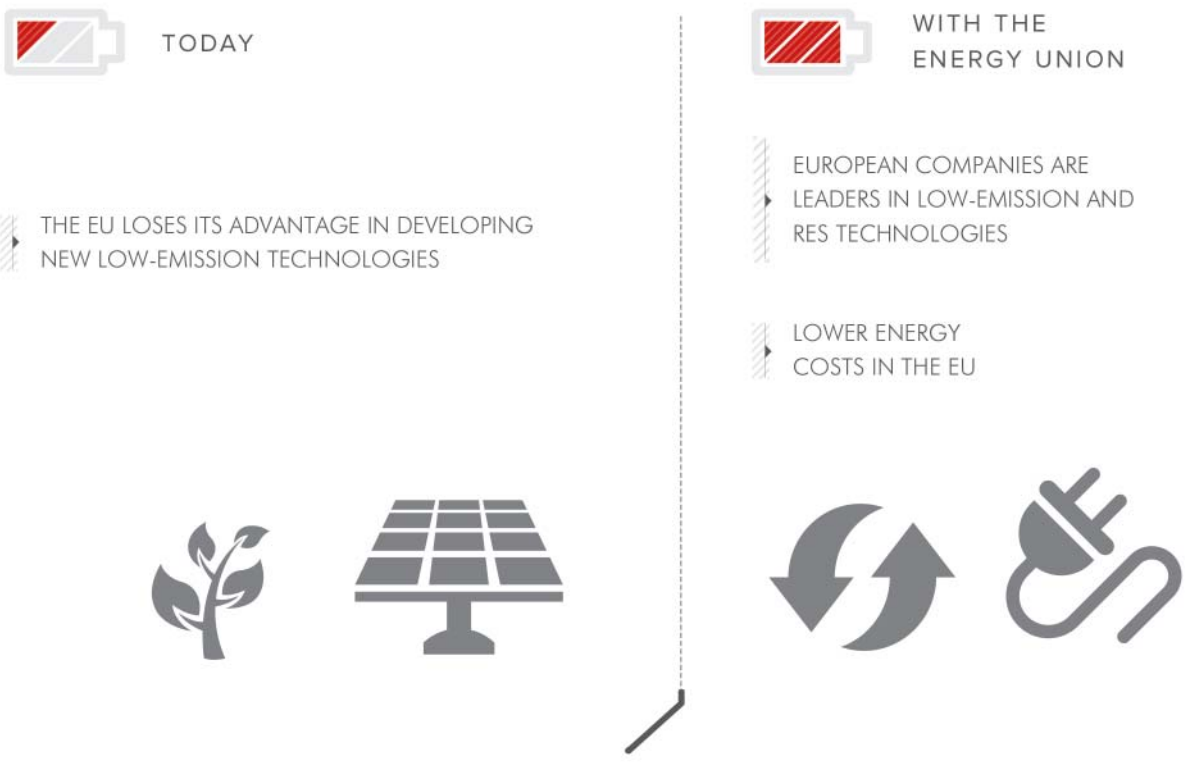
Of key importance to the diversification and security of gas supplies are certain urgent investments in infrastructure assets across Central and Eastern Europe, as well as relevant support mechanisms. Development of a single European gas market is a complex and lengthy process, in the course of

which successive regions are gradually integrated and regional gas exchange nodes established. Adequate liquidity is a feature of well-functioning markets, and cannot be achieved without well-developed transmission infrastructure and reverse flow interconnections supporting procurement of gas in amounts ensuring the continuity and security of supply from a number of diversified sources.

Should Russia decide to discontinue supplies, countries of Central and Eastern Europe would have a limited capacity to react, given their underdeveloped physical linkage to alternative sources of supply. The only really sizeable neighbouring market - Germany – would also be unable to satisfy Central and Eastern Europe's demand in a scenario where Russian gas stops flowing.

With all of this in mind, there is a need to establish new supply directions for the countries of Central and Eastern Europe. Only after bidirectional interconnectors are built and transmission grids are extended to allow them to tap into sources in Norway and the Caspian Sea region will the CEE nations enjoy diversification and security of their gas supply. New sources of LNG from the US, Canada and Africa are also worth exploring.

NEW TECHNOLOGIES FOR THE ENERGY SECTOR OF TOMORROW



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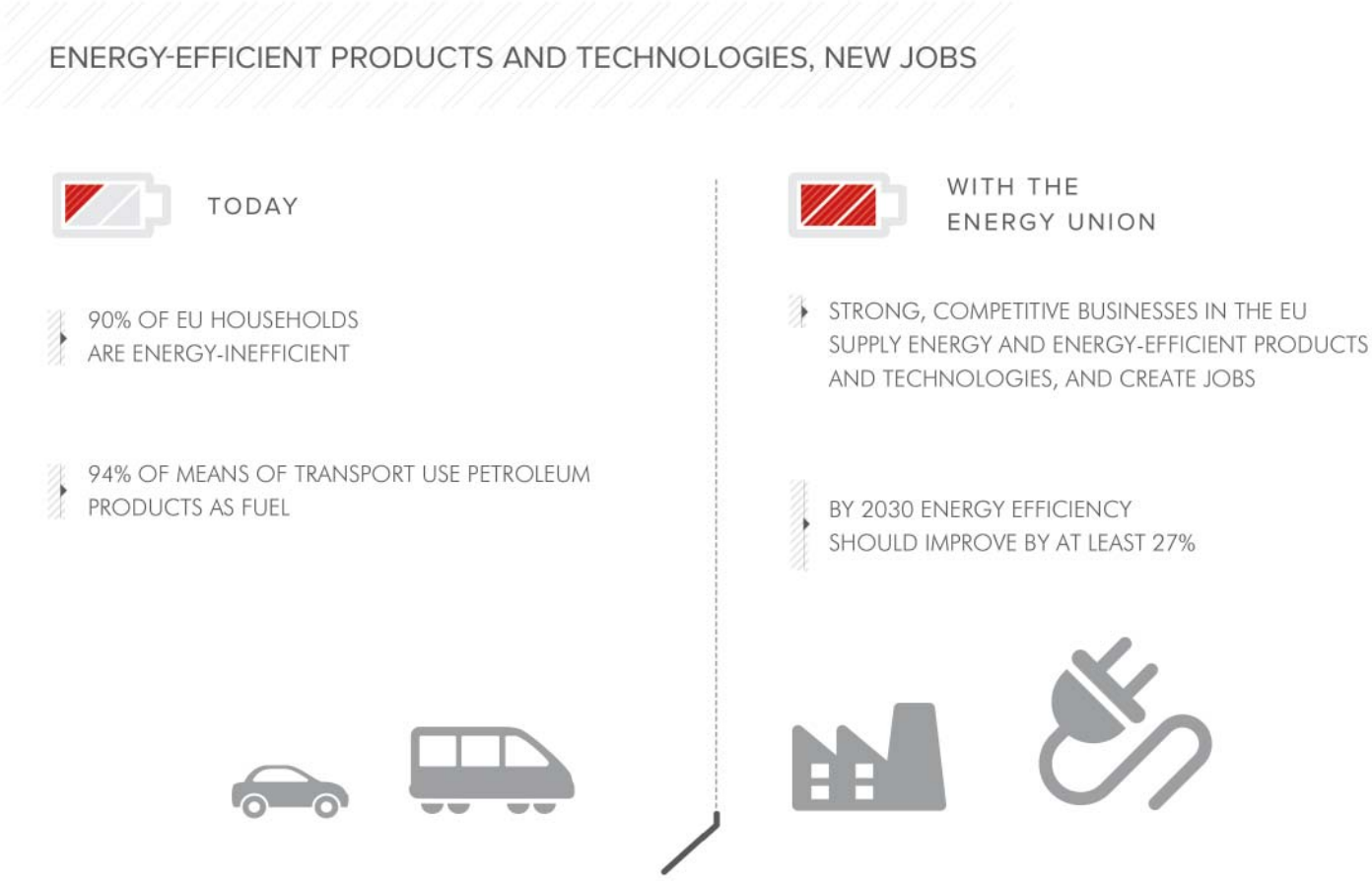

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Strategic gas reserves

With the development of the European gas market and the related financial instruments, demand for storage services is expected to decline. As a side-effect of this process, the burden of assuring the flexibility of physical natural gas supplies will shift to external suppliers (under import contracts). This will diminish the influence of EU Member States on the physical security of gas supplies into the EU in the event of unexpected disruptions.

Although storage is expected to decline in importance with the advancement of the Energy Union, it should be stressed that gas storage facilities can still work in the short term, by providing a prompt response to any gas shortages in the grid, and hence they may remain a key part of EU energy security.

In light of the above, it seems valid that framework rules for uniform mandatory gas stocks be introduced at the EU level, similar to the rules used for holding minimum stocks of oil or petroleum products coordinated by the International Energy Agency.

LONG-TERM ACTIONS

We believe it is necessary to create a uniform and consistent vision of a secure European Union in 30 -- 50 years, which reflects the distinct nature, pace of change and level of maturity and affluence of the Member States, as well as their country-specific

geological, climatic and technological conditions. And although the European Union is taking such steps, they have so far failed to deliver the expected results when it comes to reducing greenhouse gas emissions from production activities in the EU and, even more so, contributing to a global reduction in emissions, which is the primary objective of the climate policy. One visible effect is the high price of energy in the EU compared with other countries, which is harmful to European economic growth.

We believe that one of the reasons behind this state of affairs is that the European Union does not offer conditions which would encourage businesses to taken on risky projects, such as developing new technologies. And without developing new, innovative technologies we will not be able to improve energy generation costs on the scale needed to regain the lost competitiveness while maintaining the same ambitious climate protection targets. Innovation is necessary to break the impasse. The US undoubtedly has one such economy. Geological conditions were not the reason why commercial production of shale gas began in the US.

The US is an example that the state has a considerable role to play in creating breakthrough innovations. However, as experience demonstrates, not all forms of state involvement in promoting innovation give rise to revolutionary technologies, and each such involvement comes at a cost, financed by tax payers. According to the latest studies on how landmark innovations in the IT, pharmaceutical and energy sectors over a 15-year period were financed, those breakthroughs would not have been possible without substantial involvement on the part of the state. On the other hand, there are many examples where the state's involvement in supporting innovation failed to produce any visible effects. So how can government institutions support (finance) innovative technologies effectively?
Choosing to support only selected solutions can drive up the social cost of development. Since we like our successes to come quickly, it is not surprising that politicians prefer to back technologies that are already available. In any case, refining existing solutions makes perfect sense for businesses, as it provides them with very tangible benefits in terms of efficiency improvements. However, involvement of the state in the process means giving preference to (or even arbitrary choice of) specific technological solutions, usually purchased from specific manufacturers. Although the chosen technology develops at a faster pace, it does so without business and market verification, and as a result becomes more expensive overall. The more capital is involved, the greater the pressure to bring the project to a conclusion, even if there are no valid business reasons to do so. Besides, favouring one manufacturer over another hampers the development of alternative, perhaps more effective technologies, which address the same problems.

State financing should be technology-neutral. When encouraging innovation, the state should act as a leader, defining objectives by identifying key challenges in the development process and mapping out a vision of a future economy in which these challenges have been beaten. This economic vision should be rooted in research and given public approval through open discussion of its generally accepted objectives, such as energy security. Another role of the state is allocating money from the budget, which – through national research programmes coordinated by independent experts -- should be invested to enable discovery of the answers needed to make the vision a reality.

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