Federal Ministry for Economic Affairs and Energy

Energiewende direkt

23 Jul 2015


## Moving the energy transition further forwards

The government coalition has taken fundamental decisions ensuring plannability and compliance with climate mitigation targets. **Find out more**

# Moving the energy transition further forwards

**The government coalition has taken fundamental decisions ensuring plannability and compliance with climate mitigation targets.**

The "gears" of the energy transition have now been "set into motion", Federal Minister for Economic Affairs and Energy Sigmar Gabriel said about the political consensus achieved on critical questions concerning the energy transition. The government coalition joined together for the energy summit at the beginning of June to adopt a package of pioneering and coordinated measures that puts the energy transition on the road for success. It provides a clear structure and makes it possible for all stakeholders to plan ahead.

A number of key issues on the implementation of the energy transition had to be settled, as there are important tasks ahead: expanding the grid as soon as possible and in a citizen-oriented way, setting up a viable electricity market, providing clear prospects for climate-friendly combined heat and power generation (CHP) and implementing climate mitigation targets.

Now, the coalition has paved the way for a systematic implementation of the 10-Point Energy Agenda. Federal Minister for Economic Affairs and Energy Sigmar Gabriel said: "We can now make rapid progress".

## Germany is meeting its climate mitigation targets

The agreement sends a strong message: Germany is committed to its pledge to reduce $CO_2$ emissions by 40% by 2020 relative to 1990 levels. To meet this goal, an additional 22 million tonnes of $CO_2$ have to be slashed from the electricity sector. Over the past months, there have been long debates about how this reduction can be achieved. Several options for action and their potential impact on companies and employment have been weighed carefully. The agreement marks a breakthrough as it addresses $CO_2$ emissions not as an isolated issue, but in the context of closely-related issues such as the electricity market, promotion of CHP and grid expansion. The $CO_2$ reduction will be achieved through a combination of several different measures, ensuring that environmentally-friendly and socially compatible solutions are used to meet national climate mitigation targets.

As laid out in the agreement, lignite power station units with a capacity of 2.7 gigawatts (that’s 13% of installed lignite capacity) will be gradually transformed into a capacity and climate reserve and then phased out after four years. On top of that, the lignite industry pledges to cut an additional 1.5 million tons of $CO_2$ per year as of 2018 if additional cuts become necessary.

The moderate increase in funding for combined heat and power generation also has to be seen within the overall context. The revision of the Combined Heat and Power Act will leverage additional efficiency potential and reduce $CO_2$ emissions in Germany in the long term. It also opens up new opportunities for CHP. Costs will be limited to 1.5 billion euros per year, ensuring that they will not get out of hand.

## Electricity market 2.0: energy security at the lowest possible costs

The capacity and climate reserve, which will include the lignite power plants mentioned above, is directly connected to the fundamental decision in favour of an electricity market 2.0. "Energy security at the lowest possible costs" – this is the slogan that best describes the vision for the electricity market of the future. The new White Paper defines the individual aspects of the future electricity market in detail: strengthened market mechanisms ensure an efficient electricity supply; flexible generators and consumers of electricity can adapt to volatile amounts of renewable electricity being fed into the grid. Energy security is a valuable asset for an industrialised country such as Germany.

This is why the capacity and climate reserve provides additional support to the electricity market 2.0. – a belt and braces approach.

The funding for combined heat and power generation, which was topped up to 1.5 billion euros, also has to be seen within the overall context. The funding for building new combined heat and power generation plants is increased moderately, making CHP viable for the future without costs spiralling out of control. CHP funding also promotes the replacement of coal-fired CHP installations with gas-fired CHP installations, but is mainly geared towards temporarily supporting gas-fired plants run by public utilities whose economic viability is at risk. Many CHP installations run by public utilities are hardly profitable due to the low price of electricity on the exchange. Apart from maintaining funding rates at their current level, the eligible volume of investment in heating networks and storage will be increased. This will give CHP power installations more flexibility to react to price signals. The future expansion target for CHP will be set at a share of 25% of thermal electricity generation.

## Grid expansion is getting underway

Great strides have also been made on the especially controversial issue of grid expansion. It is widely known that most of Germany's wind power is generated in the North of the country, most of its solar power in the South. Our electricity grid has to be ready to transport power over long distances from its point of generation to the consumers. Modern direct current (DC) technology is especially suitable to fulfilling this task with very low losses.

Citizens living in regions where the necessary transmission lines are to be built are often concerned. The new agreement takes these concerns into account: when setting up new DC routes, underground cables will be given priority over overhead powerlines. However, this does not change the need for grid expansion. The central SuedLink powerlines and the South-eastern DC route will be implemented. Their exact routing will be further specified during the future planning process.

The agreements concluded by the heads of the coalition parties are to be passed by the German Cabinet after the summer recess in autumn. "We have put together a historic package for the energy transition and our country's economic future," Sigmar Gabriel said about the fundamental decisions, which will help to move the energy reforms a great step forward.

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FURTHER INFORMATION

[→ "Principles for a successful implementation of the energy transition" (in German only)
[→ Overall energy transition strategy

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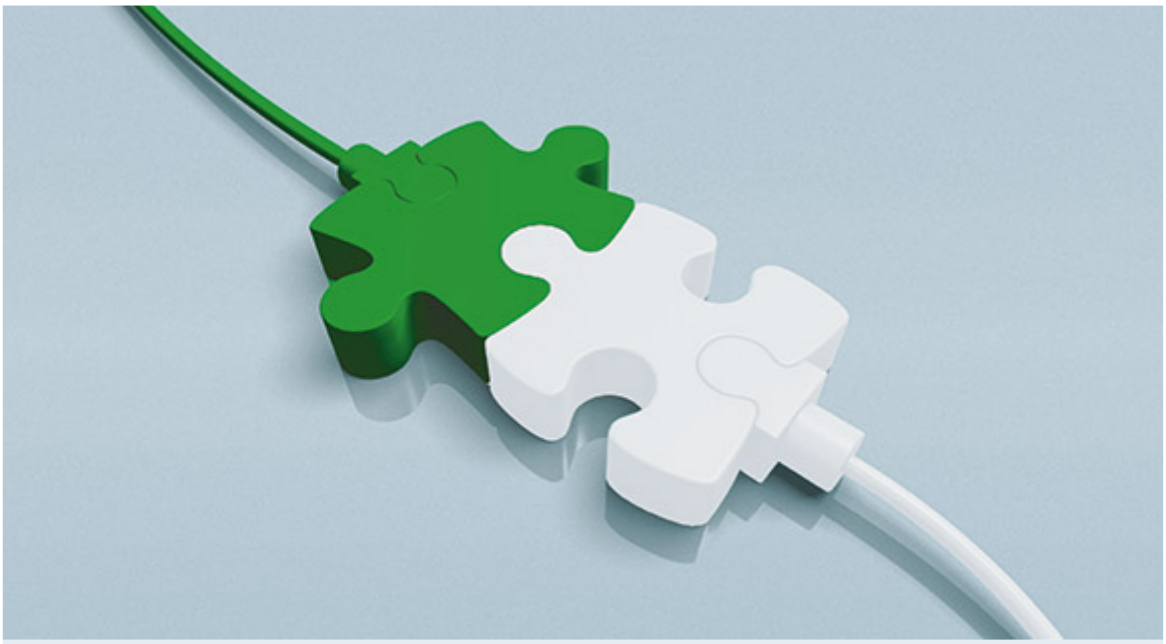
# White Paper: electricity supply remains secure and affordable

**The decision is clear: the Federal Ministry for Economic Affairs and Energy has decided to transform the electricity market into an electricity market 2.0, and has rejected a capacity market. The recently published White Paper explains and details this decision.**



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Electricity supply has to remain secure and affordable even as the share of renewables grows. A number of questions have to be addressed in this context: How can weather-dependent, fluctuating electricity supplies from wind and solar energy be cushioned? What role shall be given to conventional power plants? How can we encourage consumers to use electricity when it is cheapest? In a nutshell: how can we make the electricity market fit for the energy transition? The recently published White Paper, which sets out the details for the electricity market 2.0, is a solid basis for answering these questions.

## Green Paper sparked off broad-based debate

The White Paper is the result of a broad-based and transparent discussion process initiated by the Federal Ministry with the publication of a Green Paper in October 2014 which outlined the energy market of the future. Authorities, associations, trade unions, companies and citizens submitted around 700 comments which were incorporated into the White Paper. Thus, the fundamental decision in favour of an electricity market 2.0 was based on a joint development process.

After weighing a number of different points, the stakeholders clearly opted in favour of an electricity market 2.0 and against a capacity market. The electricity market 2.0 preserves and strengthens the existing market mechanisms. It is particularly important to make sure that pricing on the electricity

market is not interfered with and that electricity suppliers are compelled to meet consumers' energy demand at all times.

A point has been made to not create a capacity market, because this would introduce a separate market remunerating the maintenance of capacity. The expert reports commissioned by the Federal Ministry for Economic Affairs and Energy find that the electricity market 2.0 model is more cost-effective than the capacity market model.

## Capacity reserve safeguards electricity supply

Further, the electricity market 2.0 will be backed up by a 4 gigawatts capacity reserve. However, this reserve is made up only of power stations that do not participate in the electricity market and therefore cannot distort competition. These power stations will be used only if, despite free price formation on the wholesale market and contrary to expectations, supply does not cover demand at a particular time. The capacity reserve is directly connected to the government coalition's agreement to build on the energy transition and to meet climate mitigation targets, as 2.7 gigawatts of the capacity reserve will come from especially climate-damaging lignite power stations whose emissions will be reduced to close to zero as a result.

"We have opted for the electricity market 2.0 so that Germany's electricity supply can remain reliable and cost-efficient. This is because the general public, small businesses and industry must be able to rely on electricity being available as and when they need it," State Secretary Rainer Baake said during the presentation of the White Paper. "They also need to be able to rely on electricity being affordable and delivered at internationally competitive electricity prices."

## More flexibility in terms of weather-dependent electricity supply

One key concept of the electricity market 2.0 is "flexibility". Renewables generation is dependent on weather conditions and the electricity market has to be able to react flexibly to that. The options on the table include high-performance grids, modern power stations, combined heat and power generation, load management and storage facilities. On the electricity market 2.0, these options are competing to provide the most innovative and affordable solutions.

"The electricity market 2.0 ensures security of supply, is cheaper than a capacity market, creates incentives for innovation and permits high proportions of renewable energy to be integrated. It also fits into the European internal market," State Secretary Baake said.

The White Paper lists 20 measures for implementing the electricity market 2.0. Apart from the principle of free pricing and the introduction of a capacity reserve, the measures also include a continuous monitoring system using state-of-the-art methods to check whether supply is really secure.
Balancing markets are also developed further: more suppliers are to be granted access to these markets to increase the level of competition and therefore reduce costs.

## The White Paper serves as the basis for the legislative process

Directly after the summer recess of Parliament, the Federal Ministry for Economic Affairs and Energy will debate the White Paper with all relevant stakeholders at the Electricity Market Platform, a national multi-stakeholder dialogue forum. Stakeholders will also be able to submit statements until

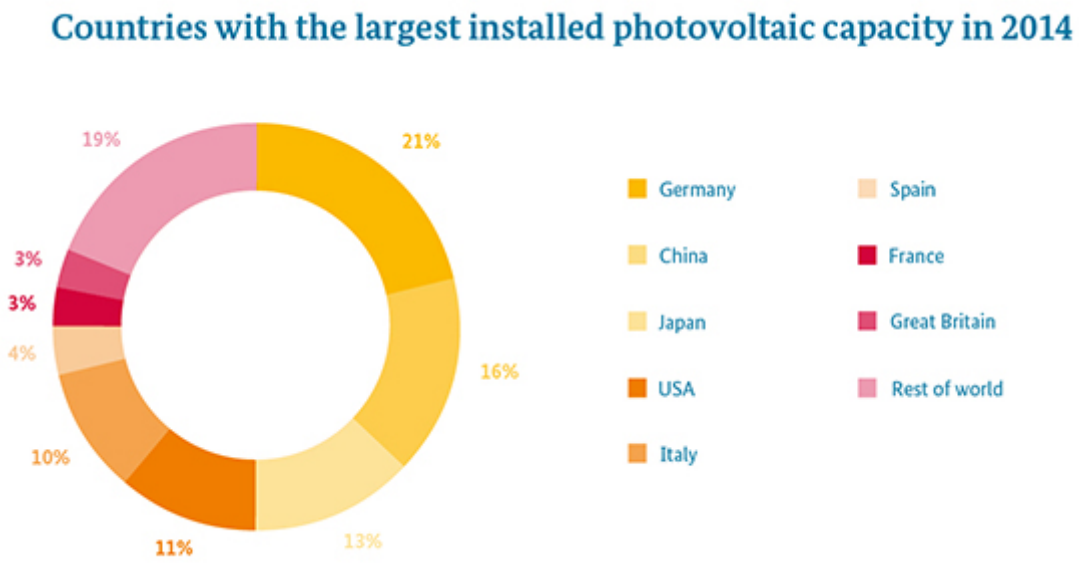
24 August to weissbuch-strommarkt@bmwi.bund.de. The legislative process for implementing the measures specified in the White Paper will start in the autumn. The electricity market bill is to be passed by the German Cabinet in October and the associated legal process to be completed by spring 2016.

FURTHER INFORMATION

[→ White Paper: an electricity market for the energy transition (in German only)
[→ Electricity Market Platform

# Germany leads the way in solar energy

**Germany has the world's largest installed photovoltaic capacity. This is a finding by the "Renewable Energy Statistics 2015" of the International Renewable Energy Agency (IRENA).**

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21% of the world's installed solar capacity is located in Germany, 16% in China and 13% in Japan. In absolute terms: according to IRENA, the world's photovoltaic capacity was 179.6 gigawatts (GW) at the end of 2014. Of that, Germany accounted for 38.2 GW, China for 28.1 GW and Japan for 23.3 GW.

The ongoing expansion of solar energy capacity in Germany's electricity sector is mainly the result of funding under the Renewable Energy Sources Act. Since of this year, new rules apply to the funding of ground-mounted PV installations. The 2014 Renewable Energy Sources Act created the preconditions to convert the funding of renewable energy from rates prescribed by the administration to rates determined by competition: new ground-mounted PV installations – solar panels installed on level ground but not on roofs or buildings – only receive funding under the Renewable Energy Sources Act if they have taken part in a bidding process and their bid is successful. The bidders demanding the

lowest funding amount will be given the contract. In other words, funding will go to those who ask for less money.

The first round of the pilot auction was concluded on 15 April 2015. The high level of participation confirms that acceptance of the new instrument is high. The bids for the second round of the auction can be submitted to the Federal Network Agency by 1 August 2015; the deadline for the third round is 1 December 2015. Bidders who did not win in the first round can try again in the forthcoming rounds.

The pilot auction for ground-mounted PV installations aims to achieve the expansion targets for renewables in a cost-efficient manner while maintaining a high level of public acceptance and stakeholder diversity. At the same time, the number of ground-mounted PV installations shall be steadily increased. Another important point is that these pilot auctions help to gain experience for the future auction design for other types of renewable energy.

The IRENA statistics also offer interesting data on these other types broken down by country. There are data on wind and hydro capacity and installed capacity from biomass, geothermal energy and marine energy. With a capacity of 39.6 GW, Germany is the world's third-largest producer of wind power after China and the USA and, with a global share of 9%, ranks fourth in terms of electricity generation from biomass.

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FURTHER INFORMATION

[→ IRENA statistics on renewable energy capacities
[→ On pilot auctions for ground-mounted PV installations

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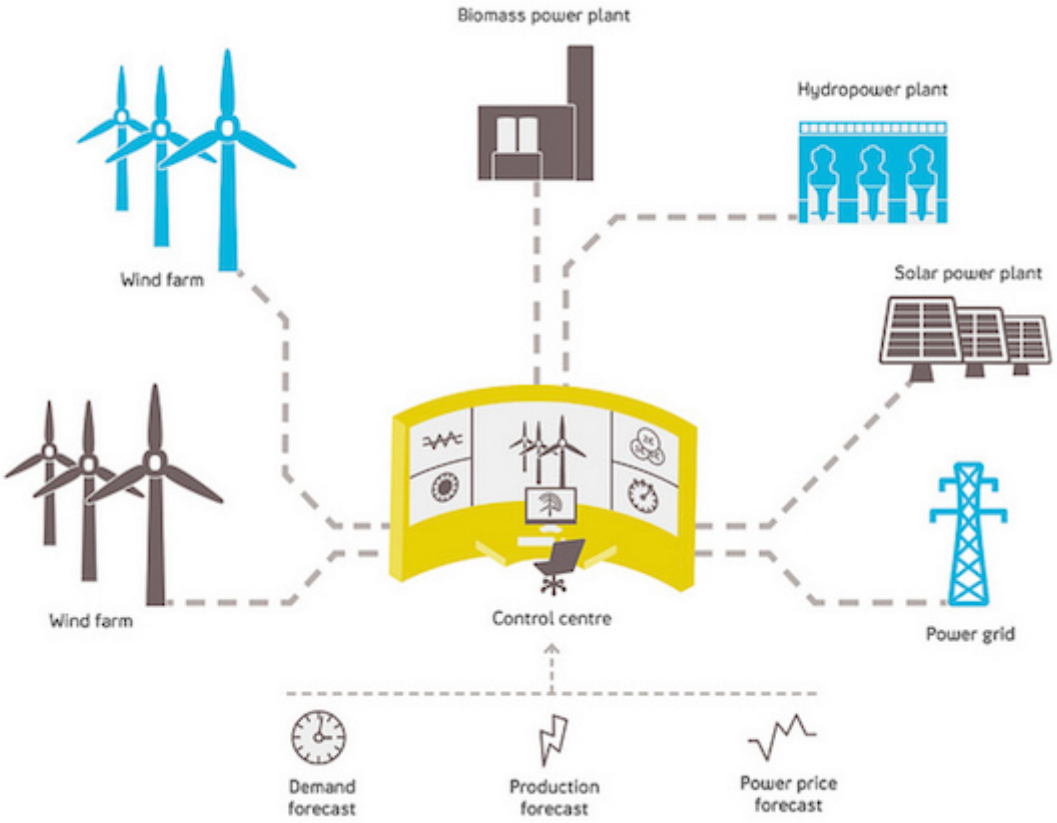
# What is a "virtual power station"?

**The energy transition is bringing a wave of new jargon into the public realm. This section provides some background on the most important ones, with this week's edition focusing on "virtual power stations". Unlike conventional power stations, virtual power stations consist of several generating installations, load or storage facilities that aggregate electricity and feed it into the grid in a controlled fashion. Virtual power stations therefore play an important role in making the energy transition a success.**






Renewable energy sources such as wind, solar and biomass already account for nearly one third of Germany's electricity consumption. This clearly indicates that the energy reforms are making good progress. However, the transition from conventional energy sources such as coal and gas to renewables also involves some challenges. Electricity no longer comes from a few large-scale power stations, but from countless small-scale installations all over the country. There are also sharp fluctuations in electricity fed in from renewables. In times when there is a lot of wind and sun, production will be high; at night or when there is no wind, production will be low. However, households and industry need a reliable electricity supply at all times.

## Renewable energy gains more independence

Up to now, conventional power stations step into the breach in times when wind, solar or biomass are unable to meet electricity demand. In the future, however, renewables will have to be able to deliver a

reliable electricity supply, especially as their share in the overall energy mix is to grow. A secure and reliable electricity supply can only be guaranteed if the electricity grid is stable – this means that at all times just as much power is fed into the electricity grid as is taken off it.

This is where "virtual power stations" (sometimes called "aggregators") come in. Like a control centre, they aggregate electricity from several small-scale generators and feed in exactly as much electricity as has been purchased.

What may seem easy at first actually requires a lot of planning and controlling. To predict the amount of electricity a virtual power plant can feed into the grid as exactly as possible, the amount of electricity available from generators that are part of the cluster has to be assessed. A monitoring system is required to track every single generator in real-time, to know exactly which installations are turned on and ready for operation and how much electricity each of them can provide at a given moment. For example, to predict the exact amount of electricity solar and wind power installations can generate, weather conditions have to be taken into account.

## Working together for more flexibility

The amount of electricity a virtual power station can generate varies. If the amount available from one installation of the virtual power station is higher or lower than predicted, adjustments have to be made. This is possible – thanks to so-called dispatchable power generators, such as generating installations, demand or storage facilities.

An important task fulfilled by virtual power stations is that they sell the electricity produced by the generators of the cluster. The reason for this is that since August 2014, operators of renewable energy installations with an output of more than 500 kilowatts have to sell the electricity they don't use themselves. From 2016 on, this rule will apply to all installations with an output of 100 kilowatts or higher. The virtual power station takes care of selling the electricity from connected generators on the exchange. It therefore has to control every single system, ensuring that the electricity that is fed into the grid matches the exact amount that was sold.

## Ensuring system security

To ensure that electricity is available at all times, so-called ancillary services are needed, for example, to stabilise frequency and voltage in the electricity grid. Virtual power stations can make a contribution to this as well, for example by providing balancing capacity for frequency control. The "Kombikraftwerk 2" project has already confirmed this successfully.

## The power station of the future

Some virtual power stations are already up and running, Next Kraftwerk GmbH's "Next Pool" for example, or the virtual power station set up by Statkraft. Together, these two power stations can access almost 10,000 megawatts of electricity – this corresponds to the output of ten nuclear reactors. Some other virtual power stations also integrate storage facilities or flexible loads in the cluster of different electricity installations or already deliver ancillary services. This makes them an important part of the energy transition, contributing to a secure electricity supply.

FURTHER INFORMATION

"Kombikraftwerk 2 – the regenerative aggregate"

# How might a smart energy supply of the future be organised?

**The competition for funding under the "Smart Energy Showcases - Digital Agenda for the Energy Transition" programme (SINTEG) has really struck a chord. There has been a large number of submissions from seven big consortia representing around 200 companies from all over Germany.**

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Germany is relying on ever greater shares of wind and solar energy to generate its electricity. However, these sources fluctuate heavily. This is why a number of extensive model regions are to be set up, in which different ways of providing a secure, efficient, and climate-friendly supply of electricity will be developed and tested on a large-scale basis. The Federal Ministry for Economic Affairs and Energy has established a funding programme for this initiative, entitled "Smart Energy Showcases - Digital Agenda for the Energy Transition (SINTEG)", and is currently calling for offers. The aim of the initiative is to develop a smart energy system that balances supply with demand and also uses storage in order to keep the grid balanced.

Smart energy systems based on new information and communication technologies are also to enable consumers to participate in the energy market more easily – whether it is selling electricity that they have produced or using electricity when it is cheapest. These systems are also to foster the development of new products and services, such as those designed to monitor the status of the grid or to stabilise it. These large-scale "showcase regions" have been set up to bundle together the

knowledge, experience and activities of different players across the system. The solutions being developed and tested are to serve as a blueprint for an energy system that can be rolled out nationwide.

The SINTEG programme is part of a host of measures entitled "Innovative Digitisation of German Business", making it an essential building block that is serving to help implement the Federal Government's Digital Agenda.

FURTHER INFORMATION

[→ SINTEG
[→ Grids and grid expansion

# What the press says

**A new study by the German Energy Agency has revealed that there is still a lot more potential for saving energy in commercial buildings used for retail. See also: New methods developed for storing excess energy.**

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**globalenvironmentalsociety.net, 13 July 2015: Europe's largest "Efficiency House Plus" opens in Frankfurt**
Frankfurt is now home to Europe's largest "Efficiency House Plus": the new build, which contains 74 housing units, produces more energy per year than its residents consume for electricity, heating, hot water, and travel. This energy is produced by approximately a thousand high-efficiency solar panels affixed to the roof of this "active city house", as well as 330 panels affixed to the façade.

**dena, 9 July 2015: More energy efficiency for retail**

Supermarkets, specialist shops and shopping centres account for the second highest amount of electricity use in all commercial buildings in Germany. According to a new study by the German Energy Agency, over 80 per cent of Germany's retail buildings were built before 1978, i.e. before the first Thermal Insulation Ordinance came into force. Therefore, there is still a lot more potential for saving energy and improving energy efficiency.

### Energy park in Mainz, 2 July 2015: Energy to hydrogen: World's largest conversion facility opens in Mainz

A new means of storing energy is currently being tested in Mainz. Here, with a capacity of six megawatts, the world's largest hydrogen electrolysis system has begun converting excess wind power into hydrogen. It serves as a large battery that can be used to cover electricity shortfalls at lightning speed.

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