



Voices on 2030

The future of energy

KPMG in Belgium
kpmg.com/be/EnergyVoices

Russia's invasion of Ukraine on 24 February 2022 has had severe consequences for Europe. On top of an already tight gas market and low availability of French nuclear power plants, the invasion has resulted in energy scarcity which has caused energy prices to skyrocket, constituting a burden for both industry and households, dampening economic recovery from the downturn experienced in 2020.

This crisis has placed the topic of energy security back on top of the geopolitical agenda and has reminded us that energy is the cornerstone of economic development and human prosperity. Together with the urgent need to decarbonize our society and the ambition to move away from fossil fuels, the necessity to create a new energy future has never been more pressing.

Looking ahead, where will we be at the start of the new decade, in the year 2030?

Why Voices on 2030: The future of Energy?

To explore what the energy landscape could look like in 2030, KPMG asked various leaders of key players in the energy sector to share their vision on the future. The Voices in this report explore the energy sector from every angle, ranging from producers, transporters, distributors, suppliers and beyond. Seen as a whole, the Voices create a valuable chorus of insight and expertise into the future of the energy sector. And while views may vary, it's clear that cooperation between the different stakeholders is key to achieving our goals, both on a Belgian and European level.

These Voices capture a range of views on the different energy transition pathways between now and 2030. One point on which they all agree is that the sector will

be fundamentally transformed: reshaped by changing stakeholder expectations, driven by technology, digitalization, regulation, evolving customer expectations and other disruptive forces.

Our goal with this report is not only to share the bold predictions of some of the key Voices in the sector, but to stimulate debate and encourage our readers to reflect on what they think the future holds. In today's world, where energy security, affordability and Environmental, Social and Governance (ESG) has rightfully taken center stage in the minds of all stakeholders, the decisions we make today will undoubtedly shape our future.

We thank the Voices that shared their time and expertise to make this project a reality. KPMG in Belgium is also committed to playing a constructive part in the green transition towards 2030. This year we released our first KPMG Impact Report aimed at enhancing the transparency and accountability of our firm, including the capture of our own environmental footprint and sustainability initiatives. In addition, we are also investing in capabilities that will assist our clients in navigating the energy transition.

We hope the insights of our Voices will challenge your own thinking about the actions needed to get us to the energy world we want to have in 2030 and beyond. Whilst the exact pathway for energy to get us there is still not completely clear, we are confident that Belgium has strong cards to play and will take the necessary actions over the course of the next years to achieve a new and positive energy future.

And while the future will be challenging, this report illustrates that we can look at it with confidence and hope.



Jorn De Neve

Partner, Head of Energy & Natural Resources, KPMG in Belgium



Magali Vercammen

Sector Lead, Energy & Natural Resources, KPMG in Belgium

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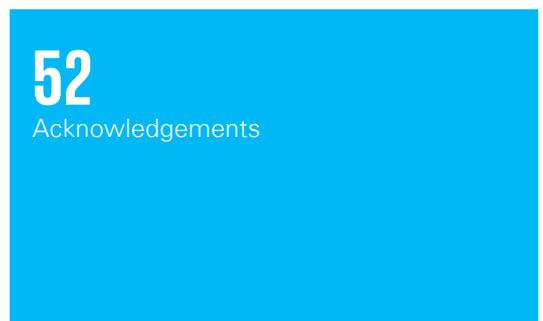
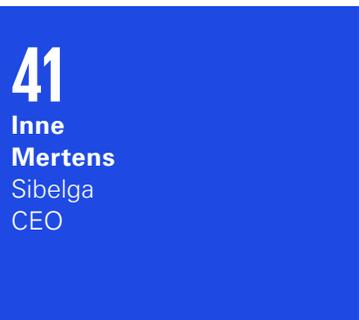




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Predictions for 2030



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The 2030 policy agenda and geopolitical landscape



Governments drive the green transition in close concertation with key stakeholders



New energy supply partnerships have been forged at a geopolitical level



Belgium plays a leading role in energy: specifically in offshore wind, the transit of hydrocarbons, innovation and research



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Energy efficiency measures play an important role in reducing CO2 emissions



Rapid electrification poses challenges in terms of increasing production capacity



Uses that cannot be easily electrified will need to rely on green molecules



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Data: the new fuel of the energy system?



Data providing insights to consumers and allowing them to become active players



Data and AI as drivers to minimize infrastructure investments



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The emergence of the active consumers



Consumers become prosumers and sell flexibility



Smart meters give them control over their consumption & supply



Energy suppliers must adapt their business model



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Governance: authorities bring all stakeholders together to succeed

Predictions for 2030

It's 2030, the energy sector has gone through challenging times in the previous decade. Firstly, the aftermath of a long-lasting global pandemic that accelerated digitalization and emphasized the importance of economic resilience. Following quite closely, the shocking war between Russia and Ukraine which led to skyrocketing energy prices and concerns over security of supply. These events were complete game-changers and the EU realized its heavy dependency on Russian imports for energy and the importance of working together as a block. All this happened in a context where sustainability, climate change and decarbonization were at the top of the global agenda, adding further pressures on the energy industry to transform.

Today, many countries stand firm on their approach to realize their net-zero goals. This, however, does not mean that all transitions have been completed. It's still ongoing, but the sense of urgency to ensure energy security and affordable prices that arose in the twenties was an important catalyst in the acceleration of the transition.

The Russian war in Ukraine left many lessons learned, one of the most important being the need for diversification in energy sources and the importance of governments working together with different stakeholders, including energy companies, to determine their long-term energy strategies.

When the war broke out and relationships with Russia deteriorated, Europe was forced to rapidly look for new partners for energy sourcing, with an eye on geopolitical relations. Energy matters proved to know no borders and the urgency of Europe working as a block on energy - just as it's doing with climate - became apparent. In this matter, Belgium had a key role to play given its position at the heart of Europe and the European institutions.

In terms of energy mix, a general shift away from fossil fuels and towards renewables was initiated, triggered by the overall awareness for energy independence as well as by global decarbonization targets. New technologies have also been included in many countries' energy sources, and Belgium is no exception. The shift from fossil fuels came hand-in-hand with a switch towards energy efficiency, as well as increased electrification. The latter driven by a widespread use of electric cars and heat pumps. Electrification of uses led to a significant increase in electricity demand and has challenged the country in its search for an electricity mix that can cope with this increased demand while at the same time manage potential system imbalances. Besides this, not all uses could be easily

electrified and alternatives such as hydrogen and other green molecules had to be developed.

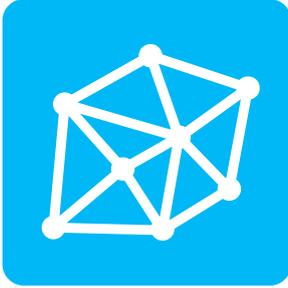
Regarding the electricity mix, all available low carbon technologies were integrated and renewables were complemented with nuclear power. The latter making its contribution to achieve sustainable energy goals and enhancing energy security at affordable prices. Gas-fired power plants were still needed to balance the grid but had to be used in combination with carbon capture and storage technologies to reduce their carbon footprint.

At the same time, important changes were also emerging at a consumer level. Digitalization, accelerated by the COVID-19 pandemic, and consumer awareness sparked by climate consciousness, have led to a change in the relationship between consumers and energy companies. The former are now more involved than ever in their energy consumption, looking for optimization where possible, requiring more tailored solutions. It is no secret that the shift to active consumers has completely changed the business model of energy suppliers, who had to reshape their offers to include services that provide consumers with the ability to manage their energy consumption through interactive and near real-time, internet-based apps.

The shifts towards renewables and decentralized generation combined with electrification of uses translated into important investment requirements in grid infrastructure as they were not designed to accommodate these new uses. This was followed by an increased need to balance the grid and avoid congestion in the system. Flexibility became the cornerstone of the future energy system. It was not only met by conventional power plants but also with new sources of flexibility such as batteries and demand side management, which grew significantly. Smart meters and data played an important role in developing smart grids and transmission system operators (TSOs) and distribution system operators (DSOs) had to find a common vision on balancing responsibilities.

These changes have all happened in a short time. The entire sector has transformed and is leaning more towards sustainability, serving as a catalyst and inspiration for other sectors.

What seemed like a major task in the early 2020s is today seen as a common purpose. The decisions and actions taken in the last decade have shifted the dial and helped to create an industry that is decarbonizing for survival, more diversified and thriving today in 2030.



Pillar 1: The 2030 policy agenda and geopolitical landscape



Governments drive the green transition in close concertation with key stakeholders



New energy supply partnerships have been forged at a geopolitical level



Belgium plays a leading role in energy: specifically in offshore wind, the transit of hydrocarbons, innovation and research

In 2030, energy security, affordability and sustainability are high on every country's policy agenda, as one of the big lessons learned from the crises experienced in the last decade. The world has acknowledged energy as vital to society and as a determining factor in prosperity and livability. Energy-related topics are therefore managed as a key strategic domain of national and European interest.

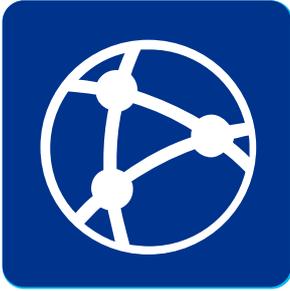
The war in Ukraine was a game-changer. Until then, the energy strategy was mainly left to the market. Today, governments are very much aware of the market's limitations and are taking a leading role in energy strategy development and policy making. Topics such as determining the optimal energy mix, strengthening international co-operation, accelerating innovation and developing infrastructure require government leadership in close concertation with all stakeholders, including the energy companies.

At present, it remains difficult to determine who has the most important role in the decision-making process. And while Europe should have assumed this role, in practice, history has shown that divergent interests take time to reconcile. Therefore, in 2030, local

governments (Belgium included) are assuming the role of framing a country-level energy strategy. A long-term vision combined with more decisive and stable policies shared by all stakeholders is needed to provide market players with a framework that allows them to make the major investments required to transform the sector.

With regards to gas specifically, the balance of power has changed. While Russia secured market share and influence in the European energy market through cheap gas in the twenties, Europe was forced to quickly search for alternatives and develop new collaborations for energy sourcing. This is how partnerships with countries such as Norway, the US, Libya and Qatar were strengthened, and new alliances were formed.

Whereas in the 2000s and 2010s Belgium assumed a key role in gas import and transmission in Europe, it is now creating a hydrogen hub and becoming part of the European hydrogen backbone. In addition, the country has positioned itself in the forefront of offshore wind, solar and nuclear research placing Belgium in a strong, leading position for the future.



Pillar 2: The energy mix of 2030



Energy efficiency measures play an important role in reducing CO2 emissions



Rapid electrification poses challenges in terms of increasing production capacity



Uses that cannot be easily electrified will need to rely on green molecules

Globally, countries are looking to shift their energy mix away from fossil fuels with the aim of reducing CO2 emissions and ensuring security of supply at affordable prices. Achieving this requires a diversified mix of energy sources and energy vectors. Other key elements of the energy roadmap include reduction of energy consumption, electrification and green molecules.

The ambition to reduce energy consumption and move away from fossil fuels led to the rapid electrification of society. This resulted in an increase in electricity demand from around 85 TWh on average to more than 100 TWh¹. Moreover, demand is expected to further grow to 250 TWh by 2050². It was a considerable challenge to increase production capacity, find the right capacity mix while at the same time ensure energy security, affordability and system balance.

Today, a large part of Belgium's electricity is produced by renewables, and in the future, this is expected to increase. Belgium currently plays a leading role globally in offshore wind and has increased its production capacity from 2,2 GW up to almost 8 GW. Other renewables, such as solar and onshore wind energy, provide a growing share of electricity supply and the country has increased its import capacity, while at the same time remained mindful to have sufficient electricity production capacity on its territory.

The intermittency of renewable sources presents additional challenges to the energy system. Nuclear and gas-fired power plants are also necessary in the capacity mix, the first to secure firm baseload and the second to be activated in case of imbalance. Carbon capture and storage technologies are being vigorously developed to reduce the carbon footprint of the gas-fired plants.

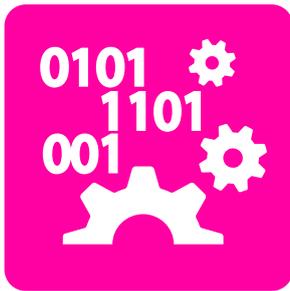
In the early 2020s, some of us pictured the gradual disappearance of nuclear from the energy mix. However, the energy crisis resulting from the Russian war in Ukraine brought a new perspective on the technology, making it popular again thanks to its advantages in terms of energy security, climate impact and costs.

In addition, there is still the portion of energy consumption that cannot easily be electrified, such as heavy transport and certain energy-intensive industries. Those sectors will have to rely on hydrogen and other green molecules in order to green their energy consumption, something we would not have expected to play a major role in the Belgian mix at the start of the century. Today, it is a topic through which the country has gained a forefront position.

Looking back ten years ago, we have moved forward with giant steps and transformed our energy mix: it is now cleaner and more diversified than ever.

¹ Source: EDF Luminus

² Source: Febeliec



Pillar 3: Data: the new fuel of the energy system?



Data providing insights to consumers and allowing them to become active players



Data and AI as drivers to minimize infrastructure investments



Data and AI as enablers for flexibility and demand-side management

Anno 2030, the entire energy ecosystem is highly digitalized. The system is more intelligent, more integrated and generates huge amounts of data. Energy usage is more efficient, as it is better managed through automation, controlling millions of devices in customers' homes (with consent), including electric vehicles, electric hot water systems, heat pumps and air conditioners. Machine learning and artificial intelligence play particularly important roles in influencing energy consumption behavior, enabling grid flexibility. This indicates the grid is now operating with increased demand response, optimized capacity, efficiency and storage. Deriving insights from these more integrated systems, companies can better control costs, while offering cheaper and more relevant services for their consumers.

The changes in the system are also creating opportunities for new energy and technology players. The enhanced near real-time visibility of the energy system, and the accessibility of information via online "platforms" have allowed new entrants to challenge incumbents in all business segments.

Trust is now a key differentiator for energy companies – protecting consumer data and privacy. Consumers have higher expectations; not only regarding price and how sustainable their energy is but also how flexible it is. Companies doing this well are employing AI to clean and analyze massive amounts of data and utilizing it to better understand and serve their consumers. They are differentiating themselves through efficient and cost-effective energy services.

The energy system is not only more complex but more transparent. The digital verification and tracking of the source of energy and emissions is standard for domestic and international trade. There is strong demand for certified zero emission products, with AI and blockchain technology helping to classify the products that are sustainable and low carbon. Companies who can verify their energy is green, and those who have created a transparent and integral supply chain compliant with ESG commitments, are capturing a greater share of new energy demand.

For some, however, the focus on data has gone too far. Even in 2030, energy still revolves around an electron or a molecule. Data and automation have to facilitate production, use, storage and transportation, but no more than that. Therefore, infrastructure is and will remain at the core.

To manage the energy system as well as possible, a flexible tariff system is important. Here, too, data and technology play a part. They make it possible to work out a fair and flexible pricing system and adjust it continuously. However, as it has a major impact on the consumer, the right balance needs to be found between market complexity and the ease of use for consumers.

This brings us to an important goal of data: giving consumers the tools to monitor and optimize their own usage (see pillar 4).



Pillar 4: The emergence of the active consumers



Consumers become prosumers and sell flexibility



Smart meters give them control over their consumption & supply



Energy suppliers must adapt their business model

For a long time, energy was a low-involvement product. End users saw it as a regular, given and secured utility service, in which they had limited possibility of intervening. The energy crisis in the early 2020s changed that and resulted in increased consumer awareness.

From then on, consumers wanted to be fully aware of their energy usage and became more aware of the consequences their consumption had on them financially, as well as on the environment. They now have the opportunity of producing renewable energy themselves and add their surplus to the grid. We can safely say that in 2030 there is a clear shift from consumer to prosumer.

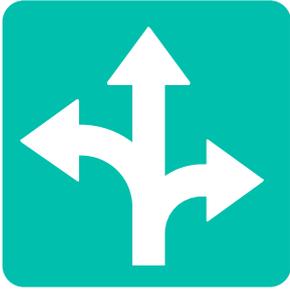
The standardization of the use of smart meters has helped to gain insights in consumption and production patterns through the available data. Together with digitalization, it has become easier for consumers to become active users. Interactive platforms have allowed them to maintain control over their energy usage and bills in an easy to use and almost real-time manner. This puts the energy customer at the center of a new ecosystem.

Furthermore, we have also witnessed a surge in energy communities. They typically have

control over the electricity they consume and ownership over what they produce (via solar panels, wind turbines, integrated batteries, etc.). They have agreements with operators and manage their assets just as if they were actors on the supply side. Moreover, they contribute to increased public acceptance of renewable energy projects and make it easier to attract private investment to finance the clean energy transition.

Another main development is the role that consumers play in balancing the grid. Demand-side management has been crucial in dealing with increased intermittency caused by the growing share of renewables in the electricity mix. Demand-side management allowed consumers to reduce their electricity bills and, at the same time, encouraged them to reduce and modify their consumption pattern.

For dynamic and active consumers, suppliers had to adapt their business model and provide more tailored solutions for their clients, such as interactive platforms, energy management and flexibility packages. The simple, one-sided energy offer, we were familiar with ten years ago, is over and gave way to an intertwined relationship between producers, suppliers and a new conscious type of consumer.



Pillar 5: ESG: It's not only about green energy



Environmental: strong shift towards green energy



Social: the energy sector as an inspiration for other industries in accelerating the transition



Governance: authorities bring all stakeholders together to succeed

As mentioned before, the unprecedented crises, such as the COVID-19 pandemic and the war in Ukraine, gave the world and particularly the EU a strong incentive to shift towards sustainability and carbon neutrality. The need for economic resiliency, security and independency of energy supplies drove the energy industry to take a leading role in achieving decarbonization.

In 2030, many actors in the energy industry increasingly prioritized their move towards sustainability. Today, in Belgium, a large part of the energy consumed comes from green sources, such as solar, wind or green gas. Our country's pioneer position in technologies, such as offshore wind, has allowed it to reach its ambitious goals.

Belgium's early entry in the hydrogen market and its derivatives has also helped. As a matter of fact, hydrogen is set to play an increasingly important role in the decarbonization of energy-intensive industries, such as metals, cement and glass. The perspective of circularity in the energy industry has also broadened the sector's horizon. The widespread use of carbon capture technology together with the reuse of CO₂ has increased the country's green energy potential. The mix has become considerably greener and diversified, using several complementary sources to meet the country's demand.

Nevertheless, sustainability in the energy sector is not just about the ecological aspect, even though there seems to be an obvious link. We must not underestimate the catalytic and facilitator role that the industry has taken from a societal point of view (the S in ESG). The war and subsequent economic crisis accelerated the move towards sustainability in the industry, and it served as an inspiration for other sectors to move at a faster pace. Particularly because it was not only incumbents who played a significant part in the transition, but awareness among consumers and society as a whole also played a major role.

Finally, the G in ESG sets the tone for the framework and overall incentives for the transition to a sustainable energy industry. Budget allocation, investment incentives and a cohesive strategy in Belgium and throughout the EU were primarily responsible for the move towards carbon neutrality.

The core of the sustainability transition is about "better together." By working together (energy producers, companies, consumers, governments and regulators) we will succeed. Compared to a decade ago, we have taken a giant leap towards sustainability in the energy sector. We are not there yet, but we are quickly moving forward towards achieving the ambitious sustainability goals set for 2050.

“This report is meant as ‘food for thought’ to challenge your own thinking about the actions needed to get us to the energy world we want to have in 2030 and beyond”

Jorn De Neve

Partner, Head of Energy & Natural Resources
KPMG in Belgium



Alexander De Croo
Belgian Government
Prime Minister

We have diversified our energy policy without sacrificing openness to the world

The energy crisis of the early twenties caused difficult moments but proved to be the tipping point towards a safer market model that better protects consumers from volatility”, says Belgian Prime Minister, Alexander De Croo.

As we enter the fourth decade of this century, I am happy to say that that we have succeeded in addressing the energy, security, and climate challenges of the early twenties. The combination of rising energy prices and a war on European soil gave us a solid wake-up call at the time. We realized that we depended on Russia for our energy and on the United States for our security. Thanks to that challenging context, the insight dawned that we could make a 20-year leap forward if we succeeded in fundamentally reshaping the Belgian energy landscape.

I am proud that we were able to deliver that fundamental change without turning our backs on the world. It proved possible to diversify our energy mix without sacrificing openness to the world. We have developed our own renewable energy and have deliberately chosen to over-invest in our national potential to continue to play our role as energy hub.

A very visible exponent of this transition is our offshore wind capacity in the North Sea, which has grown to 8 GW. But the hydrogen import has become at least as important. Thanks to the harbor of Zeebrugge, we were able to grow into a hydrogen hub. The challenge was not a minor one. That step proved to be an absolute must to keep the energy-

intensive industry in our country. We realized in time that we would prefer to become climate neutral by 2050 while maintaining this industry.

Nuclear power

Providing our own energy also means nuclear power, where we have chosen to extend some of our nuclear reactors further into this fourth decade. It was certainly not an easy debate in which we let the national decision on capacity depend on the risk we wished to take, but also on weaknesses in the countries surrounding us.

At the same time, Belgium also managed to win a seat at the table in the evolution of the small modular reactors (SMRs) that are announced for 2045. The belief in new reactors with the old technology has disappeared and cooperation between European member states proved to be a must. The investment was so large that no private player could bear it without government support. Moreover, the trump cards were complementary. Countries like France and The Netherlands developed their political discourse faster, but a country like Belgium was ahead in terms of know-how.

Next to wind, hydrogen, and nuclear power, gas also continued to play an important role, although it has become clear that this is mainly in combination with carbon capture and storage (CCS) and with the ambition to build a pipeline to Norway for CO₂ transport. Last, but not least, we have been able to realize most of our ambitions so far by dealing better

with demand management. The run-up to it took many years, but now that everyone has a digital meter, we fully realize what potential was hidden in this demand management.

A more engaged government

In recent years, energy has evolved into a security domain. Even today, in 2030, we see that Russia remains a destabilizing factor. From that security dimension, we have moved to a market model with more involved governments. It was necessary to intervene to avoid one market destroying the other. The free market does not work enough in this domain, which is precisely why an evolution was needed towards strong European regulators who look above national interests. Only in this way could we grow towards systems that take the volatility out of the market and ensure controlled profitability.

The 2008 financial crisis had previously taught us that it is not easy to develop unified European policies. During the energy crisis, it gave us the insight that it is better to move forward with those countries that are willing to do so. We could not afford to wait too long, and it made little sense to come up with a European model that would then take ten years to take effect. Moreover, it was interesting to observe how, in parallel, a political system developed that was more economically educated. That opened the door to better integration with the industrial players who were willing to step into energy.

Will the energy transition from the third decade allow us to better protect consumers in the fourth decade? The choices made in the twenties led to the fact that after the given support, energy prices could drop again. Incidentally, these important choices are not just made by the government. Consumers themselves also made important steps and learned to deal with new technology and higher investments. As a government, we were able to encourage energy suppliers to provide better guidance and help develop the financial models so that sustainable solutions became accessible to all. We often say that Belgians are born with a brick in their stomach. Meanwhile, the same reflex for heat pumps is quietly visible. In retrospect, the energy crisis in the first half of the twenties was the right time to bring consumers into the transition while offering them a better market protection.

About the interviewee

Since 1 October 2020, Open VLD politician Alexander De Croo has been Prime Minister of Belgium. He leads a coalition of Liberals, Socialists, Ecologists, and Christian Democrats. The son of former minister Herman De Croo, he was active as a consultant and entrepreneur after obtaining his MBA. In 2009, he made the switch to politics and became party chairman of Open VLD. Four years later, in 2013, he made his first appearance in the federal government as deputy prime minister and minister of pensions in the Di Rupo government. In subsequent governments - Michel I, Michel II and Wilmès II - he was also present as a minister, before assuming the premiership himself in the so-called Vivaldi coalition.

“ We will evolve towards a more regulated energy market with strong regulators putting public interest first, aiming to reduce price volatility and with more regulated returns ”



Gregoire Dallemagne
EDF Luminus
CEO

Fossil fuel reduction goes hand in hand with electrification

Luminus continues its deployment in the field of renewable energy, where it holds a leading position. It has a double objective: on the one hand, to respond to the growing electrification, and on the other hand, to contribute to fulfilling Belgium's commitments for a CO2 neutral future. All this against a backdrop of sobriety and improved energy efficiency, says Grégoire Dallemagne, CEO of Luminus.

Today, in 2030, Luminus' raison d'être is more than ever to build a CO2-neutral future that combines the preservation of the planet, well-being and development through electricity and energy efficiency solutions. In order to fulfill our commitment to a CO2-neutral and sustainable energy future, we focus on an energy mix that includes an increasing share of renewable energies. We are continuing our efforts to deploy more renewable energies, including onshore wind power where we are the leader. In terms of energy efficiency and sobriety, the lessons of the 2022 crisis have been learned: fossil fuel consumption has been considerably reduced thanks to the acquisition of sobriety habits that are now integrated into our behavior.

Efficiency and flexibility

Currently, we are witnessing the generalization of energy efficiency in order to reduce energy consumption, for example in public buildings, where energy performance contracts are being generalized. At the same time, we are implementing maximum flexibility, which translates into a better adjustment of

the supply and demand of electricity. From this point of view, the widespread use of smart meters allows us to better adjust electricity supply and demand at any given time. We note the development of new uses such as batteries, but also the significant increase in the number of electric vehicles, which contributes to intraday load shift and the balancing of the network.

“Mobilizing nuclear power plants is important to meet the strongly increasing electricity demand and the CO2 neutrality imperative”

Rapid electrification

We are evolving into a world that is rapidly electrifying and at the same time pursuing its efforts to reduce total fossil fuel consumption through energy sobriety and efficiency. With the massive electrification of uses, there are hardly any thermal cars left. As the name implies, a thermal car loses most of its energy as heat. Today, we are focused on electric cars that consume three times less energy per kilometer driven.

We are using far fewer oil-fired boilers and far more heat pumps that use four times less energy to heat a house. In the end, our electricity consumption increased from 85 TWh in 2022 to more than 100 TWh today. It was a considerable challenge to increase electricity production and to find the right production mix to meet this strongly increased demand, as most gas fired power plants that existed in 2022 reached their end of life and solar potential remained limited.

Our neighbors also face a rapidly increasing electricity demand, however, they are short on electricity production. That's why it has proven important for Belgium to have sufficient electricity production on its territory.

Diversified electricity mix

The terrible Ukrainian crisis had the advantage of removing a certain number of taboos concerning the production mix. Governments fully went for a carbon-free production mix and prolonged the lifetime of the nuclear reactors that could be extended, which was imperative.

Today, in 2030, we look to the future with optimism, building on the strengths Belgium has at its disposal, particularly in the field of research with world-renowned centers, such as SCK-CEN, which are using the resources provided by the government to build the next generation of nuclear energy. This contributes to a low-carbon electricity mix and helps meet Belgium's stated objectives and ambitions in this area.

Supporting customers

We support our customers in reducing energy consumption. This is our main role. We have been working in this area for 15 years. With our subsidiary, Luminus Solutions, we are expanding the use of energy performance contracts. We have commissioned a new gas-fired power plant in Seraing, which has been running for five years and produces electricity with the highest efficiency for a gas-fired plant on the European market. These gas-fired power plants are designed to only run when there is a shortage of wind and/or sunshine that cannot be compensated for with the storage solutions in place.

Limited inter-seasonal storage

Intraday storage solutions are growing, but the question of inter-seasonal storage has not been resolved. With intraday flexibility, we can move electricity between noon and evening. Each day, thanks to a battery coupled to a photovoltaic station, the uses in the house are adjusted to the times of electricity production. However, inter-seasonal storage

does not work. Therefore, we have to rely on a centralized dispatchable production capacity sufficient for long periods in winter without solar and wind production and without inter-seasonal storage capacities. This is why we have a power generation park that we can decide to start up ourselves.

More Europe for energy matters

The influence of Europe for energy matters became stronger. In 2022, Europe had a clearly stated climate ambition and strategy but the energy policy was decided by each member state. We found out it was not realistic to decouple both. We need more Europe if we want to achieve the climate objectives. We can no longer only have national energy policies in Europe when we know that the implications of energy choices go beyond national borders and impact other countries. I would add that the framework and the contours of the market must be set by the politicians, but it is up to companies to implement technological innovation in the most efficient way possible.

Energy consumers

Today, in 2030, the consumer is fully aware of the importance of consuming as little electricity as possible and at the right time, by adjusting it to his or her own production with the use of digital tools. We rely on optimized data management thanks to smart meters. In B2C, customers optimize their self-generation potential by maximizing their auto-consumption through fully integrated solutions with smart meters, storage facilities and connection to interactive platforms so that electricity use always takes place at the most appropriate time.

About the interviewee

Commercial engineer from UCLouvain and MBA from the University of Chicago, Grégoire Dallemagne started his career at Arthur Andersen as an auditor. In the early 2000s, he moved to the telecom sector, first within the Tele2 group, than at Proximus. In 2011, he became CEO of Luminus.



Chris Peeters
Elia Group
CEO

Powering the decade of electrification

The transition to renewable energy has made the world a very different place than it was a decade ago, says Chris Peeters, CEO of Elia and its parent company, Elia Group. This is true in terms of how we work, transport things and people and heat buildings – but also in terms of the geopolitical balance of power.

In recent years, the European electricity market has been characterized by accelerated integration, driven by renewable energy. The Princess Elisabeth Zone (which includes the energy island) is fully operational, and several interconnectors have been built to the UK and Denmark, as well as further up north and south. The electricity grid on the mainland has also been reinforced by the Ventilus and Boucle du Hainaut projects. Ventilus has been completed as an overhead line, as society realized that this design made the most sense from a social benefit perspective.

The Internet of Things allows us to monitor the status of our assets and manage and maintain them more efficiently. The increase in intermittent renewable energy means we need help from consumers to maintain the grid's balance. Digitalization enables us to harness the flexibility offered by household assets such as electric cars and heat pumps.

The decision to phase out fossil fuels was used as a way to increase our strategic security of supply and bring about geopolitical stability. Producing electricity locally and, at the same time, using a diversified mix of resources strongly reduced our dependence on certain regimes.

The move to renewable energy was also necessary because a decade ago we were at a turning point in terms of nuclear power: an ageing fleet of reactors had been phased out, and no immediate replacement

for them was ready. Even the small, modular reactors (SMRs) that many had such high expectations for, are still struggling to deliver on their economic promises. The expected standardization and mass production of that type of power plant have not yet materialized. In terms of both profitability and availability, renewable energy has made such great strides that nuclear energy has been completely overtaken by it. This doesn't mean there are no more nuclear plants in Belgium. Existing plants (Doel 4 and Tihange 3) have had their lifespans extended, which was a completely political choice.

“Even the small, modular reactors (SMRs) are still struggling to deliver on their economic promises”

Convergences

Despite there being a clear outline for a strategy to drive forward the energy transition, differences between the different energy sources still exist. There is no single, integrated view of electricity and gas. Electricity and gas are complementary, but for electricity, convergences with other sources of energy

are much more important than its convergences with gas. Electricity is also the cheapest energy carrier right now and has the most efficient systems in place to support it – from heat pumps to electric vehicles (EVs). One challenge that remains is to construct large, integrated networks to which different sources can be connected, from hydroelectricity through to hydrogen and nuclear sources. A second challenge is building the flexibility that the system needs – which is primarily driven by the demand for power – in a cost-effective manner.

This integration with other sources and their associated players also means that Elia has now switched completely to a platform strategy and has become a digitally driven company. We are still a system provider – or, if you will, a market facilitator. We are not a commercial player: our job is to make the rest of the market work. Given the complexity of the energy market today, a platform is also the only way to manage it. Our grid has changed from being connected to a few hundred power plants and injection points that were largely unidirectional into one which comprises millions of bilateral connections, with vehicle-to-grid interactions, solar panels turning consumers into prosumers and industries selling their surpluses (and so on). Maintaining the balance can only be done efficiently through a platform. This platform is highly flexible, adaptable and constantly changing – it receives daily software updates.

Power surplus

For this platform to be successful, the barriers to accessing it had to be made as low as possible. This has involved a lot of market reforms. Economic incentives and price signals were built into it to make it as attractive as possible to all involved parties. These run from encouraging people to charge their cars or use their boilers when there is a surplus of power through to allowing large companies to sell the electricity they don't need to other parties. Electrification hasn't only affected vehicles or heat processes. Its impact is being witnessed across all industrial processes. The value chain has been redrawn, certain flows have changed, semi-products are in a different place, ... how exactly this will evolve further will be different for each industrial sector.

On a side note, those who put their money on hydrogen-powered vehicles have woken up with a shock... because there aren't any. The efficiency of the electric motor has made the battery-powered car dominant over other models, by far. Moreover, battery costs have dropped dramatically and our dependence on rare metals has virtually disappeared, as huge strides have been made in terms of battery recycling. EVs now form part of a circular system.

Data

One important aspect to note about our platform strategy is that its success relies on data. Today, 80% of Elia's value is intangible and only 20% of it is physical. Ten years ago, it was the other way around. Digital twins of everything we own exist today and the Internet of Energy has become a reality. The skills our people hold had to be translated over to this digital domain. For businesspeople in particular, this has sometimes been challenging, but I am convinced that winning companies are human-driven companies, no matter how much AI we use.

About the interviewee

After studying civil engineering at KU Leuven, Chris Peeters (56) began his career in the field of construction, after which he worked for fourteen years as a partner at McKinsey. In 2012, he became the Director of Business Consulting at Schlumberger, the oil and gas group. In 2015, he was appointed CEO of the Belgian high-voltage grid operator Elia and its parent company Elia Group. The latter also owns one of Germany's transmission system operators (50Hertz) and other non-regulated businesses (EGI, re.alto and WindGrid). In 2022 he was named Manager of the Year by Trends magazine.

“Our grid has changed from being connected to a few hundred plants and injection points that were largely unidirectional, to one, which comprises millions of bilateral connections”



Jean-Jacques Delmée
Eneco
CEO

Energy is today's currency

The energy mix looks completely different, energy is a currency and Eneco is no longer an energy-only company. In record time, the energy market has been transformed, Eneco CEO Jean-Jacques Delmée knows.

The energy shock we experienced in the early 2020s gradually raised awareness that energy was the currency of the future. Meanwhile, the time has come. Energy is something you obtain or can generate and then consume or store. And you can sell it further if you want: A new kind of currency, in other words.

The important thing is, of course, that you can generate your own energy. That you can print your own money, so to speak. That's how, as a consumer, you make sure that you break free from the central energy supply. The energy crisis in 2022 and 2023 showed how important decentralized energy generation is.

No more energy company

Unfortunately, today this is still insufficient to supply the entire country with energy. Therefore, the second part of the energy transition is still the expansion of larger production players' renewable assets. As from

2035 Eneco and its customers will no longer be dependent on fossil fuel natural gas.

Now, we are also no longer an energy company. We were 25 years ago. Now the management of energy is completely different and our job is to be a platform that helps users with everything that has to do with energy: generating, consuming, storing, monitoring consumption, etc. We add an intelligence layer.

In itself, this is a remarkable course. Ten years ago, we knew nothing about apps, now we are a complete digital player ourselves, and other apps and software systems are our main competitors. The best proof that our app works extremely well – we no longer have a call center.

Digital meters caused delays

Despite the record pace at which we reinvented ourselves, it was no walk in the park. On the contrary, the road was slow and bumpy. That has everything to do with the varying pace at which digital meters have been and are being installed. There was and is a very big difference in adoption rates between Flanders, Wallonia and Brussels.

Digital meters are of course a crucial element in looking at energy in a different way. They are the only way to make energy consumption transparent and measurable and make it possible to adjust that consumption instantaneously. Digital meters provide much-needed data availability.

Crisis as accelerator

Digitization sums up the evolution – or call it revolution – in our profession over the past 10 years. It made it possible to set up high-performance energy management systems.

In 10 years, a lot has actually changed. During the COVID-19 period, our parents and grandparents digitized at lightning speed. During the energy crisis, the focus on energy and the energy transition increased dramatically. And in the years that followed, these two elements came together: digitization and awareness of energy demand and generation.

The crisis we had in 2022 and 2023 hurt really hard for a while, but it has been an accelerator. It has caused us to once again live more to the rhythms of nature. The weather determines what energy sources are available and that in turn determines the price at that time. We have therefore adapted to concentrating the bulk of our energy consumption at the times when there is wind and/or sun.

Energy Communities

Making energy data visible has made the impact of our consumption immediately clear, but using data goes beyond that. For example, it is now perfectly possible to start predicting future usage thanks to the use of predictive data. For example, it allows devices today to autonomously decide when is the best time to recharge.

In addition, insights from data also allow us to set up finely meshed energy communities, where it is clear in advance what energy production is needed for a certain group of people or companies and how it will be generated. Peer-to-peer sharing of energy is also an important part of this. These energy communities, by the way, are still the only way to install wind turbines on land. Only if people realize that wind turbines are for their own consumption will they allow their construction.

Renewable + nuclear

All these elements have ensured that the energy mix today looks completely different from, say, a decade ago. The vast majority of our energy comes from renewable sources, such as wind and solar. There are solar panels on all government and enterprise buildings today.

In addition, our innovation efforts have proven successful: flexibility in the energy system is a given and all fossil fuels have been phased out through the use of green gas and green hydrogen. Car batteries also play an important role. Not in the production of energy, but in its storage. This is crucial to being able to use daytime production in the evening and at night.

In order to realize the energy transition and meet the sustainability objectives, the Belgian governments had to take the leadership and play a more active role in the sector, sustained by long-term government commitment.

About the interviewee

Jean-Jacques Delmée is CEO of energy producer and distributor Eneco in Belgium. The Dutchman has worked in Belgium since 2009, when he moved to our country for a mission at Coca-Cola. He also worked as Managing Director Extrusion Coatings at Mondi Belcoat. During his career in the Netherlands, Jean-Jacques Delmée worked in numerous commercial management roles, including at FrieslandCampina, SCA and Iams Pet Food.

“The energy mix today looks completely different than, say, a decade ago. Most of our energy comes from renewable sources. In addition, nuclear plants provide security of supply”

“
**Governments will need
to drive the energy
transition, in close
concertation with
all key stakeholders,
including the energy
companies**”

Magali Vercammen

Sector Lead, Energy & Natural Resources

KPMG in Belgium



Thierry Saegeman
Engie Electrabel
CEO

We provide smarter and more tailored solutions to our customers

The acceleration of the energy transition and decarbonization, with the help of renewable energies, and nuclear power as an option, is shaping the energy landscape in 2030, according to Thierry Saegeman. Thanks to innovation and R&D, new technologies will be developed to offer customers, both industrial and residential, more intelligent solutions adapted to their needs.

We are active in electricity and gas. Four elements play a clear role in our sector. First, the energy transition, which has been underway for years, is accelerating with the same objective in mind: to free us from our dependence on fossil fuels. Second, the various crises we have been through are resulting in greater energy efficiency and a more circular economic environment. We have more local energy production and waste, such as CO₂, which is being used more as a raw material. In order to reduce our energy dependency, we need to cover our needs with our own means.

Renewable energies dominate

Third, renewable energies dominate the Belgian electricity mix and represent, together with solar, wind and hydro, more than 50% of our production. Between 2022 and 2030 ENGIE will have developed in Belgium as much wind onshore energy capacity as it did between 2000 and 2022! Besides renewables in the energy mix, we have new gas-fired power plants, and nuclear power remains an option. Having nuclear in the production mix offers certain advantages in terms of energy security, climate impact and costs.

However, nuclear will only be able to exist if there is social acceptance. It requires a long-term and stable view in which governments have a key role to play. It is not a technology for a private company alone. It requires significant investments, the build up of knowledge and supply chains.

Fourth, decarbonization is increasing among our customers, their suppliers and their customers. In particular, we are working with our industrial customers, including chemical companies, cement companies and steel companies, to decarbonize their production processes, as well as their facilities. To achieve this, we use green hydrogen and synthetic hydrocarbons. Greening their processes with electrification is not enough. There is a need for green molecules.

Green hydrogen and synthetic gases

Green hydrogen has the disadvantage of having a low energy intensity, and you cannot produce it in Belgium in large quantities. We produce synthetic gases by combining CO₂ extracted from the air with hydrogen.

We already had several projects in this area back in 2022. For example, the Columbus project, in collaboration with Carmeuse and John Cockerill, where CO₂ captured during lime production combined with green hydrogen to produce carbon-neutral synthetic methane. In 2030, we have a total of 4,000 MW of electrolysis capacity worldwide, including at least 200 MW in Belgium.

Energy and technological diversification

We do not put all our eggs in one basket; we promote diversification of our supply sources. We cannot depend on one country or region for our energy supply. Similarly, there is no simple solution for the energy transition. In 2030, we are using a range of technological solutions to meet our decarbonization goals. In addition, we are seeing increased decentralization of electricity production with photovoltaic panels. Year after year, these panels offer improved energy performance at lower costs. The share of offshore wind power is also becoming increasingly important in electricity production. This is less the case in Belgium, but at group level we are increasingly developing floating offshore wind, which has a number of advantages: it can be installed at any depth, it can be moved according to the wind, there is virtually no limit to the unit power of the wind turbines.

Innovation and R&D

In the actual context, innovation and R&D are essential. More broadly, our teams are working on renewable energies, new ways of producing decarbonized energy, new vectors, new uses, new materials, etc. We are not innovators of technologies, but we identify them and transform them into solutions that can be brought to market. With our global presence, we are able to deliver large-scale solutions, which are tailored to our customers' needs, quickly, more efficiently and at a lower cost. However, the state can help us to implement certain technological developments, such as the electrification of the car fleet, which is constantly increasing. The state must have a vision and set the rules while remaining technologically neutral. It is up to companies and their customers to find solutions.

Offshore wind

The development of offshore wind remains important to Engie. Our subsidiary Ocean Winds already has 5-7 GW offshore wind capacity operational or under development. There is still room for significant technological progress such as e.g., the capacity of the wind turbines and the use of floating wind turbines, which are moveable and can therefore reduce the wind risk.

Provider of intelligent solutions

The way businesses see us has also changed in 2030. Successful energy providers are those that reassure customers, bring comfort (including investments) and help them to lower their bills and their impact on the environment. That's a big change. Gone are the days when the goal was to sell more electricity and gas. Now it's about consuming less and continuing to

decarbonize. Thanks to data, digitization and artificial intelligence, we can both better manage production and also better predict demand from the customer. Our customers, both industrial and residential, continue to ask us for greener solutions. We offer complete solutions including energy management services (in order to maximize, amongst others, auto consumption) and flexibility packages (in order to provide flexibility to the grid).

Residential consumers are looking for unburdening. We are today one of the few companies who offer dynamic contracts. We help them maximize their auto consumption by combining data from the digital meters, solar panels, electric vehicles and heat pumps. The market needs large players such as Engie in order to be able to benefit from its geographical size, its R&D capabilities with its 900 researchers worldwide and a broad range of expertise. Engie's role is to identify the technologies and to bring them to the market in the form of innovative solutions.

About the interviewee

Thierry Saegeman graduated from Ghent University in 1995 with a Master's degree in Electromechanical Engineering and an MBA from Vlerick School. He started his career at Engie Electrabel in 1995 as Project Manager Combined Heat and Power. He later progressed within the ENGIE group and moved to France, first as Managing Director Engie Thermique France, then as General Manager of Compagnie Nationale du Rhône. In 2016, he returned to Belgium as Chief Officer Nuclear before becoming CEO of Engie Electrabel in 2021.

Successful energy providers are those that reassure customers and help them lower their bills as well as their impact on the environment ”



Raad Alkadiri
Eurasia Group
Managing Director Energy,
Climate & Resources

A sea of competing islands

Our energy supply is not just a matter of supply and demand; it is as much a tool in international relations, national politics and policymaking. And while the energy sources we will use in the future will be different from the ones we use today in 2030, that aspect may never change, says Raad Alkadiri.

It had faded into the background for a while, but in the past decade, it became clear again that geopolitical movements have had a huge impact on energy markets in 2030. We have seen some events, including the first major land war in Europe since 1945, that clearly exposed the fragility of globalization and at the same time put increasing pressure on it. In addition, the energy market crisis brought along unexpected other crises, such as sky-high fuel and energy prices, faltering supply chains, empty shelves in supermarkets and empty car showrooms.

We collided, in short, with the limits of neoliberal thinking and this spurred regionalism. The world once again became a sea of competing islands, each evolving in different directions and a lot of them becoming more inward looking, the United States

being a prime example. Some blocs also saw opportunities in this evolution. Many developing countries, which lacked the resources to purchase expensive energy, cautiously took China's, and to a lesser extent India's, hand. It made the Chinese confident and assertive, especially in their own region. Europe is still the most coherent continent in this story, with local superpowers, although even here regional priorities are usually considered more important than a global world vision.

“We have hit the limits of neoliberal thinking this decade”

Gap

Because of the events I describe above, a sort of “energy poverty” developed in certain parts of the world that lasted through the first half of 2020. This also widened the gap between poor countries and the West even more. The high interest rates and the lack of cheap and rapidly available fuels caused a multi-speed energy transition (indeed, the fact that we also must fight climate change in the meantime made the whole situation even more pertinent and complicated). In Europe, for example, energy transition and energy security quickly became synonymous. Many countries in South America and Asia did not have this luxury for several more years.

Since about 2025-2026, we have seen developing countries slowly but surely catching up. Europe's large investments in renewable energy have brought prices down, and China has also made a clear commitment to curb its emissions. That has given the global market for renewable energy a growth boost.

The big loser in this story was natural gas. Its high cost meant that, at first, it priced itself out of the market. In the first part of the decade there was also so much focus on gas that we saw overinvestment, which, in turn, led to a surplus in production. After 2025, the reduced demand, the transition to green energy and alternatives to Russian supply meant that gas became much less competitive.

Hydrogen is increasingly casting itself as an alternative but has not yet been able to fully live up to that role. That will probably not be the case until 2040. Especially for green hydrogen, there are still many practical challenges and obstacles to overcome.

The big test

As I said, in Europe, energy transition and security are now synonymous. The EU has shown what is possible when political will, a great need for energy security, financial resources and public support all coincide. The continent managed to develop a coherent energy transition. The CBAM (Carbon Border Adjustment Mechanism), part of the Fit for 55-program, played an important role in this. It was also a lever to shape new energy and trade relationships.

That is not to say that this transition came about without a hitch. The winter of 2024-2025 was the big test. Ongoing tensions between Russia and Ukraine provided the basis for a common vision and public support. At the same time, there was a shift in financing, with private investment in energy claiming an increasing role and public investment declining in importance. Regulations were winding down, not so much around pricing, but mostly around operational licensing. Europe realized that energy security should not be hampered by red tape. The transition to green energy also set in motion great competition between different blocks for critical minerals and resources. This led to a period of "resource colonialism." As we got better and better at recycling those resources, this movement diminished and faded out.

Clusters

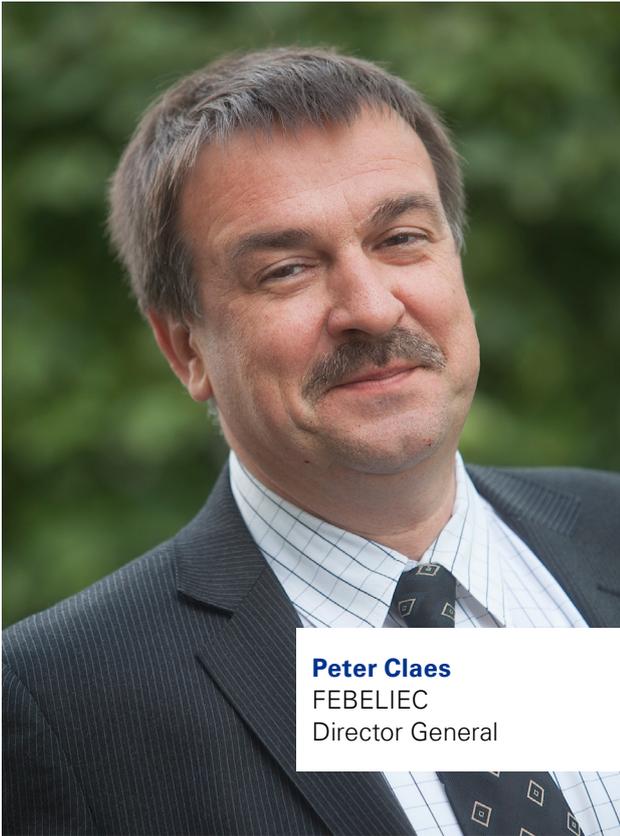
Of course, all government decisions also had some impact on how energy was invested in, although consumption patterns were still the big differentiator. The vast majority of investments went into renewable energy, with the role of gas increasingly reduced to no more than a marginal backup or a way to absorb peaks

by the end of the decade. Investments in hydrogen were also gaining momentum, with industrial clusters in Belgium, the Netherlands and northern Germany, for example, acting as major levers. The effects of climate change – which have become increasingly apparent and hard-hitting in recent years – brought with it an enormous number of investments and a clear commitment to halting this phenomenon.

About the interviewee

Raad Alkadiri has more than a quarter century of experience advising C-level managers and government leaders, especially concerning issues such as energy, climate and the economy. He joined Eurasia Group in 2021, having previously worked at Boston Consulting Group and IHS. Alkadiri studied International Relations at the Universities of Oxford and St. Andrews and holds a degree in Psychology.

“Regulations have been phased out, not so much around pricing, but around operational permits”



Peter Claes
FEBELIEC
Director General

Towards a green world, but with an open mind

Taking the necessary steps to reduce CO2 emissions is something no one can be against. But at the same time, we must keep an eye on the cost of that ambition and we cannot afford to be naive, warns Peter Claes, Director of FEBELIEC.

Even today, in 2030, the world still consumes very large volumes of energy based on fossil fuels. The switch to renewable energy and other low carbon technologies is still not fully complete. Especially if you look at global energy consumption, not only in terms of electricity-generation, but also in terms of heating and transport, we still see a high dependence on fossil fuels.

Relying solely on renewable energy to remain competitive is difficult, particularly in Belgium. Solar and wind yields are relatively low here, we have challenges in terms of zoning and planning and not enough coastline. That means we cannot write off nuclear energy, we have more than half a century of experience with it. Why should we give this up?

Game-changer

The war in Ukraine was a game-changer because it seriously pushed energy prices up, until 2026 - 2027. After we stopped importing Russian gas, Europe looked feverishly for alternatives. One such alternative was to deploy completely new energy sources. A second was to start looking for alternative gas suppliers. That gas then had to get to Europe by pipeline or by LNG tanker. However, both alternatives took a long time, in terms of building infrastructure, bringing in large volumes and negotiating contracts.

For our industry, these past few years have been very difficult, even painful. Because regions such as

the United States, the Middle East and Australia didn't feel this price handicap, our European industry suffered structural damage. Not only directly because of the high energy prices, but also because of the impact it had on inflation and logistic chains. As we no longer produced sufficient energy-intensive products such as metals and fertilizers, it affected other companies that used these products as raw materials.

At one point, we also sat down with alternative suppliers like Norway, Libya, Qatar and the United States, with a simple message: „If prices are five or ten times higher in Europe than in your home markets, you are squeezing us to death. And in a few years' time, there won't be an industry in Europe left that can buy your gas". So, in exchange for long-term contracts, price agreements were made with these countries. This required long-term commitments in terms of volumes: LNG exporters would not invest in expensive infrastructure to export gas to Europe, without a long-term commitment on volumes.

Market forces

Of course, this doesn't mean we didn't believe in market forces. Both in terms of prices and security of supply, it's preferable to organize the energy market in a competitive manner. But I do believe that exceptional circumstances can push governments to new types of agreements. Such agreements allow companies to buy a certain volume of energy at a certain price. These

agreements do not have to be the same for every country. Norwegian gas is mainly pipeline gas, both supplier and offtaker are heavily dependent on one another. It's different for LNG: it can be sold anywhere in the world.

But as I said, such a mechanism was not created overnight. And asking companies to shut down plants for four to five years because energy was too expensive or to operate at a loss was very difficult. Not all energy-intensive companies were able or willing to sustain that. Not all their customers had the patience to do that either. So, in recent years, there were cases of delocalization and closure.

Carbon capture

Of course, in our search for alternatives, we were careful not to shift our dependence from one energy source to another. What if suddenly the supply of solar panels from countries such as China was interrupted? But, being one hundred percent independent is by no means evident. Building all our solar panels and wind turbines ourselves is a huge economical challenge. What also didn't help was that there was (and still is) no strong overarching European energy policy.

The main problem was, and still is today, that the energy transition to climate neutrality came with a cost that was vastly underestimated for a long time. Wind and solar power require backup capacity when there is no wind or sun. With too much wind or solar you have to start storing energy in batteries or converting it to molecules such as hydrogen or ammonia. Both systems are very expensive. Certainly until 2040 - 2045, using conventional systems such as gas-fired power plants combined with carbon capture is much more affordable. After 2040 - 2045, I think we need to once again look at new generations of nuclear power plants as a backup. We can also import green molecules from countries with lots of wind and solar, but that too is a very costly operation. It requires building huge renewables capacity outside of Europe, and transporting the hydrogen or ammonia to Europe where it would then be converted again into electricity, which is not efficient.

However you look at it, the transition to climate neutrality was and still will be extremely expensive. Especially the last steps to reach net zero come at a huge price. We may be able to handle the first half of emission reduction, but to reduce the last emissions will require enormous financial efforts. And I wonder if our policy makers are aware of this. Moreover, in 2030 this is still a global challenge, requiring a global approach. So, while decarbonization is necessary, we must be careful not to squeeze ourselves to economic death.

About the interviewee

Peter Claes received his master's degree in Applied Economics in 1984 at the KU Leuven and worked there as a research assistant until 1986. From 1987 to 1992, he was employed as an economist at the bank BBL. After that he joined essencia, the Belgian federation of the chemical industry and life sciences, as Director of the economic department and later became Director General. Since 2009, Claes is Director of FEBELIEC, the federation of Belgian industrial energy consumers.

Climate neutrality is necessary, but we must be careful not to condemn ourselves to economic death ”



Frank Vanbrabant
Fluvius
CEO

Data have become the driver of the energy market

Getting the energy distribution grid ready for a world full of electric cars, solar panels and heat pumps; Frank Vanbrabant, CEO of Fluvius, wants to complete that mission in the early thirties of this century. But for him, being a DSO (Distribution System Operator) today, in 2030, is about more than a strong distribution system. „The importance of data management can hardly be underestimated,“ he says.

In recent years, huge investments have been made in basic infrastructure that enables us to respond to society's evolution towards electrification. In a world full of electric vehicles, solar panels and heat pumps, getting more power to people, in addition to capturing more power, has proved crucial.

At the start of the twenties, our electricity grid was not ready for the big electrification. To avoid congestion and breakdowns preventing the increasing amounts of electricity from reaching households and businesses, Fluvius rolled out a €4 billion energy transition investment plan, spread over ten years. Today, in 2030, the end of that investment period is in sight, and we are approaching our targets: reinforce 36,000 kilometers of power lines and provide 750,000 homes and commercial buildings with a heavier connection.

Avoiding net congestion

The investment plan was one that you could challenge at the outset with the opportunities that flexibility could possibly offer. Flexibility means, for example, a consumer is willing to switch off his freezer or boiler in

exchange for a fee. That market already existed at medium voltage and later at low voltage, but at the time it was impossible to foresee what prices we would pay today, in 2030, for, say, switching off your solar panels. If the market were 100 percent flexible, there would have been no need for investment. We believed that the investment of 4 billion was necessary. Thanks to this plan, we now avoid grid congestion all over Flanders.

We made a street-by-street inventory of the places where we were going to open up all the pavements and reinforce the cables by 2032. Of the low-voltage grid to which households and small businesses are connected, at least 40 percent must be reinforced by 2032. Of the medium-voltage network, to which larger companies and part of industry are connected, 13 percent must be reinforced, and adjustments are required at one-third of the Flemish distribution cabins. Does this mean that today in 2030 all problems have been dealt with? Right now, 80 percent of the plan has been rolled out, so there are places where problems remain, for example when people drive electric or install solar panels. We have responded to that by creating the option of proactively requesting an attenuation.

Data as a driver

Next to the infrastructure, we notice more than ever how fast the data layer has grown today. Data have become the driver of the energy market. Everyone has a digital meter and that makes it possible to functionally use data from every customer. We no longer find dynamic tariffs that change every hour strange. We

eventually got used to the capacity tariff, so people are now more energy conscious.

What's more, the energy customer has become central to the new ecosystem. Where he was previously the end point of the chain, he is now the epicenter of a much more crowded ecosystem. In that system, where we see support firms helping customers to actively participate, we market and share surpluses or become part of an energy community. That's a fundamentally different interpretation of the energy landscape from where we started in the twenties.

For Fluvius, as a DSO, the basic role of the time remained intact: everything depends on a strong distribution system. On top of that, we saw our role as data manager grow. Providing all parties with the data needed to do business required major investments in the systems to develop data management via software. It was building brick by brick and it is a role that cannot be underestimated. It involves much more than acting as a mailbox of meter readings. This is about sharing volumes of data in the millions per day.

Persistence

The breakthrough of the energy communities was very illustrative in that context. It was crucial for its evolution that, as a DSO, we could collect all production and consumption data on one platform. That made it possible to share energy and afterwards assemble everything correctly on the energy bill. The energy crisis we experienced during the early twenties was not insignificant in that respect. The biggest challenge we knew, and still know today as a DSO, was creating support. Whether it was the digital meter or the capacity tariff, it invariably required a lot of effort to overcome resistance. Even for our role as data manager, we had to fight and that applies equally to the investment plan. Nor do I expect that challenge to disappear with future evolutions, but I have always believed that the tipping point would come. The active energy consumer is here today, whereas ten years ago that same consumer would be happy if the lights were on. By persevering, and with the energy crisis back then being a game changer, things are different now. In 2030, we see the benefits of the persistence of 2022.

About the interviewee

Frank Vanbrabant is the CEO of Flemish distribution system operator Fluvius, which was established on 1 July 2018 from the merger between Eandis and Infrax and is the DSO for electricity and natural gas. It works independently from energy producers and suppliers. It does not produce or sell energy, but ensures electricity and natural gas reaches customers under the best possible conditions. Before becoming the CEO of Fluvius, Vanbrabant was the CEO of Infrax until 2014. Between 2007 and 2014 he was director customer services, purchasing and operations at Infrax.



The active energy consumer is here today, whereas ten years ago that same consumer would be happy if the lights were on. By persevering, and with the energy crisis back then being a game-changer, things are different now. In 2030, we see the benefits of the persistence of 2022 ”

“The availability of data via online platforms and AI allows for grid flexibility and enables consumers to become active in trading energy”

Philip Jeandarme

Director, Energy & Natural Resources
KPMG in Belgium



Pascal De Buck
Fluxys
CEO

Looking back from 2030: Shaping the multi-molecule decarbonization grid

Clean hydrogen and its derivatives along with clean electricity will take an increasing share of the energy mix. And carbon capture also will contribute substantially to a successful journey to climate neutrality. Belgium is well placed to accommodate this transition in a wider Northwest European perspective, says Fluxys CEO Pascal De Buck. Thanks to our extensive infrastructure that makes society ready for the future. This is his view looking back from 2030.

The 20s in hindsight

Early in the last decade the COVID-19 pandemic and the war in Ukraine were a strong impetus for the EU to accelerate action towards climate neutrality, while supporting economic resilience and security of energy supply. Climate pledges in the various EU countries intensified accordingly throughout the decade. While the level of progress varies across the bloc, on average, energy efficiency measures have brought down energy demand considerably. In the same vein, clean hydrogen and its derivatives along with clean electricity have progressively replaced part of the fossil fuels in the energy mix.

Regarding infrastructure we have managed to facilitate new activities to strengthen and diversify the economic tissue. Circularity has increasingly become a driving force in technological development, economic renewal and forward-looking partnerships. Reuse of CO₂, for example, has seen some impressive breakthroughs, and waste can now sustainably reinvent itself as a raw material.

Developing an integrated vision and approach towards the overall energy system has shown to be essential. Major milestones were taken through progressive insight into the way in which molecules and electrons act complementarily to adequately meet the need for clean energy and raw materials. Across the energy system we are now developing the necessary infrastructure at optimum societal cost. The mix of clean electricity and clean molecules, each with their diversified mix of local and non-local sources, is the foundation we work from to achieve full climate neutrality through to 2050.

Belgium multi-molecule hub

Today Belgium has successfully diversified its import and transit role for natural gas with a similar international hub role for clean energy molecules and CO₂. Our infrastructure offers the market the capacity required to transport 30 TWh of hydrogen and 30 million tons of CO₂ per year. Through to 2050 we are set to continue the development of our infrastructure to keep offering the capacities the market needs to achieve climate neutrality.

Our extensive reach-out to industry in Belgium early in the decade laid a strong foundation for repurposing and developing our extensive natural gas infrastructure. We now have a multi-molecule system with separate networks for hydrogen and its derivatives, CO₂ and methane (natural gas, biomethane and synthetic methane). What levels of hydrogen supply and demand did industry in Belgium project over time? And what levels of CO₂ capture did they deem necessary? Close

cooperation with industry and an array of stakeholders allowed for the development of a coordinated blueprint for a multi-molecule infrastructure. We started out with local infrastructure in the industrial clusters to achieve scale from the outset and swiftly provided connections between these clusters and into the systems of neighboring countries.

Hydrogen crossroads

At this stage the hydrogen grid serves the industrial sectors in Belgium with processes requiring high temperatures such as the production of steel, cement, aluminum, ceramics and glass. Marine shipping and heavy-duty transport have developed as sources of demand for hydrogen and its derivatives as well, and several gas-fired power stations have shifted or are in the process of shifting to the new energy carrier. The grid also provides clean hydrogen and its derivatives as feedstock for the chemical, petrochemical and plastics recycling sectors in Belgium. Currently, transit volumes are mainly destined for Germany.

The grid is configured to allow optimum diversification of supply. Inflow of onshore hydrogen production from electrolyzers in Belgium remains modest and is complemented by a variety of sources: local blue hydrogen from natural gas with carbon capture, imports through the connections with the Netherlands and France and hydrogen from offshore wind capacity in the North Sea. Imports of hydrogen derivatives by ship also have been developing. The latter are set to increase steadily over the next decade as more production and shipping chains come on stream, in line with the agreements concluded with various countries in North Africa, the Middle East and Latin America.

CO2 aggregator for NW Europe

The CO2 grid in Belgium currently serves industry sectors such as steel, cement and lime, which have production processes that inevitably generate CO2. Carbon capture has proven the key solution to address their carbon emissions and allowed them to keep their activity and employment in Belgium. Blue hydrogen production from natural gas incorporates carbon capture as well, and other industries have implemented carbon capture as the transitional option for the time it takes to switch to carbon neutral energy sources for their activity.

CO2 captured in Belgium and surrounding countries flows through the grid to a series of reuse locations. A number of breakthrough innovations have extended the circular reuse of CO2 largely beyond the deployment in the production of e.g. synthetic fuels as envisaged at the beginning of the decade. The grid also pipes vast quantities of captured CO2 to export facilities ensuring onward transport to safe and permanent storage under

the seabed. The Zeebrugge terminal is a key node in this onshore/offshore chain. The terminal has diversified into a major export facility, a hub aggregating CO2 for subsea pipeline transport in the North Sea. In parallel, smaller liquefaction terminals serve as collecting hubs where CO2 is liquefied and loaded onto ships for onward transport.

The natural gas grid: fade-in/fade-out accelerator

The natural gas grid continues to make available the capacities required to ensure security of supply to the customer base. New sections were added to the grid in the wake of the war in Ukraine early in the decade. Additional capacity was needed to accommodate increased flows from the west and ensure security of supply in Belgium and surrounding countries. The mix in the grid has included increasing quantities of carbon-neutral biomethane and synthetic methane, flattening the carbon footprint of the methane consumed.

Several sections of the natural gas grid in the 20s were repurposed and are now part of the separate hydrogen and CO2 grids, each combining existing and newly developed infrastructure. With the uptake of clean hydrogen and clean electricity in the energy mix, the process of reconfiguring the natural gas infrastructure is set to continue through to 2050. Facilitating the fading in of clean molecules and the fading out of natural gas, while ensuring security of supply of the evolving molecule mix, the natural gas grid has proven to be instrumental in the success of the green transition.

About the interviewee

Pascal De Buck joined Fluxys in 1995 where he successively headed the Legal, Commercial and Business Development & Strategy units, before being appointed Managing Director and CEO of Fluxys in 2016. He holds a degree in Law and graduated from the IESE Global CEO Program.

Today in 2030 our infrastructure offers the market the capacity to transport 30 TWh of hydrogen and 30 million tons of CO2 per year ”



Fernand Griffnée
ORES
CEO

We moved from conceptual thinking to concrete actions

Energy played a key role in reaching the climate and decarbonization objectives, and the grid operators faced a triple challenge: accommodating decentralized production and enabling the transitions to electrical mobility and electrical heating. To meet these challenges, ORES relied first and foremost on its infrastructure, in which it continued to invest heavily, and on the efficient use of data for the benefit of a consumer who became increasingly a consumer-actor, says Fernand Griffnée.

Today, in anno 2030, the energy sector embraces things that caused concern in the past, such as the energy transition and decarbonization. We realized that we needed to talk about these issues in concrete terms and see how they transform the lives of people, businesses, and energy players. In other words, we have moved from conceptual thinking to reality.

Three major areas were connected to the energy transition and decarbonization: electricity production, heating, and mobility. In the coming years, we must meet these three challenges in order to achieve the objective of a climate-neutral European Union by 2050, i.e. tomorrow.

Produce electricity differently

Electricity production had to increase substantially due to the electrification of our society. Today, we are

pursuing the decentralization of electricity production, mainly through photovoltaics. In the past 10 years, no less than two gigawatts of renewable electricity have been added to our network – roughly the equivalent of two nuclear reactors, to reach a total of more than four gigawatts. This meant that ORES had to develop a new activity, namely the accommodation of decentralized electricity generation.

Heat homes and organize mobility differently

In Wallonia back in the 2020s, around 40% of the population heated their homes with gas and another 40% with fuel oil. The rest was covered mainly by biomass or heat pumps. The priority was to increase energy efficiency and to reduce the share of fuel oil. Furthermore, gas was gradually replaced by biogas as we realized that the potential of biogas in Wallonia is substantial³. The advantage of biogas was that the existing gas network could be used. It provided a new revenue stream for the actors in the agricultural sector, which, together with the public authorities, were important partners to develop this industry.

As far as hydrogen is concerned, we remained attentive to the development of the sector, but did not see immediately important development of the uses on our infrastructure.

Electricity plays an important role in heating as well. Over the last decade, we have seen an important

³ According to the study of ValBiom of 2019, the realistic biogas potential in Belgium is 15.6 TWhpc. The Walloon potential alone could represent almost 50% of the consumption of the distribution network: in other words, 1 in 2 Walloon households could be supplied with biomethane.

electrification of heating with heat pumps becoming the standard for new or well insulated homes. Hybrid solutions that smartly combine electric heat pumps with gas boilers - depending on external temperatures - have also been adopted by many households and contributed to the decarbonization of heating.

The number of electric cars increased massively between 2020 and 2030 and is expected to represent the majority share of the car fleet of 2050.

Significant investments in the low voltage network

These three elements have a significant impact on the electricity and gas distribution networks, which raised two questions. First, were the networks ready? And if not, would we have sufficient time to adapt them?

We were able to gradually adapt the distribution networks. They were not in a situation of under-investment. However, the pace at which we had to transform the networks had to accelerate around 2028-2030. The amount of required investment also increased rapidly, particularly in the low voltage network, which was put to the test because it is at this level that electric vehicles are being charged and solar panels and heat pumps are being connected. This also meant that we had to adapt our operations significantly. Until then, we were used to working mainly on the medium voltage network. The low voltage network is more fine-grained, spans over 50,000 km (1.25x the Earth's circumference) and is situated along municipal roads.

In order to relieve the low voltage network as much as possible, we had to incentivize certain applications that used the medium instead of low voltage network, such as, for example, photovoltaic panels.

As far as ORES is concerned, we knew enough in 2022 about what was going to happen in the next years to launch projects and invest. So today, anno 2030, our networks are ready for the new uses we anticipated.

Data & infrastructure

Even in anno 2030, infrastructure remains the core business of a network operator. This does not mean that we neglect data. Together with software it is a key enabler to minimize our investments, allow efficient operation, unlock flexibility in the network, and offer new services to our customers. In order to avoid duplication of tasks, it was important that the distribution network and the transmission operator worked together to develop a unique, real-time data platform in Belgium, which was able to manage the significant amount of data.

Thanks to the investment in data, a whole new range of services have been proposed to consumers, by ORES but also by a large eco-system of companies, from startups to well established energy players.

These services have allowed consumers to take a much more active role regarding their energy use, by adapting their consumption depending on market conditions, by providing win-win flexibility services to the network operators, and by actively participating in energy communities. These new consumer behaviors, facilitated by investment in data, have been to the triple-benefit of the energy transition, reduced energy bills, and the sustainability of our energy network.

To support this energy transition and the electrification of society, ORES had to invest efficiently and accurately. In other words, we needed to get it right. We knew enough in 2022 about what was going to happen in the next years to launch projects. It was certainly not too early to put in place the required projects. We did not have the time to wait any longer. Today, in anno 2030, our networks are ready for the new uses we anticipated.

About the interviewee

Fernand Grifnée is the Managing Director of ORES, the operator responsible for the electricity and gas distribution networks of some 200 Walloon municipalities, and a well-known player in the energy world. As law graduate from ULiège, he worked in the early 1990s in the office of Justice Minister Melchior Wathelet, before joining Electrabel in 1995, where he became communications director in 2002.

As far as ORES is concerned, we knew enough about the future trends to act in 2022. It was certainly not too early to put the required projects in place. We did not have the time to wait any longer ”



Gil Simon
Resa
CEO

From energy transition to energy revolution

From decentralized production to electrification, even today, in 2030, the energy transition has many implications for a DSO like RESA. This requires substantial investments and above all a lot of anticipation, says Gil Simon.

For decades the debate on energy focussed mainly on the question of the phase out of nuclear power plants. Russia's invasion of Ukraine in 2022 changed all that. Soaring prices made energy a major topic of common interest. Everyone became aware of the issues surrounding supply, thanks to explanations by popularizers in the press.

This event highlighted the true scale of the challenge of the transition, and even of the energy revolution. Achieving the objectives set required a major acceleration of the pace. In Wallonia, carbon neutrality meant reducing energy consumption by more than 50% and replacing the use of fossil fuels by green alternatives such as biogas, e-methane etc.

Massive electrification

At the root of this energy revolution stands a massive electrification of uses. In one decade, electricity consumption for mobility multiplied by almost five times in Wallonia.

Today, heat pumps have clearly made their mark, which has also increased the share of electricity for heating, a trend that is set to accelerate even more between now and 2050, as home renovation intensifies.

Renewable energy

In parallel with electrification, renewable energies have been actively developed. In Wallonia, the installed capacity has more than doubled between 2021 and 2030, with photovoltaic energy developing very strongly. And this is only the beginning, as power production is expected to multiply by 5 between 2021 and 2050 to reach carbon neutrality.

Historically, our electricity networks were not designed to absorb such decentralized production. As a public utility, we had to do everything we could to ensure that every consumer has access to a reliable power grid.

Doubling electric voltage

In concrete terms, the plan we established in 2022 to increase the electric voltage available to each customer from 3 kVa to 6.66 kVa is today, in 2030, more essential than ever. This is based on a requirement of 2 kVa for traditional uses, 2 kVa for electric mobility and 2.66 kVa for a heat pump.

In recent years, we have therefore initiated an ambitious investment plan of 820 million euro to adapt our networks by 2050. This is in addition to our recurring investments of around 80 million euro per year.

To finance all of this, we plan to continue to turn, among others, to investors, who are fond of bonds issued by a player committed to the energy transition and with a stable financial outlook.

Smart Meter

Back in 2022, Resa asked Wallonia to accelerate the installation of smart meters. They were essential to the energy transition, and they were the precondition to building the networks of the future.

The platforms developed with our colleagues from Ores, Sibelga and Fluvius and our common smart meter allow us to collect and analyze data. The P1 port enables us to offer our customers applications that enable them to manage their energy in the best possible way and thus ease the tension on the network.

The future of the green molecule

Anno 2030, the role of fossil gas in tomorrow's low-carbon energy mix is clearly reduced. However, we cannot do without the molecule, which still represents the majority of the energy we transport.

Our investments and support for sectors such as biogas, hydrogen and e-methane are contributing to the development of green alternatives. We are also participating in the development of CO2 capture technologies in Wallonia.

Ideal vision

This scenario that we have before us in 2030 is somewhat idealistic. Unfortunately, unforeseen events are likely to occur along the way. That is why the sector needs to think about changes to the tariff methodology. While five-year rates provide visibility, it is important to be able to take into account the changing context, political choices regarding climate targets, etc. The tariff methodology has to adapt to the transition, not the other way around.

About the interviewee

General Manager of RESA since 2018, Gil Simon has been active in the group that integrates the gas and electricity, known as a Distribution System Operator (DSO), in the province of Liege for over 10 years. A connoisseur of the energy world and local politics, he insists on the public service aspects and the social role of a company like RESA.



To absorb the massive electrification of uses and the development of renewable energies, we need more than double the electric voltage available to each customer ”



Hamid Ait Abderrahim
General Manager of MYRRHA,
former Deputy Director General of SCK-CEN

Building on our strengths in nuclear power

The 2022 crisis brought us back to certain realities that we had completely forgotten. Energy transition is an absolute requirement, but we also need large quantities of energy at affordable prices. As a result, anno 2030, nuclear power has gradually regained its place as an essential link in the transition to carbon neutrality, says Hamid Aït Abderrahim.

In 2030, Belgium finally has a detailed and realistic roadmap for its energy transition. Although fossil gas still has an important place in the energy mix, it has been definitively relegated to the category of energy sources to avoid. Methane has a greenhouse effect 25 times greater than CO₂, and its climate balance is in fact burdened by losses during extraction, liquefaction and transportation.

Electrification

Numerous energy carriers are still under development. The most advanced ones include hydrogen, which remains promising, especially for industrial uses. But its impact on the transition is still limited in 2030, and it is not yet the revolutionary energy vector that we imagined back in 2022.

In concrete terms, the main transformation of the energy system is electrification. The electric car is on its way to becoming widespread. Especially since users have become aware of its financial advantage in terms of cost/km, when all the costs over its life cycle are taken into account.

Offshore wind power

This increased dependence on electricity has raised questions about security of supply and the transition to low-carbon sources. Belgium has been able to rely on the expertise developed in offshore wind power to increase its offshore capacity.

The most optimistic still dream of developing large wind projects in international waters, or even beyond the Arctic Circle where the winds are more constant. But whether from a technical or political point of view, there are still many obstacles, and these projects will not contribute to Belgium's electricity supply for the next decade.

Extension of nuclear power

The extension of nuclear power has gradually become an obvious choice. In 2022, the decision to extend Tihange 3 and Doel 4 until 2035 was at a moment when we were backed into a corner. But the energy crisis had also led to a broader reconsideration of nuclear power after two decades of procrastination.

Today, in 2030, the advantages of the atom, low-carbon and controllable, are more valued than ever. Society realized that nuclear power provides an energy that can be controlled, and therefore contributes to energy security at an affordable cost. Tihange 1 and 2 have thus also been extended, but Doel 3 has been sacrificed on the altar of political hesitation. Nuclear power thus plays a major role in the Belgian energy landscape and in keeping electricity prices at a level of

90-100 euro per MWh. This is much higher than what we were used to in 2020s, but still competitive, as the energy costs have risen in the other continents as well.

“The crisis brought more realism in the energy debate and made Europe return to its roots, which was the creation of the European Coal and Steel Community⁴ that led to the foundation of Euratom⁵”

New nuclear power

Gradually, the question of a long-term nuclear strategy also arose. In the end, reason prevailed. Belgium has opted out of the pressurized water reactors of the third generation, preferring to extend its existing plants until 2045.

Eventually, they will be replaced around 2045 by small Generation-4 modular reactors, with the potential of being installed on all the country's nuclear sites (Doel, Tihange, Mol, Fleurus), or even in combination with other production facilities elsewhere. The trend is to create energy hubs that manage multiple energy sources and vectors capable of ensuring a continuous supply and storing/transforming surpluses, hence increasing the return on investment for all components of the puzzle.

In addition to the safety aspects, the main advantage of 4th generation SMRs is obviously their ability to accommodate used nuclear fuel. This means that a new source of energy will open up to us in the years to come, and it will allow for the production of 100 times more energy with the same quantity of uranium. Recycling used nuclear fuel will become second nature in Europe and will enable us to strengthen our energy independence, while partly resolving the issue of nuclear waste management.

⁴ After the war, six European countries decided to jointly manage the main raw materials for the war industry (coal and steel). This led to the creation of the European Coal and Steel Community (ECSC). The ECSC is considered the first impetus for the European Union, into which it later merged, although it did not legally cease to exist until 2002, after 50 years.

⁵ Euratom was created in 1957 to further European integration and tackle energy shortages through the peaceful use of nuclear power.

Euratom relaunched

To develop these fourth-generation reactors, Belgium has joined forces with other European countries to relaunch Euratom. The organization is once again at the center of the creation of a real industrial sector.

More broadly, the whole issue of energy has come back to the forefront of European policy. For the EU this is a real return to its roots, as it was originally founded primarily on the subject of energy (European Coal and Steel Community and Euratom).

Belgian nuclear expertise

With its deep expertise in nuclear power, developed since the 1950s, and the expertise accumulated through the MYRRHA project, Belgium established itself as a major player in Euratom in 2030.

As MYRRHA General Manager and former Deputy Director General of SCK-CEN, this is obviously a great source of pride, especially since our research on lead-bismuth coolant also allows us to consider new energy storage solutions.

About the interviewee

General Manager of MYRRHA, former Deputy Director General of SCK-CEN, Prof. Dr. Hamid Aït Abderrahim has been leading the research project on nuclear waste treatment, fuel materials for fission systems and fusion materials MYRRHA since 1998. He also teaches reactor physics and nuclear engineering at the École polytechnique de Louvain (UCL). Passionate about nuclear energy since his youth, he obtained a diploma in Industrial Engineering in Nuclear Energy (Haute École Paul-Henri Spaak), a DEA in Reactor Physics (University of Paris-Sud) and a PhD in Reactor Physics from the same university. Involved in society, Prof. Dr. Hamid Aït Abderrahim founded the Belgian & Algerian Entrepreneurs Club in order to strengthen the economic links between the two countries.

“KPMG is committed to playing a constructive role in the decarbonization journey. Next to reducing our own carbon footprint, we also invest in capabilities that will help organizations transform”

Daniel Pairon

Partner, Global Lead Asset Management
KPMG in Belgium



Inne Mertens
Sibelga
CEO

To heat homes in Brussels we need a mix between green electrons and molecules – why not hydrogen?

Energy transition is a big challenge, no matter where you live, but certainly in a metropolitan area like Brussels. Sibelga did not make everyday choices in recent years, but the distribution system operator was determined to ensure a pathway to decarbonized energy through a fair and affordable energy transition. Where are we today, anno 2030, asks Inne Mertens, CEO of Sibelga.

Wind energy is not an option in Brussels – there is only one wind turbine in the city and I am looking at it now, out there in front of our headquarters, as I write this from my office. Capturing industrial waste heat is also not an option – we have relatively little industry. There's really only one possibility for renewable electricity production in Brussels itself: solar energy.

Sibelga as a market facilitator

In 2030, Sibelga fully plays the role of 'notary' of the energy sector. It facilitates the provision of new energy services through its smart meters, data, and GDPR. After several discussions, Sibelga and Elia found a modus vivendi and common vision on the balancing responsibilities Sibelga needed to take. Sibelga now plays a balancing role in order to avoid imbalance in certain districts in Brussels while reconciling balancing and congestion activities on its network. It is indeed the role of the DSO to ensure the security of the access to electricity at the level of the energy consumer or in certain districts by making the necessary investments

in the network and actioning the flexibility of the customer.

Sibelga also facilitates the creating of energy communities. In 2022, there were only 5 communities spread throughout Brussels. But in barely eight years, the number has significantly increased representing 20% of Brussels' total electricity consumption. Once an energy community has formed, we place the necessary intelligent energy meters at all the members of the community to calculate how much energy each member consumes and produces every 15'. We then send the consumption and production data to the energy community administrator, who bills each community member for the produced and auto-consumed energy, and to the energy supplier for the remaining necessary energy.

However, we leave the creation of energy communities to commercial players. Today, in 2030, energy suppliers fully take on this role. In the early 2020s, they were more likely to see these communities as a threat, but by now they have realized the value of it and are helping to create them. Energy production has been uberized by the growing active role played by the customer.

“Energy production has been uberized”

But what about heating?

Integrating solar energy and electric mobility into the Brussels electricity grid will only have led to local congestion problems in 2030. But heating is another matter. In 2022, 50% of the final energy consumption in Brussels was natural gas for the heating of homes and businesses. And the problem is: everyone is cold at the same time. If we would heat all Brussels consumers electrically today, all together, we would reach unfeasible peaks in electricity consumption.

We did a study of alternatives to electric heating as early as 2022. An electric heat pump only works adequately in well-insulated homes and preferably with underfloor heating, which requires huge renovations. Heat pumps with geothermal energy then? Also not an option in Brussels. The only possibility left is air-to-air heat pumps, which are less performant.

Why not with ... hydrogen?

It became clear: we needed to heat with another molecule as part of a diversified mix of solutions for heating besides electrification. This could be biomethane or synthetic gas, but we also wanted to analyze whether hydrogen would be an option. From our study, hydrogen proved to be a possible solution for heating, especially in those neighborhoods where homes are difficult to renovate.

“In the bigger picture, hydrogen became technically and economically feasible”

Hydrogen was expensive but taking the total cost (including the cost of renovations and managing the system costs) into account it appeared in some cases feasible, both economically and technically. We had to replace certain sleeves and taps, but we could simply reuse the polyethylene pipes of our grid. And to avoid the need for everyone to have a hydrogen boiler in their home, we would build heat networks at the neighborhood level.

One main question that remained was and is: would there be enough hydrogen? Who could supply it? And would that hydrogen be green? But in the end, whether the solution is biomethane, synthetic gas, or hydrogen, the Brussels Region is always going to have to import green molecules.

Have we realized this ambitious project today, in 2030? Not quite yet. But if all goes well, by 2050, we will be completely off natural gas in Brussels, period.

Key to success

The key to success for this whole story, of course, was the customer. For starters, the customer had to be able and willing to come along. A very large renovation program started in Brussels in 2022, but we also had an energy crisis. Were Brussels residents still able to free up enough resources to renovate? After all, in 2022, 60% of Brussels residents were renting and 30% were living in energy poverty.

In recent years, Sibelga has therefore started to supply energy to more and more socially protected customers. Not only through a social tariff, but also by placing solar panels on the roofs of social housing, in collaboration with social housing companies and the government. The residents could then buy this energy at a lower price.

More flexibility needed

In addition, every energy customer had to become an active customer, consuming energy much more consciously. Only in this way could we avoid congestion and optimize balancing. We are currently working with implicit and explicit flexibility.

With implicit flexibility, we use prices to signal to the customer in which periods it is better to use energy. The charging of electric vehicles can certainly be controlled this way. Heating not so much.

Are there supply risks with certain customers or neighborhoods? Then we push the emergency button and force explicit flexibility, so that the entire network does not shut down. In 2022, we already looked at the exceptional circumstances in which this could be possible, today this has been clarified and we can actually do this. Very temporarily, of course.

Time for a master plan

The challenges in recent years have been enormous. To meet them, policy, the regulator, and the grid operators also had to come together. We had to arrive at a real cooperation model, with a holistic vision and a complete master plan for Brussels. In 2022, we already had pieces of the puzzle, but today, in 2030, we are putting the complete puzzle together. Now we have 20 years left to make it all happen. And we believe in it.

About the interviewee

Inne Mertens knows the energy sector inside out. She began her career at Electrabel in 1998, then joined ORES, Wallonia's largest distribution system operator, as Director of Customers & Markets in 2009. Since February 2022, she has been CEO of Sibelga, the Brussels distribution system operator for electricity and gas.



Marco Alverà
TES H2
Group CEO

A comprehensive energy vision and collaboration: the key to a greener future

The energy mix in Europe a decade ago is made up of around 25% electrons and 75% molecules. By 2030, we need to reduce the share of fossil fuels by introducing green hydrogen in order to reach the net-zero targets. At that point, the role of renewables in the molecule part should have strongly increased, greatly reducing our reliance on fossil fuels.

The current energy crisis has demonstrated that we need to accelerate the move to renewables. At TES, we plan to accelerate a seamless transition from the use of fossil gas to green gas. By 2030, different industry players can gradually shift their share of fossil fuels towards eNG (green gas) provided by TES.

In addition, by 2030 the electrolyzer capacity will have likely increased, making it even easier and more affordable to produce hydrogen and therefore more eNG.

Green hydrogen more affordable than methane

Until a few years ago, the price of green hydrogen was too high. Now, the price of solar power and other renewable energy sources is getting cheaper, making it possible to create green hydrogen at a reasonable cost. It has even become less expensive to use green hydrogen than gas. This tendency will make green hydrogen even more affordable by 2030.

“Our eNG is a completely renewable LNG, produced by combining green hydrogen and CO₂ to create electric natural gas (CH₄). This form is much easier to transport because it can be used directly in the existing pipeline networks”

To remain competitive, it is crucial that Europe supports the building of new factories for electrolyzers and solar panels to really ramp up the production of green hydrogen ”

EU member states need to stick together

It all depends on storage. The EU gas market is a truly European market; there are no boundaries for gas. If there is a crisis in one EU country, it will be felt in the other countries. If it is cold in one EU country, it is cold at the same time nearly everywhere in the EU which results in European countries competing for scarcely available gas. The big risk is that some countries have the power to close their borders for gas. We might just manage to get through the winter of 2022/23 since gas storage facilities are relatively full. But, for the winter of 2023/24, the situation will become even worse.

To overcome this crisis, we need to look at the situation as a common European gas crisis that can only be addressed with European solutions, such as price caps. When it comes to prices, we can only deal with and cap the wholesale price by collectively purchasing LNG across Europe. We also need to build strong solidarity mechanisms across Europe, thereby reducing the risk of countries hoarding gas and encouraging EU member states to help each other.

The future is green hydrogen

We're in the situation we are today because we don't have a comprehensive energy vision and rely too heavily on either gas or electricity. TES is here to create a bridge between the electric part of the energy mix and the molecular part. We are using renewable electricity, such as solar and wind power, to produce green molecules that are easy to transport as eNG. This is particularly important for certain use cases such as heavy mobility and for some industries, since not everything can be electrified. In 2030, TES will be on track towards its goal to supply 10% of the total annual primary energy demand of Germany by 2045 with its eNG.

The good news for many companies and industry players - that are thinking about decarbonizing and creating a more secure portfolio of energy supply - is how cheap green hydrogen and its derivatives are going to be in the next decade.

The first deliveries of green hydrogen into the TES terminal in Wilhelmshaven, Germany, are expected to take place in 2026. By 2030, TES will have developed green hydrogen production globally, with important locations in Australia, Europe, the Middle East and Africa. With this, TES will be at the center of the transition to a new energy system that will be affordable, secure and clean. As a result, our company will be a central and reliable partner to different industry players who want to phase out their consumption of fossil fuels.

About the interviewee

Marco Alverà has more than 20 years of experience in energy companies and is the author of *The Hydrogen Revolution*. He began his career at Goldman Sachs before starting and selling a telecom company, and then joining Enel, one of the world's largest green electricity companies. He subsequently worked for Eni, the oil and gas major, for over 10 years in senior positions, and from 2016 to 2022 was CEO of Snam, which Marco positioned as an international leader in green gas and green gas infrastructure. Since 2017 he is Non-Executive Director of S&P Global, where he is also Chair of the Finance Committee. Marco Alverà became the CEO of TES in June 2022.



Marc Bensadoun

TotalEnergies Power & Gas Belgium
VP Customer Supply & Services BE-NL

Belgium's economic development is intimately linked to energy transition

As an energy pioneer, Belgium almost lost its historical advantage on the eve of its 200th anniversary. But a return to pragmatism and a willingness to move forward together have put it back on track. The widespread use of smart meters has led to a real transformation of the sector, says Marc Bensadoun, VP Customer Supply & Services BE-NL at TotalEnergies Power & Gas Belgium.

From coal mining to renewable energies, from nuclear power to the transit of hydrocarbons, Belgium's economic development is intimately linked to energy. A trend that has been confirmed since the beginning of this century and that is still going on today in 2030. Despite its narrow coastline and limited sunshine, the country has managed to become one of the world leaders in offshore wind power and residential solar panel installation.

Pragmatism

After facing many successive crises, from Covid to energy prices, Belgium's pioneering spirit has been highly challenged. One of the major pitfalls in establishing change was staying too hung-up on radical concepts and some dogmatism around how to accelerate the energy transition. As a symbol of this agitated period, Belgium shut down its nuclear reactor Doel 3 amidst an energy crisis after Russia invaded Ukraine.

While the decision could be explained technically, the debate surrounding the power mix was symptomatic. So was the great discrepancy between the debates on the accessibility of call centers (in the age of apps) and the Internet of Energy launched by Elia.

Fortunately, crisis is often a source of pragmatism, national cohesion, innovation, and new opportunities. All stakeholders have a role to play: the federal government, the Regions, the network operators, the energy companies, and the consumers – all of them together. A dialogue that has allowed pragmatic solutions to emerge and enable concrete progress in the energy transition and the transformation of the sector. This dialogue among stakeholders was not common in the twenties as there was not yet a culture of trust, nor bodies who would encourage it. Ensuring security of supply, transition towards decarbonization, affordability of energy needs, and new consumption need a culture of solidarity and concertation. A culture of 'better together' was vital for the country, the climate, and our planet. Each one had a role to play.

This has changed considerably. Energy companies are now more considered as key part of the solution. This energy crisis got us a seat at the table, and we became an important 'sustainable' partner in solution building - not only with a short-term view, but to shape the future of low carbon energy.

A realistic roadmap

A realistic roadmap, integrating all available low carbon energy sources has been established. Today, Belgium is champion of managing renewables, moving step-by-step towards carbon neutrality while accelerating energy sobriety and efficiency, while limiting its dependence on imports, which are often subject to the same hazards as Belgian production (availability of wind and sun). It realized that having production capacity on its own territory is a major asset ensuring security of supply, climate ambitions and affordable prices. Moreover, the roadmap took an electricity capacity mix into account that aimed to reduce system imbalances, which were extremely high back in 2022 compared to neighboring countries.

In the wake of the advertising campaign launched in 2022 to encourage households to reduce their consumption, the sector and the authorities have been able to move forward together on numerous projects.

The energy crisis and soaring prices have served as catalysts. Consumers no longer look at their bills with a distracted eye but have become aware of the financial (and environmental) benefits of better managing their consumption. Today, in 2030, they have become true consumers and prosumers.

Smart meter

One of the key points of this evolution is the progressive generalization of smart meters. Belgium has gone from being a latecomer to a pioneer in this field. The authorities have succeeded in reassuring the general public and making them aware of the advantages of smart meters in the face of the many urban legends in circulation.

Today, all actors can fully exploit the data and possibilities. The consumer can more easily follow and more efficiently manage their consumption. The possibilities of data communication facilitate the optimization of the electric car charge and the storage of the production of its solar panels for example.

All this allows the consumer to rationalize their bills while contributing to stabilizing a network subjected to a higher tension in a context of transition.

Increased digitalization

This new relationship between consumers and energy providers is much more digitalized. Call centers are no

longer used only as a means of emergency contact or as a last resort in the event of a specific problem. Most of the communication is done through an app.

Through these apps, the customer can find all the basic information (such as contracts and bills), request an intervention in case of a problem, and receive many tips to better manage their consumption.

The compilation of data and theoretical disaggregation schemes have made it possible for the past few years to really accompany the consumer on a daily basis. We can inform them of any deviation in their consumption and its probable origin without having multiplied the meters for each of their appliances.

The end of pure suppliers

Regarding the composition of the sector, the main evolution of the last eight years is the progressive disappearance of most of the pure suppliers. The energy crisis of 2022-2023 and the increased volatility of energy prices have taken their toll on their business model. To remain sustainable, they had to de-risk and transform their relationship with customers as a catalyst for being both strong actors in the energy transition.

Today, in 2030, the large energy companies have a major role to play. They manage the auto-production of the consumers and supply green energy for the remainder. As a supplier, they must have sufficient production capacity and needs assets to provide flexibility to the network. TotalEnergies, which has always applied an integrated model strategy for power and gas, has largely anticipated this environment.

About the interviewee

VP Customer Supply & Services BE-NL of TotalEnergies' gas and electricity activities in Belgium and the Netherlands, Marc Bensadoun has spent almost his entire career with the French energy giant. In particular, he oversaw the acquisition of Lampiris in Belgium and the launch of its gas and electricity activities in France.

“The main evolution of the last eight years is the progressive disappearance of most of the pure nonintegrated suppliers”



Paul Tummers
Virya Energy
CEO

We must also produce our own green hydrogen

What will our energy supply look like today, anno 2030? More sustainable and less dependent on other countries, that is for sure. The war in Ukraine made us realize that we depended too much on Russian gas, exposing our vulnerability to an undiversified energy supply. So, we started relying more on green hydrogen, made with renewable energy. Where would we get this green hydrogen from? Did we have to produce a certain amount of hydrogen in Europe? Paul Tummers explains.

In 2022, we consumed about 400 TWh in Belgium, of which almost 80 TWh were electric. In 2030, we are on our way to increasing the share of electricity drastically due to the further electrification of our society. But we always knew that not everything could be electrified. Imagine having all trucks drive electrically. While technically possible, it's not economically feasible. Today, we live with this reality. The future that is unrolling in 2030 is certainly a combination of electricity and green molecules. But then again, the question is: where do we get those molecules from?

Import green molecules, but also produce them locally

Let me say it right away: we realized that we needed to import green hydrogen (or derivatives thereof) to meet energy demand. We could build the infrastructure for that fairly quickly. But then some of the green hydrogen had to be produced somewhere locally, and some had to be imported through the ports of Zeebrugge or Antwerp. That required huge investments. And by

relying only on imports, we had to think about new geopolitical dependencies. So, diversification was one of the main considerations, as we developed our [national] plans.

Diversification of energy sources was key to ensuring energy security”

Did we envisage production of green hydrogen in Belgium? I'm convinced we did, in part. Conversely, back in 2020s, you heard voices against the idea of producing green hydrogen domestically, with the argument being it would waste scarce green power. There is some truth to this, but it's not the whole story. We had to make choices, weighing all the costs and benefits. Today in 2030, we have an excess of green power production at certain times of the day, which we cannot all store in batteries and therefore we convert this excess green electricity into green hydrogen that can then be used when needed.

In recent years, our society has become much more aware that energy is a limited resource and trade-offs had to be made on its uses at every level of society.

Who will choose?

Should Europe make these choices? Yes, this is the most appropriate solution. Especially if you have to weigh the costs and benefits. It's about making the best choices together, without everyone thinking about themselves. Decisions should be based on facts and the guiding value of solidarity. Only, how do you explain this to EU citizens? At some point, though, we just have to tell it like it is.

The solution to energy transition is a puzzle with many pieces, and each piece brings part of the solution ”

Working on every piece of the puzzle

Look, the solution to energy transition is a puzzle with many pieces, and each piece brings part of the solution. Awareness has also grown in recent years – everyone is literally feeling climate change firsthand. Politically, all this is not always obvious, because everything has its price. But again, doing nothing is the most expensive option. We will continue to have to choose what to put first, our future depends on it.

Virya Energy keeps on contributing to the energy transition, by producing more renewable energy via onshore wind energy, which we were able to expand significantly outside our traditional home bases – Belgium and France – into several new countries like Poland, and via solar energy for SMEs and in the field via agro-voltaics. Both paths continue to offer enormous potential. At the same time, we are also focusing on the intermediate links, such as the hydrogen economy, making sure that renewable energy reaches the end customer and ensuring that they can use fit for purpose energy at an affordable price.

About the interviewee

Paul Tummers is CEO of the energy holding company Virya Energy, part of the Colruyt Group. Quietly, Virya Energy has grown into the largest green energy company in Belgium. It is a green energy empire worth more than 2 billion euro, stretching from Norway to India. Previously, Mr. Tummers had worked at Fluxys from 2000, where he was CFO.



Leonardo Meeus
Vlerick Business School
Professor

The security of energy supply crisis that accelerated the energy transition

Before 2022, we had to meet European climate targets to save our planet. But, as important as that was, it still proved a difficult argument to convince everyone. Then we experienced an important security of energy supply crisis. A moment that also showed that European energy spot markets worked, but that we needed to supplement them with a longer-term investment framework. Prof. Dr. Leonardo Meeus tells us why.

Since the 1990s, Europe has been pushing strongly to liberalize the European electricity market. That was supposed to lead to more competition, and thus to sufficient energy supply at affordable prices. And guess what: that liberalized European market has not failed. I understand that this is a bold statement, especially if I had made it in 2022, during the time of extreme energy prices. But still. It is correct.

After all, the energy crisis would have been much worse had we not had this market. Some member states suffered more from the energy crisis than others, but thanks to the market they all got extra energy from other “drawers” exactly when they needed it. And as extreme as prices were, they would have been much higher had they not been linked across European borders. That dampened the volatility.

Quid dependence on Russia?

So yes, our energy spot markets are working. And no, European policy has not failed. Neither with respect to our dependence on Russian gas. Look, from 2006-2008, Eastern Europe already experienced at first hand that Russia could use energy as a weapon when

Russia cut off gas supplies via Ukraine twice. But that could not convince the rest of Europe to reduce their dependency on Russian gas. Thanks to infrastructure projects supported by the EU we are now able to move gas more easily from the west to the east when the east is short of gas, but the massive imports of gas from Russia continues.

After all, the EU member states themselves decided where they bought gas. So countries like Germany and Italy continued to import most of their gas from Russia. Which is understandable: Russian gas was so readily available and so cheap. But that choice would cost us very dearly in 2022, when we all realized that we had to cut our ties with Russian gas.

Everything changed in February 2022

It was the moment when Russia invaded Ukraine, topped by an energy crisis. As dramatic as that event was, it also had positive consequences.

Suddenly we had to accelerate Europe’s energy transition, otherwise we risked losing our energy supply. So we stepped up to the plate in Europe,

working together to make the energy transition happen and meet the European 2030 climate and energy targets. Of course, in the short term we did some things that did not help to reduce our greenhouse gas emissions, such as restarting coal-fired power plants. But at the same time we made a lot more investments in renewable energy and storage solutions, which put us on the right track.

How the energy crisis calmed down

The alternative ways of producing electricity were also cheaper than natural gas, which encouraged us even more to invest in alternative energy sources. We decoupled the prices for natural gas and electricity by investing in renewables and storage. We accelerated the transition from natural gas towards renewable gasses, such as green hydrogen and biomethane.

Other positive consequences included measures to reduce gas demand. If we cap energy prices to keep them affordable, we increase the energy shortage, because then demand increases. If, on the other hand, we reduce demand, prices fall and we solve the shortage. But we all had to learn the latter, weighed down by extreme prices.

“If we reduce our demand, prices go down and we solve the deficit”

Today, so many years after the energy crisis, consumers are certainly adjusting their demand better to prices. We also have more appliances in our homes that allow us to do so, such as heat pumps that heat our homes during the day, when solar panels yield more. Energy is also high on the agenda at industries. No longer simply for image purposes, but to survive.

General demand has naturally increased, for example due to electric vehicles which required additional investments in the electricity network. Hence, I hope that the tariffs we pay today in 2030 reflect much more the investment costs so that consumers level off peak consumption and we don't invest more than necessary. The capacity tariff was a first step to that end, but not the last. Ultimately, what we need to do is eliminate our common peaks.

“In the end, we achieved the European climate and energy targets”

Without additional regulation?

Spot markets worked during the 2022 energy crisis. But additional regulation was needed to reform the wholesale market so that it could steer towards the necessary investments in renewable energy and backup solutions – coupled with regulation that simultaneously protected utilities from investment risks, and consumers from excessive energy prices.

But, in the end, it all worked out: we rapidly made the necessary investments in renewable energy - thus still achieving the European climate and energy targets of 2030 - gradually solved the energy crisis, cut ties with Russian gas and learned to use energy more consciously. Great!

About the interviewee

Leonardo Meeus is a former professor and partner of Vlerick Business School. He is currently a professor at the European University Institute and the KU Leuven. He is also the Director of the Florence School of Regulation and the Loyola de Palacio Chair on European Energy Regulation and Policy in the Robert Schuman Centre.



Acknowledgements

**This report was very much a team effort.
A special thank you to:**

The Sales & Marketing Team at KPMG in Belgium, Jorn De Neve, Magali Vercammen, Daniel Pairon, Philip Jeandarme, Rebecca Vercoutere, Marcia De Keersmaecker, Antonia Lauterbach, Arthur Rubinstein and Sofia Lanfranconi

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