

# EUROPEAN ENERGY REVIEW

**EER MONTHLY** | MAY 2013

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Can power markets resuscitate natural gas in Europe?

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## HIGH WAY ENERGY

*By Ben Warner - editor-in-chief*

During April EER travelled through the world. In our story '[Towards a future-proof energy system for The Netherlands](#)' by Gert van Wijland, you can read how the benevolent possession of a huge volume of natural gas is not per se stimulating a progressive transition towards the input of renewable energy sources. An in-depth research led to the conclusion that the Dutch have to accelerate to reach the EU-targets. That will not be easy in harsh economic times. Reiner Gaternann put together the facts concerning the difficult position in which the Swedish company Vattenfalls has ended up. The title of his article is a possible indication of one of the

main causes: [Vattenfall - is the state the right and good owner?](#) Of course, between the lines one can read that such a question also can be applied to similar relations in other countries. From Sweden to Germany, in which country the struggle for a solid transition to a sustainable energy future is informative, because this can be seen upon as an example for other countries too. Almost everywhere the interests of parties and policy makers strive for the right of way. Paul Hockenoss wrote a couple of articles about the Energiewende and ends for the time being with the vision and strategy of Dr. Jochem Homann who he calls [The marathon man for the Energiewende](#). This title is in more than one

respect not coincidental. Jozef Badida points out how important the developments are concerning the strengthening of the transport infrastructure. In [New approach towards the life blood of our society: EU energy infrastructure](#) he touches the essence of the security of supply. Looking further to the East we meet [Kurdistan and its role on the South East flank of Europe](#). Our correspondent Olgu Okumus shares her information on this newcomer. Although it obviously will take still quite some time before the vast resources will come on stream, the available volumes are promising and add to the diversification of suppliers: a goal that always was and is high on the EU-agenda.

The EU as a whole is subject in [Can power markets resuscitate gas in Europe?](#) Timon Dubbeling analyses the fall back of natural gas in our time and day, where a stronger position as leading fuel was foreseen. Of course, gas still is preferred from a perspective of climate control or at least the effort to lower emissions, but the actual developments alter the speed of improvements. The last article featuring the energy scenarios of Shell and the elucidation by Wim Thomas more or less represent a satellite view on the world of energy. In [Shell on the New Lens scenarios](#) paradoxes show the faces of complexity.

# *Can power markets resuscitate natural gas in Europe?*



If the integration of variable renewables into Europe's power systems is to continue in the decades to come, more needs to be done to ensure that the most flexible resources are available in the market. Gas-fired power generation is considered to be a key enabler of the energy transition due to its ability to compensate for variable renewable output. However, increased electricity production by renewables, low coal prices, energy efficiency measures and overall economic woes have reduced gas demand in recent years. In order to obtain the flexibility needed to manage a system with an ever-increasing share of variable renewables, power markets will have to reward generators on the basis of the ramping services they can deliver. Doing so will also help to get the flexible gas capacity back into the market and counter the coal renaissance that has a detrimental impact on Europe's climate agenda.

| *By Timon Dubbeling*

The EU is clear about its intention to increase the market share of variable renewables in the decades to come. In 2020, renewables should account for twenty percent of final energy (not electricity) consumption. And by 2050, the Commission's Energy Roadmap 2050 foresees renewables to deliver between 55 and 97 percent of total power consumption. Given that the region's hydropower capacity is almost fully exploited, variable renewables – wind,

solar PV, solar CSP in particular – will take up a lion's share of this growth in total non-conventional generation capacity.

The integration of the needed quantities of variable renewable capacity will only be possible if it does not endanger the secure management of the power grids. As electricity cannot be stored, a sudden change in production by wind and solar units can lead to large frequency deviations that, if uncontrolled, might

lead to system failure. Therefore, transmission system operators (TSOs) always need to have a minimum amount of conventional capacity – hydro, gas, coal, nuclear – at their disposal to enable a secure operation of the power system.

Because sudden changes in production by variable renewables require quick responses, the ability of conventional resources to ramp up or down their production quickly and reliably is of vital importance. And in this respect,

*Five years into the crisis it is clear that the golden age of the much-heralded natural gas is yet to arrive in Europe*

gas has a key advantage. Gas-fired power plants can generally adapt its level of production faster, farther and more reliably than its conventional competitors. It is thus commonly

acknowledged that gas has a key role to play in (the transition to) a low-carbon electricity system.

### Shattered expectations

The rise of variable renewables thus offered great prospects for natural gas in Europe, and in the early 2000s many agreed that gas had its best time coming. The assumption that Europe's gas demand would grow structurally by 2 percent per year, as it had done until then, underpinned a surge in

investments in flexible combined-cycle gas turbines (CCGTs). This surge of gas-fired generation capacity seemed to clear the way for Europe's energy transition. And then the economic crisis hit.

The chart below shows how Europe has lost over 10 years of demand growth since the economic crisis, bringing levels of gas consumption back to those

of the late 1990s. Five years into the crisis, it is clear that the much-heralded golden age of natural gas is yet to arrive in Europe, and prospects for growth

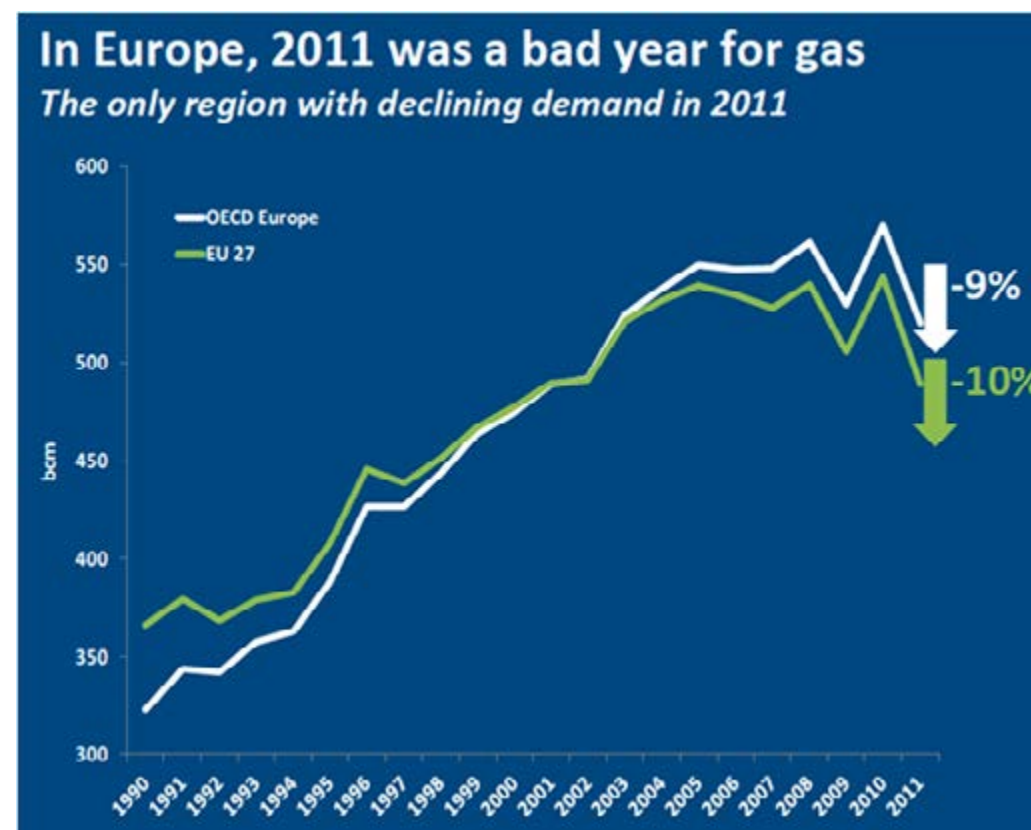


Figure 1. EU gas demand 1990 - 2011 - Source: IEA 2012

are dim. The enthusiasm about gas has turned into a situation of excess capacity, and throughout Europe load factors of gas-fired power plants have plummeted in recent years.

share is to become more competitive than coal. The two main instruments for doing so have proven insufficient. First, carbon prices as set by the ETS are far from the levels needed to induce a switch from

and leaves gas capacity underutilized. In contrast to expectations, coal generators now increasingly take up the “load-following” role (i.e. compensating for variable output from renewables) that had originally been ascribed to gas.

basis of the short-run marginal cost of their production and the flexibility of their capacity is largely irrelevant. In such a market environment, the more flexible capacity that plays a key role in compensating for the variable output of solar and wind units might not be producing energy because its marginal cost exceeds that of its less flexible competitors. The situation of coal and gas in Europe epitomizes this problem – the more flexible gas capacity is out of the market because coal is cheaper. Successfully integrating variable renewable capacity will imply that generators need to be rewarded for the ramping services they can reliably deliver.

### *The “arranged marriage” between gas and variable renewables seems to have ended up in an early divorce*

Economic woes are not the only reason the radical change in the outlook for gas in Europe. Back in December, Alex Forbes explained that the rise of renewable production, large imports of cheap US coal and energy efficiency measures have also played their part in driving demand for gas to unexpected lows.

coal to natural gas. Second, liberalization of gas markets and a move away from oil-indexed gas prices have yet to materialize, preventing the emergence of more competitively established gas prices in Europe.

As a consequence, the “arranged marriage” between gas and variable renewables seems to have ended up in an early divorce. Despite the political consensus on the importance of flexible gas in the transition to a low-carbon electricity system, the market prioritizes cheap coal

### A way out for gas

But because coal is generally less flexible than gas, this trend will put a strain on Europe’s ability to integrate increasing shares of variable renewables. In a low-carbon power system that many envision, it is of vital importance that the most flexible types of capacity are available to compensate the variable output of wind and solar units. However, the proliferation of flexibility necessitates the remuneration of flexibility. Utilities will only consider the ramping services of the capacity they put in place if it has a considerable impact on their revenues.

Rewarding flexibility implies that the economic model of power markets has to change. Currently, generators are only paid for the energy they deliver. Electricity producers compete on the

### Rewarding flexibility

One way to reward flexibility is to incorporate ramping services as an element in the capacity remuneration mechanisms (CRMs) that many European countries are gradually putting in place. These CRMs pay conventional generators for the availability of their capacity (in MW) that the system operator may require for balancing supply and demand in real

time. Although such CRMs are likely to guarantee a certain quantity of capacity, they often fail to incentivize the flexible type of capacity that the system needs.

Therefore, CRMs should be adapted to increase the remuneration for those generators that are best able to change their production quickly, reliably and by large increments. Creating multiple “capacity segments”, that have different value and are subject to separate capacity auctions, is one way of doing so. In such a system, there are multiple categories of capacity that each contain resources with a specified level of ramping capabilities. The segment with the most flexible generation capacity is auctioned first and clears at the highest price. Then the second segment, with less flexible firm capacity, is auctioned and clears at a lower price. This process of clearing increasingly less flexible firm capacity continues until the needed amount of firm capacity is procured. All generators bid into the highest capacity segment that they qualify for and receive the clearing price of that segment. The

figure below illustrates the functioning of such a system.

In contrast to a single clearing price system where all firm capacity receives the same price, a multiple clearing system rewards conventional generators according to the type of ramping services they have to offer. Because gas-fired power units can generally offer better ramping services, they would receive a higher price for their capacity than other types of generation. Under both types of auctions, the same amount of firm capacity is procured and the overall cost can remain equal as long as the rise in capacity payments for more flexible capacity is offset by a decline in revenues for less flexible capacity.

A second way to acquire the type of resources a power system needs is to tender for these resources specifically. Identifying the exact resource needs of the national or regional electricity system is no straightforward exercise. Nonetheless, each TSO can make a forecast of total electricity demand and

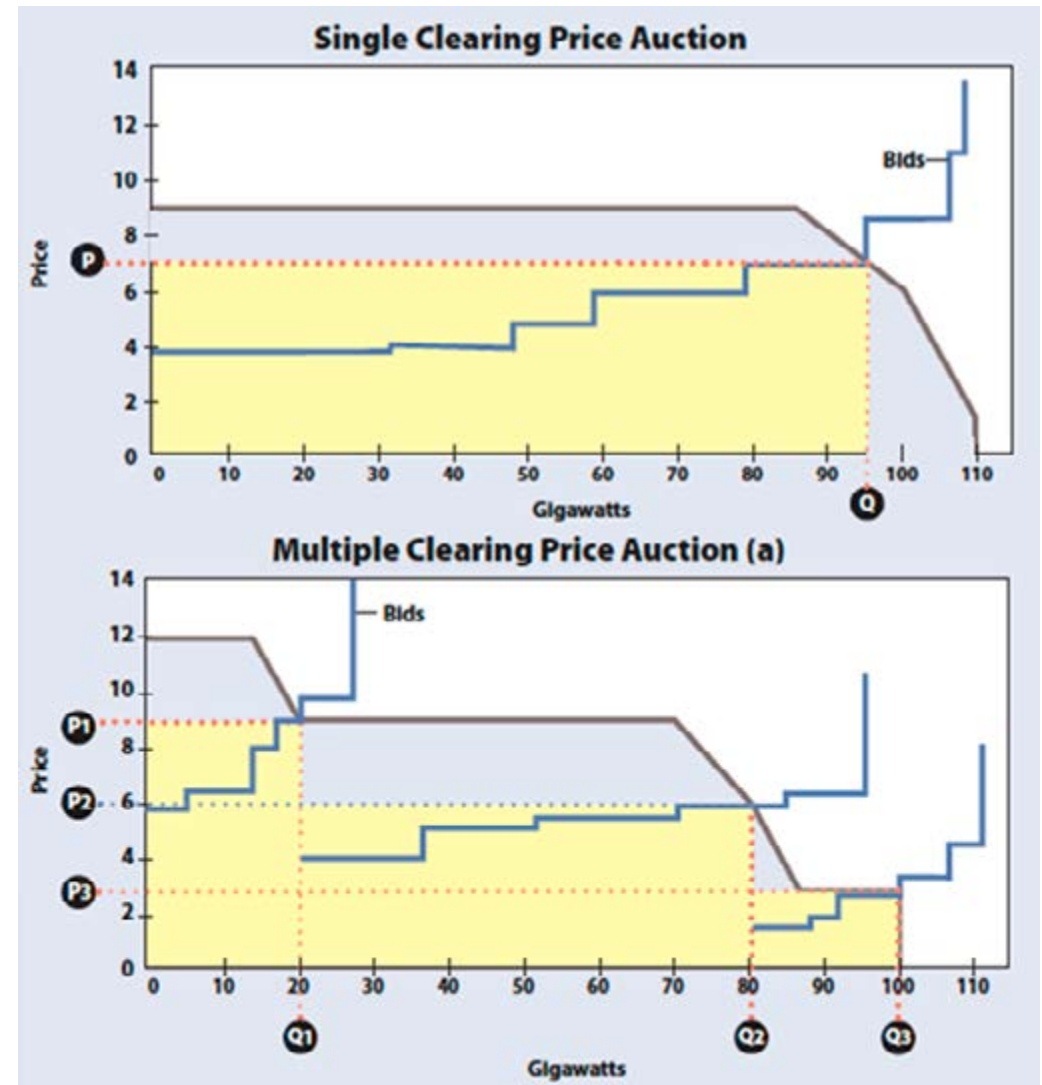


Figure 2. Illustration of single and multiple clearing auctions - Source: Hogan 2012

production by variable renewables. By taking the difference between the two – and taking imports and exports into consideration –, the TSO would then find the “net demand”. Simply put, the net demand indicates how much firm capacity needs to be available in the power system and what ramping qualities this capacity should possess.

On the basis of this net demand forecast, the TSO can then define specific products that it needs to ensure the efficient management of the power grids for the years to come. For instance, in a system with a high installed capacity of solar PV, one can imagine a tender for a ramping product that is available between 6 and 8 PM – the period where output by PV is likely to decline and where electricity consumption is reaching its daily peak. By tendering for these products on a forward basis, TSOs would offer multi-year contracts to the winning bidders and ensure reliability by penalizing non-delivery of the contracted flexibility services. Such tendering systems should allow for equal participation of parties

offering demand side management or storage opportunities.

Such a system carries two key advantages: first, it aligns the needs of the power system with the electricity products that market players are bidding to offer. And secondly, it gives those generators who can offer the flexibility services that the market needs access to additional long-term revenues.

Both solutions provide clear frameworks that allow for an optimal delivery of the flexibility services that TSOs require to efficiently manage the power grid. Nonetheless, national and regional needs. The urgency of incentivizing flexibility, as well as the most efficient way to attain the desired level, will differ between countries and regions as a function of their electricity mix, the availability of interconnection capacity, the age and lifetime of generation assets and prevailing legal prerogatives. Nonetheless, taking a regional or European approach to these issues can play a key role in making power systems

across Europe more compatible, flexible and efficient.

Although the merits of rewarding flexibility are evident from an operational point of view, the implications of such a new payment model are likely to meet important political obstacles. For one, a country like Poland has an interest in keeping its

*However, improving the situation of the ailing gas sector should not be the objective of a revamp of Europe’s power markets.*

relatively inflexible coal plants running and will thus be reluctant to suddenly cut their revenues and deteriorate their competitiveness. Moreover, if no peripheral measures are put in place to mitigate the rise of unabated coal, it will be difficult to explain the measures described above as anything else than a means to counter the coal renaissance.

## No free lunch

Rewarding flexibility has the potential to resuscitate Europe’s idle gas capacity as gas plants remain generally more flexible than their coal competitors. And together with other measures, such as credible carbon pricing, a fast-tracked liberalization of gas markets and a move away of oil-indexed gas pricing, there seems to be a way to counter the

coal renaissance in Europe. However, improving the situation of the ailing gas sector should not be the objective of a revamp of Europe’s power markets.

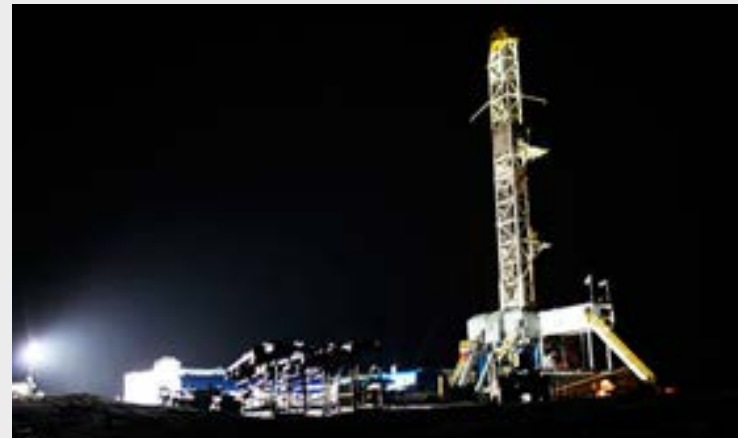
Indeed, TSOs would prefer coal over gas if coal were to be the more flexible source of power. Recent experience shows that the advantage of flexibility

that gas has traditionally held is anything but absolute. The supercritical coal-fired power plants that are currently being put in place can ramp up or down their production by around 8 percent per minute, which is not far from the flexibility of modern CCGTs. Moreover, in 2012 Centrica closed two of its gas-fired units – the King’s Lynn plants and the Roosecote facility – due to a lack of flexibility. State-of-the-art supercritical coal plants with strong ramping capabilities have every right to deliver the flexibility that TSOs need to operate the grid in real time. An unconditional prioritization of gas over coal will serve to the detriment of Europe’s ability to efficiently manage a power system with many variable renewables if it implies that older, less efficient gas plants push flexible coal units out of the market. The goal of energy policy should not be to ban coal plants, but to prevent the proliferation of unabated coal. Speeding up the deployment of CCS technologies is vital. Setting credible carbon prices and stringent emissions performance standards, such as those implemented

by the UK in its Energy Bill, are crucial steps in this process. But there should be no free lunch for gas, and in order to regain its place as the bridge fuel to a low-carbon energy mix, the gas industry will have to consolidate its position as the most flexible partner for variable renewables. ■

## RELATED ARTICLE

# *Gas is dead. Long live gas!*



Europe’s natural gas industry is going through dark times. Policy failures within the European Union have combined with unexpected developments elsewhere to create a business environment hostile to gas. Amidst all the gloom, however, there are glimmers of light. Sooner or later Europe’s policy-makers will have to wake up to some inconvenient truths: that gas is being elbowed out of the energy mix by coal and subsidised renewables; that greenhouse gas emissions are falling much more slowly than expected, largely because of the failure of carbon-pricing policy; that the US now has a competitive advantage over Europe because of its cheap energy; and that political opposition to shale gas in Europe is preventing some countries from exploiting their own unconventional resources. Sooner or later the EU will need to re-think energy and climate policy – as the UK is currently doing.

[Read the full story →](#)

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## National Markets

**08/04** The Netherlands has to speed up its transition efforts. With its strategic location, huge gas reserves, highly developed infrastructure and well-developed information economy, the Netherlands is a crucial link in the northwest European energy market. But due to the lack of a long term vision - combined with its economic dependence on fossil fuels - its much-needed transition to a sustainable energy supply has barely taken off. A badly managed transition could severely damage the economy, but failing to reduce the dependence on fossil fuels is both economically and environmentally unsustainable. [Read the full story →](#)

**15/04** Vattenfall - is the state the right and a good owner? Vattenfall is Sweden's by far largest utility. In the year 2000, the state owned company left its national territory to become Germany's third and Europe's seventh largest electricity supplier. In general it has become a success story. However, not everyone, especially in Sweden, sees it that way, and even less so after the acquisition in 2009 of the Dutch gas company Nuon for 8.5 billion. Some, among them the newly elected leader of the social democratic opposition party, Stefan Löfven, calls it the "worst business transaction in Swedish history". [Read the full story →](#)

**22/04** Profile: Jochen Homann, Marathon Man for the Energiewende

The Merkel government thought it was getting something different when it appointed Jochen Homann to the powerful post of President of the Federal Network Agency (Bundesnetzagentur, BNetzA) just over a year ago. After all, the 59-year old Homann - even though member of no political party - had been a loyal cog in the machinery of the Federal Ministry of Economics and Technology, a bastion of neo-liberal conservatism, where he served as State Secretary since 2008 and in other functions since 2001. [Read the full story →](#)

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## Geopolitics

**11/04** Kurdistan's natural gas resources may become a game-changer over the longer term

If a firm manages to create a dominant position in the Kurdistan Region of Iraq (KRG) oil business this could, in the long term, open a door to the gas business, as it did in the Caspian zones in the 1990s, when the Baku-Tbilisi-Ceyhan oil pipeline prepared the ground for the South Caspian gas pipeline and TANAP, the Trans-Anatolian gas pipeline. A similar future may be possible for the KRG and the firms working within it. The KRG's proven gas reserves are estimated at 2.8-5.7 trillion cubic meters. That is about four times more than Azerbaijan's reserves. In the perspective of the southern energy corridor projects, KRG's natural gas sources may become a game-changer over the longer term. [Read the full story →](#)

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## EU Energy Policy

**18/04** Can power markets resuscitate natural gas in Europe?

See page 2.

**25/04** New Approach towards “the life blood of our society” - EU Energy Infrastructure

The importance of energy infrastructure for the integration of European energy markets is unquestionable. The European Union and its member states have already recognized many times the significance of the development of trans-European networks, contributing to the achievement of the EU’s ambitious energy and climate goals (20/20/20 targets, decarbonisation, competitiveness, sustainability, security of supply, and elimination of energy isolated islands). [Read the full story →](#)

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## Energy perspectives

**29/04** Collaboration is Shell's strategic answer to future volatility

With its recently published New Lens Scenarios, Shell provides contrasting visions of the future in the decades ahead. In the foreword, the company's CEO Peter Voser indicates what may emerge: "We expect demand for critical resources, like water, energy and food to have risen by 40% - 50% by 2030. To meet those needs without significant environmental detriment, business as usual will not be an option - we require business unusual."

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# Colophon

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