How companies are tackling the energy turnaround

13 INNOVATION
Biogas – fit for the future?

16 PRACTICE
Jülich’s artificial sun to power aircraft

24 MAGAZINE
progres.NRW: Solar ice storage heating in the clock museum
practice
16 Jülich’s artificial sun to power aircraft
16 Klaus Scherer on SmartHomes
17 Linking energy and mobility
18 Long-term testing of fuel-cell vehicles
19 The magic word „flexibility“

magazine
20 Fiji chairs World Climate Conference in Bonn
21 A selfie with...
   Peter Hakenberg (paXos Consulting)
23 Renewables in the new pupils’ laboratory
24 Solar ice storage heating in the clock museum
25 Three questions for...
   Peter Becker (HUSUM Wind)
27 Lighting contracting in natural foods shop

news
4 News & Service

title
6 How companies are tackling the energy turnaround

innovation
12 Pit heat storage
12 Clean freight transport
13 Biogas – fit for the future?
14 Firefighting is out - prevention is the better way
15 DC - a key technology in the energy turnaround

climate protection made in nrw
26 One-stop advice
   Climate protection in the regions
28 in a nutshell
Dear Readers,

Our region today covers almost one third of its energy needs with renewables. This is a clear indication that the Energiewende, or Energy Turnaround, is progressing apace in Germany. At the same time its image has changed drastically over the past few years. Whereas in its initial phase the energy turnaround was dominated primarily by the abandonment of nuclear energy and the expansion of renewable energy sources, we now have to respond to questions of intelligent networking in the energy system, the interaction between the consumption sectors and smart energy efficiency solutions on the implementation level. For companies this means having to develop strategies for the energy future in Germany and to achieve a new degree of energy efficiency through innovative, integrated solutions. After all, it’s clear that the energy turnaround in Germany will not be decided in the political hub of Berlin. At the end of that day what will count is what is achieved on the level of implementation.

The Grevenstein-based brewery of C. & A. Veltins GmbH & Co. KG and the bakery Gilgens Bäckerei und Konditorei GmbH & Co. KG from Troisdorf are excellent examples of what is manageable with a hands-on approach under commercial conditions. Both companies are based in North Rhine-Westphalia and have been declared beacons of energy-efficient waste heat utilization by The German Energy Agency (dena). These Beacons tap their waste heat potential through a particularly innovative or economically efficient use of technology and hence set an example to other companies. The utilization of industrial waste heat is of special significance when it comes to achieving the German energy efficiency targets. In the Federal Republic alone it would be possible for companies to save around five billion euros in energy costs if they recycled their waste heat. Another company, the Thelen Group in Essen, received the 2016 Energy Efficiency Award 2016. In terms of energy efficiency it had also adopted new approaches. It had completely decentralized the heating system in one warehouse and linked it with an efficient heating control system. As a result the existing workplaces were heated very precisely and efficiently with substantially lower energy input in relation to the actual use time. The main need in the application phase of the energy turnaround is specifically for committed pioneers and doers in private industry. At the same time we must succeed in linking energy efficiency with the possibilities offered by digitalization. Smart solutions enable us to see energy efficiency through fresh eyes: as a high-tech approach with considerable potential for saving costs and innovations.

Hannes Seidl
Deutsche Energie-Agentur GmbH (dena), Head of the Energy Systems and Energy Services Division
In the endeavour to achieve 100 per cent renewable energy sources in Fukushima Prefecture, the Prefecture founded a new regional energy agency with a staff of eight in April 2017. The Fukushima Energy Agency is government-financed and is supposed to expand existing company networks, support new projects and technologies and to transfer knowledge.

“Energy Sector Coupling. NRW” climate protection competition launched

In the recently launched climate protection competition “Energy Sector Coupling. NRW” companies, higher education institutions or other organisations can again apply for funds and gauge their projects in competition with others. The projects funded in the context of the competition are intended to contribute to greenhouse gas reduction and in addition to help stabilise the transmission and distribution networks. The project outlines will be assessed by an independent committee of experts. The NRW environment ministry initiated the competition in collaboration with the economic affairs and science ministry. Applications can be submitted by 7 June 2017.

www.energieagentur.nrw/klimaschutzwettbewerb_energiesektoerekopplung

“Energy Sector Coupling. NRW” climate protection competition launched

www.energieagentur.nrw/klimaschutzwettbewerb_energiesektoerekopplung

LANUV cuts power consumption by 13 per cent

The employees at the State Department for Nature, the Environment and Consumer Protection (LANUV) NRW at its Essen site have cut the power consumption of their establishment in the second year of “mission E” by 13.1 per cent. “This means that the LANUV has saved every eighth kilowatt hour of electricity – this is really impressive,” says Lothar Schneider, Director of EnergyAgency. NRW, the organisation which developed the basic nation of “mission E” to enable mainly administrative bodies to tap the savings potential in energy-aware behaviour. “As in the previous year we initially subjected our consumption data for 2015 very closely and then sought other possible reasons why the consumption figures had fallen sharply again. After all we had no desire to ascribe savings to ‘mission E’ which are not attributable to employee behaviour,” Dr. Thomas Delschen, LANUV President explained. “After intensive analysis of our consumption data we can state that the lower power consumption can be attributed to employee behaviour. I am pleased that “mission E” is so successful and that the men and women who work at LANUV are thus helping to conserve resources,” Dr. Thomas Delschen added. By applying “mission E” LANUV’s employees at the Essen site reduced power consumption by 347,400 kWh in 2015.

www.mission-e.nrw

Fukushima creates its own Energy Agency

In the effort to achieve 100 per cent renewable energy resources in Fukushima Prefecture, the Prefecture established a new regional energy agency with a staff of eight in April 2017. The Fukushima Energy Agency is government-funded and is intended to expand existing company networks, support new projects and technologies and to transfer knowledge. EnergyAgency NRW is supporting the expansion of the new organisation and will be working closely with its Japanese partner organisation. Since 2014 a partnership has existed between North Rhine-Westphalia and Fukushima. There are regular delegations, involvements in trade fairs and an intensive expert exchange. With the new Energy Agency Fukushima this partnership is being intensified.

www.energieagentur.nrw/klimaschutzwettbewerb_energiesektoerekopplung
Final sprint in the 12th Fuel Cell Box School Competition

The school competition FuelCellBox has demonstrated several times since 2004 the practical versatility of fuel cell technology. Last year it focused on the uninterruptible power supply for a computer centre, and now a different aspect of fuel cell technology is being highlighted: the task of the school team is to create an environmentally friendly alternative to diesel locomotives. Around 40 per cent of the rail network in Germany is still not electrified and so the intention is to use fuel cell locomotives to provide emission-free travel.

At the “Energy Storage Europe” trade fair the best 20 of the original 140 groups were given their fuel cell box.

The teams are from Aachen, Brakel, Duisburg (two teams), Essen, Gladbeck, Grevenbroich, Halle (Westphalia), Kempen, Krefeld, Lemgo, Lennestadt, Lippstadt, Lübecke, Lüdinghausen, Münster, Recklinghausen, Remscheid, Rheine and Steinfurt, and they come from 15 high schools, four vocational colleges and one association.

The kit is to be used to develop a solution for a test run of the fuel cell locomotives. The five best groups can look forward to attractive prizes at the concluding event scheduled for the end of June.

www.energieagentur.nrw/qr61

Three new climate protection estates in NRW

With the planned new housing estates in Rheine, Voerde and Jülich 76 projects now already have the status of “Climate Protection Estate NRW”. In Rheine (see figure right) the urban housing association is planning four multi-family houses with 55 flats. The flats are designed for couples and families. In each building it is intended to integrate one refugee family. There are recreation rooms for communal use. In Voerde and Jülich nursing facilities are being created, partly with adjacent dwellings to provide sheltered accommodation. In Voerde a nursing home for 70 senior citizens is being planned, and in addition 54 flats and two residential groups, each for ten individuals in need of sheltered care, are being constructed. The nursing home in Jülich is designed for 80 individuals. This means that in future about 12,000 people will be living on North Rhine-Westphalian climate protection estates.

www.energieagentur.nrw/qr61

“Mould in Residential Buildings” lecture material

EnergyAgency.NRW offers speakers and further education bodies lecture material on the subject of “Mould in Residential Buildings – Identifying, Avoiding and Eliminating the Causes”.

Mould infestation in residential premises has always been a familiar and frequent problem. Even so those affected often have no idea as to where the mould comes from, how it can be prevented and how it can be eliminated permanently. Often the heat insulation is erroneously blamed for the damage. In fact it even cuts the risk of mould development by ensuring higher temperatures in the walls.

The lecture material provides basic information on the development of mould and hence how it can be avoided. It doesn’t matter whether it’s poor construction, water damage or ventilation habits that leads to the mould, the best thing is to make sure it doesn’t develop in the first place.

The presentation including explanatory notes can be obtained free of charge at lohneis@energieagentur.nrw.
As early as 2011 MPG applied for funds for the exploitation of energy saving potentials within the framework of the Ressource.NRW programme. In particular funding was obtained for the use of production waste heat for use in the production domain (tube drying) and for heating purposes.
In fact technical developments have led to an enormous expansion of the possibilities for increasing energy efficiency over the past few years. And it’s mainly companies who are doing something – if only for business reasons. And for the most part their actions are also highly rational because companies approach the subject of efficiency professionally – in other words, in a structured fashion.

For example, the brewery C. & A. Veltins GmbH & Co. KG in Meschede: they have optimised the energy use in their brewhouse using the “EquiTherm” process from Krones AG. For this purpose they utilize the heat produced in the brewing process in a specially designed heat exchanger. In the process thermal energy from the wort cooler is transferred to a heat transfer medium. The heat transfer medium in turn heats up cooling water to 96 °C. The water thus heated is stored in a layered storage tank. But in order to achieve the 120 to 150 °C required for the mashing process flow-optimized and enlarged heating surfaces in the mashing vessel provide additional heating. The process stage is thus fed completely with waste heat. As compared to the consumption rates prior to modernization, it has been possible to save 35 per cent of the energy consumption in the brewhouse as a whole.

At Miele in Bünde tried and tested technology is applied with no less effective a result: this site with a workforce of 570 and an area of around 83,000 square metres has invested about 1.2 million euros in energy efficiency. On the basis of the systematic logging of energy data as part of an energy management system, Miele decided to adopt an energy strategy which provides for the use of combined heat and power generation (CHP) to cover the demand for heat and cold. In all, two CHP units with a combined capacity of 480 kWel and 720 kWth have been installed. In the summer the heat from the CHP units is used by adsorption-type refrigeration installations to generate low temperatures, and in the winter the demand for low temperatures is covered by free cooling. To optimize the running times of the CHP units a heat storage systems with a capacity of 50 cubic metres was erected. A particularly impressive aspect of CHP is its high efficiency ratings. Since with CHP electricity is generated and the heat produced is utilized, the efficiency ratings can under certain circumstances be substantially higher than 90 per cent.

Specifications coming from Brussels and activities undertaken in Berlin will mean changes in the regulatory parameters for increasing energy efficiency in companies. With the Energy Efficiency Green Book the federal government has set in motion a process which will in the medium term also culminate in regulatory specifications. Bernd Geschermann of Energy Agency. NRW explains: “In the medium term it will not only be climate policy responsibility or business reasoning which will make energy efficiency a matter which companies will have to tackle. Soon there will presumably be further specifications which will have to be implemented and adhered to.” In practical terms this will mean that for companies energy efficiency will become a duty!

The fact that energy efficiency in many cases pays off in business terms should make the regulatory pressure more bearable, however. At MPG Mendener Präzisionsrohr GmbH and MPG Wärmetechnik GmbH a start was already made years ago on tapping the economic potential of energy efficiency. MPG specialises in the manufacture of seamless tubes – specifically heat exchanger tubes – and of thermal products. A casting shop, extrusion presses and rolls make MPG an energy-intensive company. To reduce energy con-

Efficiency – a definition

Efficiency comes from the Latin verb „efficere“ – to bring about or accomplish something. This makes clear that efficiency is a process and not a state. The relationship between the means and the effect achieved is evaluated. In view of the shortage of goods, it is efficient – in accordance with the „economic principle“ - to establish a reasonable relationship between the means used (energy) and the result according to the personal intentions involved (for example, the maximization of benefit).

The word’s got round that increasing energy efficiency not only has a positive effect on the balance sheet, but that it also helps enhance a company’s image. Numerous companies have responded to society’s call for the energy turnaround and the responsible consumption of energy.
For example...

1 Knipex

Knipex Werk C. Gustav Putsch KG: Knipex, a plier manufacturer from Wuppertal, wished to make the supply of heat in its plant more efficient and so it decided to perform an extensive modernization of its heating system – including the installation of a new control system. In this plier manufacturer’s factory complex (19 shops with a production and administration area of about 48,600 m²) the heating energy consumption was cut by 1.2 million kWh/a. At the same time the electricity consumption of the heating pumps fell by 60 per cent. As a result the company received the 2015 “Best Practice Energy Efficiency” award.

2 Julius Schulte

Julius Schulte Söhne GmbH & Co. KG: Waste heat also plays a major role at this paper factory in Düsseldorf. Hot condensate is used to heat up the process water. In addition more than 800,000 m³ of biogas is generated annually from the circulation water. The revenue from the biogas covers the operating costs of the circulation water treatment plant.

3 MPG Wärmetechnik

MPG Wärmetechnik GmbH from Menden: A less spectacular, yet all the more brilliant example of energy efficiency can be found under the ceiling of the MPG production shop. In 2016 roughly one third of the entire shop lighting was converted to LED. The investment totalled around 30,000 euros and the savings made amount to between 80,000 and 120,000 kWh/a. At MPG it is anticipated that the investment will have been recouped after three to four years.

sumption this Menden-based company is going for heat recovery in production.

As early as 2011 MPG applied for funds for the exploitation of energy saving within the Ressource NRW programme. The funding went primarily towards the utilisation of production waste heat in the production domain (tube drying) and for heating purposes.

The project was completed in 2015. Nearly all heat sinks have now been connected to a central hot water network. Into this both production-side waste heat potentials and heat from the operation of a CHP plant and a peak boiler are fed. Using a central control system the heat sources are used according to their energy efficiency. The production waste heat is used all year round in a number of tube drying facilities. Until the plant was converted and supplied with waste heat from the production processes the heat demand of the tube drying facility was met exclusively by a natural-gas-based firing system. Furthermore the closed tube drying facility can also be used for dry products of MPG Wärmetechnik GmbH (small heat exchangers), which have to date been blow-dried using compressed air.

Further optimisation is planned for the current year. In the current constellation the waste heat potentials of the tube roller is hardly exploited because the temperature level of the hot water circuit taking it is too high. To render the waste heat from the tube roller usable in future investments amounting to around 220,000 euros are planned for 2017. The calculation provides for an annual saving of 660,000 kWh (equivalent to around 370 tonnes of CO₂ per year) and 30,000 euros. The return on investment (ROI) should kick in after about seven years.

In addition MPG generates about 13 per cent of the electricity from renewable sources. The photovoltaic plant supplies around 600,000 kWh/a, the natural-gas-fired CHP plant with its roughly 7500 operating hours contributes a further 1,000,000 kWh/a.

Learning to learn

Since it has been known that energy efficiency is a good thing – in terms of micro- and macro-economics – efforts have been made to motivate companies to increase their efficiency. But over roughly the same period the knowledge has been subjected to obstacles which have hindered companies from actually exploiting their efficiency potential. The most common hurdles are a lack of knowledge with respect to the technical possibilities and the business advantages and the lack of time available to the players in the companies. Increasing efficiency requires not only a technological transformation in the company but also a “cultural” one to set the relevant learning processes in motion. There now exist energy management systems which have proven themselves as instruments for implementing continuous learning processes: as early as ten years ago Trimet Aluminium SE intro-
duced an energy management system in conjunction with the mod.EEM project of the EnergyAgency NRW. And there is a good reason for this. Aluminium production is an energy-intensive matter. In the great demand innate in the process there is also an opportunity for the energy turnaround, roughly along the lines of the higher the consumption, the greater the potential savings.

The company has now developed the capacity to determine and tap efficiency potentials itself. The result is innovative capability: not only are common technical solutions for increasing efficiency applied, but also new ones are being developed – for example, the "virtual battery". With this project the family company is flexibilising the electrolysis process for manufacturing light metal. This makes it possible to integrate discontinuously generated electricity from renewable energy sources and achieves the effect of a gigantic electricity storage system. The principle of this process developed by Trimet in collaboration with the University of Wuppertal lies in the grid-controlled operating mode of the production facilities. This means that the power demand of the facilities is adjusted directly to the quantity of electricity available at the time. To achieve this, the electrolytic cells are converted in such a way that their output can be increased or throttled by 25 per cent for several hours. This means that fluctuations in the electricity grid can be evened out during ongoing production and this eases the infeed of volatile renewable energy into the power grid. The aluminium plant therefore fulfils the function of an electricity storage system.

In the coming two years Trimet will test the new process on an industrial scale. All 120 furnaces of an electrolysis shop at the Essen site are being converted for the new process. This family-owned company is investing a total of 36 million euros.

If the technologies are employed in all four aluminium plants in Germany – three of which are operated by Trimet – it would be possible to raise the present pumped storage capacity of 40 gigawatt hours by one third. With an installed capacity of the German aluminium plants of around 1,000 megawatts this would be the equivalent of an annual electricity output of 250 gigawatt hours at approx. 8,700 load hours. 2.18 terawatt hours of electricity from fossil energy sources could be replaced by CO₂-free electricity. This would be the equivalent of annual CO₂ savings to the extent of 1.1 to 1.6 million tonnes. With an efficiency of 90 to 95 per cent the “virtual battery” is also substantially more efficient than technologies such as compressed air storage or power-to-gas.

Heribert Hauck, Head of Energy Management at Trimet says: “This investment is at present not (yet) a business case. The investment is this beacon project is more of a gamble on the future and our showcase project to proactively support the energy turnaround.”

Always dynamic...

Calculating the profitability of efficiency projects is not always easy. Investment decisions are made difficult by the effect of fluctuating, irregular income – for example from the additional use of renewable sources such as solar or wind. In practical terms the internal rate of return method has proven effective when estimating the return on the investment. Normally proceeds from investment are not taken into account when estimating the economic efficiency, and so it is not possible to say anything about profitability. The so-called time value of the money is ignored. With a dynamic investment calculation the internal rate of return method, on the other hand, the time value of the money is also considered. Here all periods over which an investment generates incoming and outgoing payments are also taken into account.

www.energieagentur.nrw/qr62
Optimisation of energy efficiency is a never-ending, dynamic process. What is called for and, ideally, also supplied is the ability to acquire skills which permit enduring technical transformation. On the macro level structured learning gives rise to an innovative milieu – for example in networks – as the Trimet example illustrates. On the micro level it is dedicated employees which make the transformation possible.

In the iron foundry of Baumgarte GmbH from Bielefeld the “energy scouts” have provided for efficiency. During their apprenticeships to become a foundry mechanic and an electronics engineer for production engineering Maren Neugebauer and Alexander König have shown that the electricity consumption of the agitators is cut by two thirds if the agitator is switched from continuous operation to need-related cycles.

Energy scouts are trainees who acquire knowledge of everything to do with energy efficiency from the chambers of industry and commerce. In this way they assist their training companies with the smart handling of energy and they take responsibility for their own projects. In all, more than 2000 trainees from around 700 companies have qualified as energy scouts throughout Germany since the beginning of 2014. In North Rhine-Westphalia the energy scouts are trained by EnergyAgency.NRW in collaboration with the Efficiency Agency NRW. They acquire the necessary skills to enable them to present their projects together with the economic efficiency calculation to the management (www.energieagentur.nrw/doppelpass).

**Radical change for success**

Every now and again the energy turnaround gives rise to radical realignments in companies. This sounds like painful processes – but on closer examination or once the “initial pain” has been overcome which changes sometimes involve, these processes lead to positive developments. At ETABO Energietechnik und Anlagenservice GmbH from Bochum the business model consisted up to 2011 of 90 per cent pipeline construction connected with the construction of new coal-fired power plants. But since the business model didn’t have much of a future, this Bochum-based company reinvented itself, so to speak. Instead of concentrating on the established clientele, instead of reducing to new construction, instead of monostructures, the clientele was expanded and the portfolio supplemented. This diversification at ETABO means in concrete terms that now the company offers services for almost all components in energy engineering in addition to pipeline construction. The customer base was broadened and now the Bochum-based company has 500 customers instead of the 60 it had in 2011. The orders received have increased from around 23 million euros to around 35 million euros. Furthermore more than 100 new jobs have been created.

**EnergyAgency in NRW**

“Energy turnaround means technological transformation. And resisting this transformation means having to reckon with business drawbacks,” Lothar...
Example for “Carsharing with Electric Vehicles”

Cambio: Energy efficiency and climate protection are playing an ever more important part in company vehicle fleets. When it renews its nationwide fleet in 2017 the carsharing provider Cambio intends initially to replace its roughly 600 diesel cars with petrol vehicles and thus help improve air quality. Furthermore Cambio has hybrid and electric vehicles in its fleet. In Aachen, for example, 10 per cent of the 150 carsharing vehicles are purely electrically driven.

Awards: At the end of 2016 Antonia Schmidt, Simon Klooß and Angelo Attardo were honoured for their contribution to the Energy Scouts Project. These trainees at the company Tente-Rollen from Wermelskirchen substantially reduced heat losses by insulating a plastic injection moulding machine with blanket insulators.

Schneider, Director of EnergyAgency.NRW, explains. North Rhine-Westphalia is a highly industrialized and energy-intensive region. In the industrial domain more than 40 per cent of the electricity used for industrial purposes nationwide is consumed here. And precisely for this reason there is a need in this state for more vigorous impulses and greater funding to exploit the potential savings and to advance the development of the market for energy efficiency. EnergyAgency.NRW therefore has a practice-oriented range of consulting and further training instruments to support primarily small and medium-sized enterprises in tapping potential savings: starting assistance in this direction is given, for example, by the Climate Profit Centre NRW, which passes on to companies the appropriate consultancy contacts from the region. This service of the EnergyAgency.NRW which was initiated by NRW’s environment ministry can be reached on the hotline +49 (0)211 / 837 1914 or online at www.energieagentur.nrw/kpc.

www.energieagentur.nrw/unternehmen
Clean freight transport

In the next few years freight transport will grow dramatically and with it the pollution caused by greenhouse gases and air contaminants. Part of the anticipated growth in freight transport should be shifted from the roads to the railways and waterways. Inland shipping will replace a large number of heavy trucks, but the diesel engines on ships also emit large quantities of pollutants. This has been confirmed by the emissions inventory kept by the Regional Department of Nature, the Environment and Consumer Protection of North Rhine-Westphalia: in 2014 only twelve per cent of the readings taken were within the EU limits laid down in Directive 2008/50/EC. Liquefied natural gas or LNG could present a climate- and environment-friendly alternative. The advantage is no emissions of fine particulates and sulphur (SO$_2$), 80-90 per cent less nitrogen oxides (NOx) and potential CO$_2$ savings of 10-20 per cent. By mixing in biomethane it would even be possible to reduce CO$_2$ emissions by as much as 80 per cent. The drawback is the lack of infrastructure. Technical and legal parameters have to be established on a Europe-wide basis. In the autumn of 2016 two European projects were launched which are intended to advance the cause of LNG as an alternative fuel.

The Interreg project LNG PILOTS is forging ahead with the development of innovative solutions for the transport and industrial sectors in the field of LNG. Under the leadership of Stichting Energy Valley from Groningen a consortium has been formed with 36 partners from North Rhine-Westphalia, Lower Saxony and the Netherlands, the aim being to introduce LNG in freight transport across national frontiers. In the EU LIFE project CLeanINlandSHipping (in short CLINSH) measures for reducing pollution in the exhaust gases of ships are being tested under real operating conditions over a period of four years. The project encompasses 17 partners from Germany, the Netherlands, Belgium and Great Britain (coordinated by the province of South Holland). The Network Fuels and Drives of the Future run by the EnergyAgency.NRW has supported the project’s initiation and is accompanying relevant projects for the introduction of climate-friendly and environment-friendly fuels in freight transport.

Pit heat storage

At the former “Werk I” Opel site in Bochum a pilot plant is being used to research thermal storage in a “pit heat storage facility”. A pit heat storage facility is intended to store the seasonal waste heat from industrial and power plant processes or solar-generated heat in mine workings and use it in the winter to supply heat to residential and commercial areas. The project, which uses the structures of the former Dannenbaum mine (1859 to 1958), is being funded by the European Union and the state of NRW.

On the works site of the former Opel factory the two main hoisting shafts are located in the north-west part. The mine was worked to a depth of 695.5 metres below sea level. After the closure of the mine the two shafts were filled in. Above the 4th level, up to 190 m below sea level, the mine workings are at present flooded. The planners assume that an undisturbed temperature level of approx. 27°C can be encountered in the mine at the 8th level at a depth of 693 metres below sea level.

In a trial run it is intended to open up the workings of the Dannenbaum mine through a production well and an injection well created by directional drilling. It is intended to drill to the 8th level at 693 metres below sea level (production well) and the 4th level at 227.6 metres below sea level (injection well). It is planned to erect the pilot plant following promptly on successful completion of the feasibility study. The aim here would be to establish a central heating station with solar panels and a heat pump for the exclusive heat supply (with thermal output of 1 MW$_{th}$) to the new estates on the former Opel factory site.

Historical note: Formerly the Dannenbaum mine produced coal, and now heat is stored here.
A round 9,000 biogas plants, with an installed capacity totalling some 4.2 GWel, are in operation in Germany. The electricity they generate currently covers 5 per cent of gross power consumption throughout the country. A fleet of plants whose longer-term future remains uncertain, however. Prof. Dr.-Ing. Christof Wetter, of the Münster University of Applied Sciences, summarises the most urgent challenges facing the sector.

**Professor Wetter, what developments are forcing biogas-plant operators to take action?**

**Wetter:** The now terminating RESA payment confronts every biogas-plant operator with the question of how the future of his or her plant will then look. An examination of the subject at an early stage appears necessary, against the background, also, of the adjustment of other legal boundary conditions, such as the Fertiliser Ordinance, for example, and growing cost pressure, in the case of substrates, for instance.

*Could these changes also in fact be an opportunity for the biogas industry, or rather the power and heat system?*

**Wetter:** Yes, provided spaces for creative innovation are also implemented. Consistent further evolution of concepts for needs-orientated supply of electricity and heat from biogas plants offers great opportunities, for example. Here, biogas can play an important role, as balancing energy and as a grid stabiliser. Not least important is the fact that biogas can be stored, and can also be transmitted via the existing gas grid, after preparation.

*What, in your opinion, are the most important adjustments for plant operators?*

**Wetter:** There is a whole series of potentials for optimisation along the biogas process chain. Breakdown efficiency, for example, can be boosted by pre-treating substrates, or by systematic use of additives. The greater use of residues, and plant technology optimised for this, and optimisation of digestate utilisation for closed nutrient cycles, offer even more potentials. The utilisation of the biogas generated has a significant influence, above all, however.

*And what future-viable business models do you perceive for plant operators?*

**Wetter:** Primarily in smart heat-utilisation concepts and demand-regulated supply of electricity, via balancing and standby energy for example. An important key to future-viable business models can be found here, in my opinion.

*Do you see any alternative utilisation concepts for plants which can no longer be operated cost-efficiently?*

**Wetter:** There won’t be all that many opportunities for these plants. The tanks can, of course, be used for storage of liquid manure, and the CHP units can, in some cases, also be operated using fossil energy sources, but there will, no doubt, in many cases be a decrease in plant numbers. From a political viewpoint, however, it will be necessary to ask whether the concomitant squandering of assets can really be desirable. There are no less than 9,000 biogas plants, and thus companies, in Germany that have made an important contribution to the energy turnaround, and can continue to do so. Especially when you remember storage potentials, balancing of peak loads, sector integration, alternative fuels and the replacement of natural gas in the grid.
Firefighting is out - prevention is the better way

Fuel cell for fire-safety, too – Bielefeld’s Oetker group shows how at Wolf ButterBack KG.

The core element of the system is a fuel cell that generates power and heat simultaneously on the cogeneration principle, with absolutely no pollutant emissions and with particularly low maintenance needs. The process results in an exhaust gas with a lower oxygen content than normal ambient air and which occurs continuously and with no additional costs whatsoever during operation of the system. A permanent shielding atmosphere, in which fires cannot even get started, is generated, via a piping system, in the rooms requiring protection. Because, too little oxygen, no fire! And if nothing can burn, nothing has to be extinguished. Wolf ButterBack KG, of Fürth, part of Bielefeld’s Oetker group, employs the innovative “QuattroGeneration” system from Fuji N2telligence for fire safety in its cold store.

“But surely nothing can burn in a cold store.” Wrong! There is a high risk of fire even at extremely low temperatures, as a result, in particular, of the dry air present, the large range of combustible packaging and insulation materials, and increasing automation. Fire-safety costs money, however, and continuous operational costs are a particular factor. But fire-safety now no longer has to be a cost element – it can, instead, generate its own return-on-investment. This, at least, is Fuji N2telligence’s promise for its “QuattroGeneration” system (www.n2telligence.com).

It’s not really a new principle, but with “QuattroGeneration” the waste-air from the fuel cell is available 24/7 at zero cost. So using the fuel cell also results in cold stores being supplied with electricity and heat (or refrigeration) and never coming into contact with fire or water.

The limited partnership for deep-frozen baked goods founded in 1991 was integrated into the Foods division of Bielefeld’s Oetker group in 2004. In 2015, Wolf ButterBack achieved annual sales of 28,326 tonnes of deep-frozen baked products, which require continuous cooling. This is why the world’s first-ever project for simultaneous supply of energy and elimination of fires in a cold store using fuel-cell technology was conceived and why it has been in use since Christmas, 2016. And it’s good for the environment, and for the company’s purse and assured energy supplies. Fuji N2telligence and its fire-safety partner Minimax are thus hoping together to make a large number of such warehouses more energy-efficient and even safer against fire in the future.

Heat turnaround – Denmark shows how!

Denmark’s long-term orientated energy policy has boosted expansion of district heating and CHP.

Denmark is forcing the pace of the European heat turnaround: CHP’s share of power generation has risen to above 60 per cent over the past thirty years. District heating now dominates the Danish heat market, at 63 per cent market share. In addition, more than 70 per cent of district heating originates from renewable energy sources (including waste-heat from waste incineration) or is generated in natural gas CHP installations. Germany’s district-heating share is only 14 per cent, while CHP’s share of total power generation is estimated at around 17 per cent. Here at home, heat storage systems combined with CHP plants continue to be the exception, whereas such flexible generation systems have now been tried and proven in practice over many years in Denmark. In Germany, the gas grid was predominantly expanded, while in Denmark a heat turnaround was initiated following the oil crisis, thanks to the establishment of a long-term political framework for the setting-up of district-heating systems.

From the 1980s onward, legislation concerning heat supplies not only assured the replacement of heat-only boiler stations by heat+power cogeneration plants, but also placed obligations on the municipalities. This is also why Denmark is well ahead in research into CHP technologies. The Termis software package, for example, is an instrument which minimises the system’s supply temperature on a utilisation basis and thus cuts heat losses by around 10 per cent and CO₂ emissions by 2 to 5 per cent. This software already controls heat supplies for more than 100 million residential units in more than 500 towns and cities around the globe.

orthuber@energieagentur.nrw.de
The largest joint EU project for fuel-cell buses up to now kicked off in Cologne in mid-January. From 2018 onward, some 140 vehicles, of which fifty-one will be used in the Cologne, Wuppertal and Rhine-Main regions, are to be purchased as part of the JIVE (Joint Initiative for Hydrogen Vehicles across Europe) project. The EU is providing some 37 million euros for this purpose. In the MEHRLIN project initiated in parallel, Brussels is funding the construction of seven hydrogen filling stations, three of them in Germany.

The magnitude of this project will enable European bus manufacturers to obtain economies of scale, and focal topics. The model for the research campus is based on the eponymous “Research Campus - Public-Private Partnership for Innovation” promotion initiative of the federal ministry of education and research (BMBF), which is thus supporting long-term cooperation between science and industry.

Together, the cooperating parties from science and industry are conducting research within the FEG research campus under a single roof, the FEG Think Tank at the RWTH Aachen University’s Melaten campus. The FEG research campus’s open structure means that other companies can join the consortium at any time and participate in the research work, as well as benefiting from the jointly achieved results. Such a transdisciplinary interchange of diverse experience, disciplines and countries is necessary in order to successfully master the challenges of our future energy supplies, and in order that innovations are implemented beyond both geographical and disciplinary boundaries. In addition, the joint, application-orientated research of the scientific and industrial partners is being pursued under a single roof. Research results can thus be quickly translated by the industrial partners into innovative products and services.

DC - a key technology in the energy turnaround

Our energy-supply system is increasingly shaped by renewable energy sources. This produces challenges for the existing grid infrastructure and energy-supplies as a whole. Smart grids are needed to counter these challenges and to integrate the renewable energy sources into our power system as flexibly and as efficiently as possible. Aachen’s “Flexible Electrical Grids” (FEG) research campus is therefore developing technologies for future electrical grids fed by a high percentage of regenerative and decentralised energy sources.

One central research focus here is the further development and integration of direct-current (DC) technology at all voltage levels. This technology simplifies a whole series of tasks which could be implemented with the alternating current used up to now only at additional cost and with additional control input. DC power grids are also more suitable than AC grids for achievement of flexible, bi-directional flow of energy between generators and consumers. They are easier to control, and react much less critically when energy is fed in at many locations simultaneously.

The FEG research campus is a consortium of RWTH Aachen University research institutes and industrial participants from a range of technical fields and focal topics. The model for the research campus is based on the eponymous “Research Campus - Public-Private Partnership for Innovation” promotion initiative of the federal ministry of education and research (BMBF), which is thus supporting long-term cooperation between science and industry.

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Europe promotes fuel-cell buses

The largest joint EU project for fuel-cell buses up to now kicked off in Cologne in mid-January. From 2018 onward, some 140 vehicles, of which fifty-one will be used in the Cologne, Wuppertal and Rhine-Main regions, are to be purchased as part of the JIVE (Joint Initiative for Hydrogen Vehicles across Europe) project. The EU is providing some 37 million euros for this purpose. In the MEHRLIN project initiated in parallel, Brussels is funding the construction of seven hydrogen filling stations, three of them in Germany.

The magnitude of this project will enable European bus manufacturers to obtain economies of scale, which will bring cost reductions for fuel-cell buses. It will also be demonstrated that hydrogen filling stations with high sales volumes can be operated cost-efficiently and reliably.
Jülich’s artificial sun to power aircraft

“Synlight” solar simulator opened in Jülich, NRW – aim: to boost research into renewables.

No less than 149 short-arc lamps radiate with 10,000 times the intensity of normal solar radiation on the earth, making up the world’s largest artificial sun. The Institute for Solar Research’s apparatus at the German Aerospace Center in Jülich is intended, above all, for the development of production processes for solar-generated hydrogen as a vehicle fuel of the future. It is, simultaneously, also available to researchers in other disciplines, and to industrial companies. Experts attach great importance to the Jülich facility for research into future energy supplies. Practical expansion of existing technology is now needed in order to meet the targets for the expansion of renewables. But it would be difficult to implement the energy turnaround without simultaneously innovative and practically orientated research that generates new technologies and global lighthouse projects, such as Synlight®. The “super sun” was put into operation in an industrial building at the Jülich Technology Center’s large-scale research facility. In energised state it achieves not only temperatures of 3,500 degrees Celsius, but also the intensity of 10,000 real suns. Something which people could not bear for longer than a second is to be ground-breaking for aircraft. The research here is into the production of hydrogen, which is to be made suitable for use in large aircraft.

The state of NRW is supporting the Synlight project with 2.4 million euros, equating to 70 per cent of the total costs of 3.5 million euros. The remaining 1.1 million euros are to be provided by the federal economics ministry. Synlight is a project operated by the Institute for Solar Research of the DLR. The institute itself was set up with science ministry funding of over 15 million euros. The Institute for Solar Research sees itself as a builder of bridges from basic research, up to and including commercial-scale implementation and application.

Klaus Scherer on SmartHomes

Greater safety, energy-efficiency, smart support for everyday life and old-age - this is the basic idea behind SmartHomes. The Smartphone and Tablet PC are ever more becoming the control centre for building automation, and are replacing remote controls. EnergyAgency.NRW asked Klaus Scherer, head of NRW’s “SmartHome Initiative Germany” state group, exactly what is really “smart” and whether hacker attacks could prove hazardous for these networked systems in future. Correctly implemented and operated, SmartHomes can boost not only energy-efficiency, but also safety in the home – Scherer explains how in the “In Conversation” web forum at:

www.energieagentur.nrw/sicherheit_von_smarthomes
The linking of the subjects of energy and mobility is a highly topical issue at present. Many researchers are currently studying it, but what are the tangible effects, for the Aachen region for instance?

What challenges are we facing, what clever ideas can we use, to create genuine benefits for the regional players? The FH Aachen University of Applied Sciences is now concentrating its research capabilities in these fields in a Network Energy & Mobility (NEMO), in order to find specific answers to these questions. More than twenty researchers of both sexes, from the fields of the engineering sciences, information science and the economic sciences, are participating in this initiative. The researchers’ aim is to create a “Living Lab”, in which technologies and concepts for sector integration – i.e., the networking of electricity, heat supplies and transport – are to be developed and applied.

A highly practical orientation is typical of the teaching and research at the FH Aachen University of Applied Sciences. And the new network is no exception: the scientists working here see themselves as on-the-spot contacts for companies and institutions. Their aim is to help in finding innovative solutions, and to pursue new approaches in cooperation with municipal and regional partners. Contents span a large range, from urban planning and climate-protection concepts, via energy management and storage systems, up to and including logistics and innovative materials.

NEMO concentrates the capabilities of the institutes of the FH Aachen University of Applied Sciences. Above all, however, it provides a platform for interdisciplinary work. Innovative ideas do not stop at disciplinary boundaries, they are generated by the interchange between clever minds from diverse sectors. Close cooperation with regional partners from industry, politics and local government ensures that the research projects are orientated around the needs of the region.
Long-term testing of fuel-cell vehicles

EnergyAgency.NRW has been testing fuel-cell cars for everyday use since 2012.

These zero-emissions vehicles are used for business trips, publicity events and test runs - at technical conferences and trade fairs, for example. “Two Opel/GM HydroGen 4 vehicles were firstly provided to us after the opening of the hydrogen filling station in Düsseldorf. Despite being developed before 2008, these vehicles impressed us with their extremely good performance”, affirms Stefan Garche, of EnergyAgency.NRW. EnergyAgency.NRW has now also had the opportunity of test-driving a Ford Focus FCEV, and thus of gathering more experience and providing the manufacturer with feedback.

EnergyAgency.NRW has been using a Mercedes F-CELL B Class since 2014. Up to today, this vehicle’s fuel cell has powered more than 50,000 kilometres of travel, without any losses in output. Leaving aside a faulty window actuator and a blinker, this car has suffered no technical malfunctions during this time. Its energy consumption is an annual average of around 1.1 kg of hydrogen per 100 kilometres, equivalent to the energy contained in around 3.7 litres of diesel fuel. A Hyundai ix35 FCEV and a Toyota Mirai have also been tested for short periods. Both of these vehicles run quietly, with good torque and acceleration: fuel-cell cars generate very little noise, with the exception of tyre and wind noise at higher speeds.

And the network of hydrogen filling stations is growing continuously (35 in Germany at present, rising to 100 filling stations by the end of 2018). Up to now, tanking up on hydrogen has been possible in NRW in Düsseldorf, Wuppertal, Münster and Kamen. These will be followed in the near future by new H₂ stations at Mülheim an der Ruhr, Cologne/Bonn Airport, Fretten and Düsseldorf South. Up to today, EnergyAgency.NRW has put in more than 100,000 kilometres of travel in fuel-cell vehicles. And tanked just on one tonne of hydrogen in 500 filling operations at H₂ filling stations.

The vehicles used emitted a good 50 per cent less CO₂ (resulting from the still predominant production of H₂ from natural gas) compared to conventional vehicles, but zero NOx and zero fine particulates.

Alongside battery-powered electric cars, fuel-cell vehicles are among the real pioneers in reduction of CO₂ emissions from mobility. “The future of driving is set to change radically, and fuel-cell vehicles will play their part. With zero emissions and short filling-up times, they are the solution to the range problem”, comments Prof. Dr. Detlef Stolten, head of the Jülich Research Center’s Institute for Energy and Climate Research.

The Mercedes F-CELL B Class demonstration project concludes in mid-2018. EnergyAgency.NRW will then also have to return the vehicle. Its successor, the Mercedes GLC FCEV, is to be unveiled at the 2017 IAA International Motor Show. Other motor-vehicle manufacturers, such as Honda, Toyota and Hyundai, will also be showing the upcoming generations of fuel-cell vehicles.
The magic word “flexibility”

Flexibility is an essential element of the energy turnaround. The focus on weather-dependent energy sources such as the sun and the wind in the supply system will give rise to a volatile new factor, which will require counterbalancing, to ensure that grids remain stable. There will, therefore, be a need for greater capability for reaction within the system, achieved via flexible demand (demand-side management) and flexible generation (supply-side management). Storage systems and grids, like a whole series of other technologies (see graphic), also provide the system with flexibility.

Assessment of flexibility options indicates various characteristics for their delineation. They can thus be differentiated by the residual-load situations that they balance out. Residual load is the output which is needed when generation from renewables is deducted from total load. Nowadays, there are usually positive residual-load situations, which means that the renewables are not able to cover the demand for power. Fossil-fuelled power plants feed in to make up the balance. In future, situations in which renewables cover more than 100 per cent of demand will also occur, a case referred to as „negative residual load”.

For this situation, the bridges between the sectors of electricity, heat and mobility are to be strengthened, and electricity from renewable energy sources which the power grids can no longer absorb will be used for decarbonisation of the other sectors. This concept is a fundamental element in sector integration.

Grids and markets are the drivers for market players, inducing them to adapt to the volatility of the renewable energy sources. The frequency of 50 Hertz must be maintained in the grid, in order that it remain stable at all voltage levels. The fluctuation tolerance is extremely low, when compared to the fluctuations resulting from regenerative feed-in. Flexibility serving grid purposes is nowadays mainly organised at the transmission-grid level. The transmission-grid operators very quickly balance out the difference between the traded and required power on standby energy markets. The standby energy markets are, it is true, grid-driven, but they are also, simultaneously, the central trading platform for flexibility. They are, however, merely replacement markets, with only a limited scope. Market players have recognised flexibility as an income option, and are impinging on the standby energy markets. The consequence: prices are falling, and refinancing projects are becoming more sophisticated.

An increasingly important system service is thus set against a difficult market environment. Market design’s function is that of resolving this dilemma. Since 90 per cent of renewables feed in at distribution network level, it is becoming ever more important to implement flexibility where volatility enters the grids. Virtual power plants, as decentralised flexibility mechanisms, can here form the foundation for the essential energy-turnaround element of flexibility.

Smart meter rollout: the status quo

The Act on the Digitisation of the Energy Turnaround, which governs the upcoming smart-meter rollout, has been in force since the start of this year. According to the federal ministry of economic affairs and energy (BMWi), the rollout is to commence in the autumn, although there is no fixed date. The obligation to install will apply as from the time at which not less than three fully independent companies begin to market correspondingly certified systems, which is not yet the case, however.

Compared to other EU states, the rollout is governed in Germany via a relatively clear legal framework. Germany has reached only mid-field in actual implementation up to now, however. Nearly 45 million smart consumer meters, and thus 23 per cent of the appliances planned for the EU up to 2020, have already been installed in the member states of Finland, Sweden and Italy. We should note that the cost/benefit analysis of the rollout has been positive in these countries, unlike the situation in Germany. Conversion to smart measuring systems is worthwhile only for specific groups of users, however. For this reason, many of the small and medium-sized municipal utilities in NRW employ external service-providers to perform the tasks involved with the rollout (and smart-meter gateway administration, in particular).
Fiji chairs World Climate Conference in Bonn

Vacation paradise backs renewables

The annual large-scale UN climate conference is to be held under the presidency of the Fiji Islands at the headquarters of the United Nation’s Climate Secretariat in Bonn in November 2017. The Fiji Islands’ leadership means not only, for the first time ever, a Pacific state, but also one of the regions most severely affected by the consequences of climate change, chairing the World Climate Conference.

Like many other South Sea islands, the Fiji archipelago is drastically threatened by climate change. The islands’ highly sensitive ecological system is under threat from rising sea levels, changing precipitation patterns and storm floods. Not only are popular vacation destinations thus being lost on the islands, the water also endangers large parts of the living space of the more than 800,000 inhabitants of the island group.

Energy supplies up to now: dirty, complex, expensive

In addition, South Sea islands are now having, in view of the limited scope for action by their populations and local industry, to find new ways of securing access to energy. Island states are to a large extent dependent on imported fossil fuels to meet their needs for energy for the generation of electricity. The principal energy sources, diesel fuel and coal, are delivered by sea in tankers. This is not only a relatively “dirty” form of energy supply, it is also complicated and expensive. According to the International Renewable Energy Agency (IRENA), energy supplies to such island states absorb around 5 to 20 per cent of their economic product, and are therefore a great burden on such islands’ budgets.

High renewables potential in South Seas

Such South Sea islands have enormous amounts of sunshine as a resource, but energy self-sufficiency nonetheless remains difficult; such islands have, by their nature, too little of another important resource: space. And what there is, is highly contested. Tourism, with its needs for attractive natural landscapes, competes with agricultural utilisation and also with potential energy utilisation of the land. Island states are nonetheless consciously investing in a future with renewable energy. Such small “island developing countries” have resources which mean that they could meet their energy needs 100 per cent from renewable energy sources. Political, technical and financial barriers must be surmounted, in order that the high potentials do not remain unexploited, however.

Best Practice: 100 per cent renewables on El Hierro

The first small island to provide supplies 100 per cent from renewable sources is the Canary Island of El Hierro. Five wind-power installations on the 270 square kilometre island now generate electricity for the around 10,500 inhabitants and the annual 60,000 tourists. A pumped-storage power plant with a water reservoir in a volcano crater ensures that the power flows even when the wind temporarily stops blowing. Renewable energy sources replace a diesel-powered generating plant which was previously responsible for supplying the island with electricity, at annual costs of 1.8 million euros, at the last count. In addition, 6,000 tonnes of diesel fuel had to be delivered by tanker ship every year. The new energy model is said to cut power-generation costs by 23 per cent.

Essen’s city hall modernised

Green capital backs contracting

The NRW city of Essen’s city hall, built in 1979, is to undergo extensive energy modernisation. EnergyAgency NRW has supported the planning with its energy and contracting advisory services. The energy-saving contracting project planned by the City of Essen, which envisages investments of a volume of over 10 million euros, is to be implemented in cooperation with Siemens AG. Annual energy costs are to be reduced by one million euros in total by means of technological improvement of efficiency, and the first modernisation measures are expected to pay off in euros and cents as early as this autumn. In addition, CO₂ emissions are to be cut by more than 2,700 tonnes annually.

The main element in the modernisation will be the replacement of the currently installed air-conditioning system, which no longer meets modern standards. Lighting is also to be converted to energy-saving LED technology.

This 10 million euro project is to receive 90 per cent funding under the Municipal Investment Promotion Act (KlnvFoG). EnergyAgency NRW kicked off the project with an initial consulting session, and has provided accompanying advisory support for the ongoing process.

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What motivates you to go to work every day?

Hakenberg: It’s the feeling that I am doing the right thing and playing a part in solving real current problems. And doing it together with a highly-motivated team, who feel just the same as I do and enjoy finding innovative solutions to technical challenges. And what motivates me in particular is achieving success and being able to develop myself and the company. PaXos is working hard on electromobility - for example in the area of charging posts. But electromobility only makes sense when its power supply comes from renewable energies. So our solar roof tiles, for example, are helping with the energy turnaround and also with the move towards electromobility.

What would be lost to the environmental sector if paXos did not exist?

Hakenberg: A very agile player, which creates stimulus in many areas, would be missing. We bring ideas to the fore, make successful patent applications and help to drive forward necessary innovations – as I said before, particularly in the areas of renewable energy and electromobility.

Just imagine that you were the German environment minister. What would be one of your first acts after taking office?

Hakenberg: Well, that’s easy: I would create greater planning certainty for renewable energies and electromobility. This is really important, particularly for investment and securing of intellectual property rights.

Is your own roof at home tiled with your company products?

Hakenberg: No, but it would be good to see (in the literal sense). But I do have the “traditional” renewable energy systems on my house roof - an 8 kWp photovoltaic installation and a 32 kWp solar system. This is also important, because you have to know the existing technology very well and be able to analyse it before you can seriously start looking for something better. And we really have discovered considerable potential for improvement. Instead of a “double roof-covering system” with roof tiles, supports and panels, our solar tiles are laid in almost the exact same way as normal tiles, which means there is no need for a crane and additional framework. The enormous efficiency of our solar roof tile results from the combination of photovoltaics (electricity) and solar thermal technology (heat). Traditional photovoltaic systems become far too hot in summer, despite back ventilation, and this not only shortens their lifetime, but also has a negative effect on yield. An 8 kW installation then does not yield even half of its nominal output, but – thanks to cooling – our roof tiles do.

What do you need so your company can continue to be successful?

Hakenberg: In the first instance, we need venture capital provided by state sources, for example the NRW bank, so that the owners of the company do not have to bear the entire risk. And of course we are looking for investors.
28.6.2017

Smart Energy Network

The annual conference of the Smart Energy Network of EnergyAgency.NRW in the Dortmunder U will focus on “Opportunities and challenges for innovative market players and established energy suppliers”

www.energieagentur.nrw/veranstaltungen

28. + 29.6.2017

9th Branchentag Windenergie NRW

Presentations, workshops, exhibitions, speed dating – the 9th “Branchentag Windenergie NRW” on 28 and 29 June 2017 in the Van der Valk Airport Hotel Düsseldorf will provide current information about technologies, services and policy in the wind energy sector. In 2017, the main themes will be research, maintenance, production, legal aspects and standardisation, with a special forum on “Municipalities and Wind Energy”.

www.nrw-windenergie.de

29.6.2017

Prosumers in the energy turnaround (Energiewende)

The joint conference of EnergyAgency.NRW and the consumer centre Verbraucherzentrale NRW will be exploring the various ways and means for companies, private households and local authorities to play an active part in the energy market. Besides consideration of the legal framework and practical possibilities for implementation from PV installations through to load management, opportunities and problems will be discussed with users and members of the scientific and political communities. Attendance at the conference, which will take place in Düsseldorf, is free of charge.

www.energieagentur.nrw/qr66

1. bis 3.9.2017

E-Cross Germany

The E-Cross Germany rally will take place this year from 1. to 3.9.2017. The event organiser is Klimawoche Bielefeld e.V. with the support of EnergyAgency.NRW, Stadtwerke Düsseldorf and further partners. The purpose of the event is to present efficient drive systems and innovative solutions which are available today for bicycles, cars and light utility vehicles. The tour starts in Bielefeld and on the following day will go on to the banks of the Rhine in Düsseldorf for the Electromobility Day. On 3.9.2017 the rally will continue on to Rursee in the Eifel region.

www.ecross-germany.de

7. + 8.7. 2017

NRW.KlimaTage 2017

A good opportunity to learn more about the work of the KlimaExpo. NRW climate exhibition: on 7 and 8 July 2017 the NRW.KlimaTage climate days will take place as a particular highlight of the intermediate presentation year of KlimaExpo.NRW. Partners or projects of KlimaExpo.NRW are invited to take part and can register now. Experts, school pupils and university students, families – in fact everyone with an interest in climate-related matters - should not miss this opportunity to learn more.

www.klimaexpo.nrw/2017/nrwklimatage2017/

8. + 9.11.2017

REIF in Japan

Already for the fifth time, a joint corporate stand will represent North Rhine-Westphalia at the Renewable Energy Industrial Fair (REIF) in the Fukushima Prefecture of Japan. Together with NRW.International and NRW.Invest, EnergyAgency.NRW will organise the NRW presence at the fair along with a NRW Symposium from 8. to 9. November 2017. The participation in the fair is being organised within the framework of the partnership between North Rhine-Westphalia and the Fukushima prefecture. Last year, the NRW joint stand, with its eight participating companies, won the prize for the best stand concept at the Fair, gaining recognition as one of the largest joint stands for its open and airy concept.

www.energieagentur.nrw/qr70

9.11.2017

Conference: Energy in Transition

The conference “Energy in Transition – Sector Coupling” (Energie im Wandel – Sektorenkopplung) on 9 November 2017 in Oberhausen will consider current questions in the area of sector coupling. Experts from research and industry will present framework conditions and global trends and identify the challenges that have to be met. The requirement for research and development will also be discussed. This conference is being organised by Fraunhofer UMSICHT together with the cluster EnergieResearch. NRW of EnergyAgency.NRW.

www.energieagentur.nrw/veranstaltungen
Renewables in the new pupils’ laboratory

The "metabolon" competence, learning and innovation centre at the Entsorgungszentrum Leppe waste disposal facility is going to extend its portfolio as an extra-curricular learning centre by adding a school students’ laboratory.

The MINT-LAB, which is being created in cooperation with the technical university in Cologne within the framework of the zdi school students’ laboratories scheme, is directed towards secondary school students and also adult learners on general education courses.

In the new laboratory, the students will engage in intensive consideration of the different themes around renewable energies. The learning content will be processed in groups, with the students working as independently and closely to actual operational practice as possible; amongst other things, the research facilities of the joint research body and also the extensive technical centre of the waste disposal facility will be used. The aim is to simulate, analyse and, finally, understand processes with the help of practical experiments.

Companies in agricultural regions of Germany are suffering more and more from a lack of new blood and young talent. One of the reasons for this is that the younger generation are leaving to live in large conurbations. This trend can also be observed in the Bergisches Land region – even though many companies are located there and can offer an interesting professional future. For in addition to the companies themselves, the TH Köln University of Applied Sciences with its sites in Gummersbach and the waste facility in Leppe ("metabolon" project) also offers a comprehensive range of learning opportunities in the region – in particular in technical subjects.

In the new school students’ laboratory, the emphasis will be above all on the relationship to real-life working, and this is to be achieved through close cooperation with the companies of the region. In turn this means that the companies have the opportunity to present their portfolios in the renewable energy and environment sectors. The technologies are to be integrated into the teaching programme as fully as possible.

The programme for the "European Green Capital" is ready

Essen is "European Green Capital" in 2017. Urban green areas, nature and biodiversity, air quality and water management – these are areas of the environment where Essen is extremely active. The story of the transformation of a coal and steel town into the greenest city in North Rhine-Westphalia should become a template for many towns and cities in Europe which are undergoing structural transformation. This is why the European Commission has named Essen as "European Green Capital" for this year. The city at the heart of the Ruhr region has planned a comprehensive programme of projects and events which everyone can join in – such as a literature project for young people. The programme can be found here:

www.energieagentur.nrw/qr67
Investment in renewable energies and energy-efficient technologies is also financially worthwhile - because the regional government of NRW provides financial support to households, local authorities and companies to the tune of several thousand euros each year through its funding programme progres.nrw-Market Launch. So innovation & energie magazine visited this project in Düsseldorf to see what can be achieved.

Bernd Deckert likes tradition: the farmhouse in Düsseldorf where he lives with his wife is 200 years old. And in the newly-built neighbouring building, he has established a museum for the old French pendulum clocks which he has collected over the last 35 years. But when it comes to energy, the 68-year-old has no time for old-fashioned technologies: “When we had to look for a heating system for the new house, fossil fuels were never in the running. After much research, we decided in favour of a solar-powered ice storage heating system – a system which at that time was quite new on the market”, says Bernd Deckert. The principle: a solar absorber on the roof of the car port takes heat from the environment – which is then provided for heating of the living space through a heat pump. The ice storage unit – a cistern containing 10,000 litres of water – also stores solar energy in the form of heat and therefore acts as a buffer storage system and additional heat source for the pump. In the cold season, the pump takes so much heat from the ice storage unit that the water slowly freezes, which releases so-called crystallisation energy – energy that can then be used for heating the building. “As temperatures here in Düsseldorf are often around freezing, the system is ideal for our climate”, says Bernd Deckert.

It is innovative technologies such as these which are helping to drive forward energy transition and climate protection in private households in NRW – and they therefore also receive considerable funding from the regional government in NRW. In fact the region provides more than twelve million euros per year thought the progres.nrw-Market Launch funding programme, in order that private households, but also local authorities and companies, can take forward their own individual energy turnaround. This means, for example, that ordinary citizens can secure subsidies for pellet heating systems, solar and photovoltaic installations which are linked to energy storage units or for geothermal boreholes in their gardens – and if they wish they can also receive a badge from the NRW ministry for climate protection which identifies them as exemplary savers of energy. “Overall, it was quite simple to apply for the funding”, says Bernd Deckert.

**Objective:**
With this funding programme, the NRW regional government wishes to promote use of available technologies for the exploitation of inexhaustible energy sources, thus reducing CO₂-emissions.

**Target groups/those entitled to funding:**
Ordinary citizens, local, companies and other organisations

**Focus of funding (selection):**
- Solar thermal installations
- Photovoltaic installations with electric storage
- Geothermal boreholes
- Heat accumulators and cold reservoirs
- Biomass installations

The programme is harmonised with existing federal funding programmes (BAFA) and wherever possible is used to supplement them.

**Further information:**
The ministry of the environment has issued a flyer about progres.nrw aimed at ordinary citizens. Companies (for example craft enterprises) who wish to inform their customers about the funding programme, and also local authorities who wish to supply relevant information, can obtain the flyer in bulk free of charge from the district government in Arnsberg.

**progres.nrw-Market Launch at a glance**

- **Objective:** With this funding programme, the NRW regional government wishes to promote use of available technologies for the exploitation of inexhaustible energy sources, thus reducing CO₂-emissions.
- **Target groups/those entitled to funding:** Ordinary citizens, local, companies and other organisations
- **Focus of funding (selection):**
  - Solar thermal installations
  - Photovoltaic installations with electric storage
  - Geothermal boreholes
  - Heat accumulators and cold reservoirs
  - Biomass installations
- The programme is harmonised with existing federal funding programmes (BAFA) and wherever possible is used to supplement them.

**Further information:**
The ministry of the environment has issued a flyer about progres.nrw aimed at ordinary citizens. Companies (for example craft enterprises) who wish to inform their customers about the funding programme, and also local authorities who wish to supply relevant information, can obtain the flyer in bulk free of charge from the district government in Arnsberg.

[www.energieagentur.nrw/progres.nrw](http://www.energieagentur.nrw/progres.nrw)
Three questions for... Peter Becker

The HUSUM Wind fair refocused in 2015 and has now positioned itself as the lead event of the German wind sector. This year, NRW is the partner region for HUSUM Wind. We used the opportunity to speak to Peter Becker, CEO of HUSUM Wind.

Mr. Becker, what are the most important themes for the German wind sector this year?

Becker: Certainly reform of the Renewable Energy Act (EEG). It is fundamentally changing the framework for expansion of renewable energies – above all with respect to the regulations and target for onshore wind. The new EEG means that 2017 is a decisive year. This is why HUSUM Wind is happening at exactly the right time. It offers exhibitors and visitors a platform for discussing the conclusions drawn from the first tender rounds and to set the framework to the coming years. I am already looking forward to stimulating discussions with the important players from the sector.

The current installation figures show that NRW made up a lot of ground compared with the northern regions of Germany in 2016. What is the importance of NRW as a partner country for HUSUM Wind?

Becker: In fact, 2016 was a record year for NRW. With 12.2 per cent the region was again able to achieve a clear increase with regard to installed capacity, and so within all of Germany occupied third place just behind Schleswig-Holstein. The supply industry in North-Rhine Westphalia is the backbone of the German wind sector, and it is precisely the small and medium-sized enterprises which have provided vital continuity at HUSUM Wind.

The supply industry in North-Rhine Westphalia is designed to be quite concise. “We are very much focussed on keeping the barriers to funding as low as possible” emphasises Dr. Andrea Hoppe - who is responsible for the scheme at the NRW ministry for climate protection. “We value every application, because it shows that ever more people in NRW are discovering the themes of energy turnaround and climate protection for themselves and are taking the necessary action.”

And it is no wonder, because the benefits are clear: normally, investment in renewable energies and energy efficiency only show financial benefits after several years, but the regional funding means that it pays for itself much faster – which is also a good incentive for tradesmen to make offers to private households in the area of climate-friendly installations. “The financial help offered by the regional government of North Rhine-Westphalia has made the decision to invest in the ice reservoir system much easier for me”, confirms Bernd Deckert. He received ten per cent of his investment costs in the form of a grant, which in his case amounted to the not inconsiderable sum of 20,000 euros. So money has been saved which can possibly be used purchase one or two more clocks for his museum.

The importance of NRW is also reflected in the level of employment provided by the sector: around 18,500 people worked in the wind industry here in 2015. This takes the region up to second place compared with the rest of Germany. North Rhine-Westphalia is characterised by a wide variety of research projects and funding possibilities.

What do you view as relevant topics for wind energy research in Germany?

Becker: The sheer size of the newer wind turbines is presenting new challenges with regard to logistics. This means that research should not only be concerned with creating ever-larger turbines, but should also concentrate on more complex themes. Here, among others, research into different materials should be considered – for example relating to the theme of lightweight construction. Other questions which are certainly of relevance are those concerned with intelligent coordination of supply and demand. How can reliable and detailed forecasting data be obtained for electricity generation, for example? The complex of themes around repowering and continued operation is also certainly of interest in connection with the cessation of EEG funding. In specific terms, the task here is to find out which instruments and opportunities are suitable in order to support worthwhile continued operation.

And HUSUM Wind can also benefit again from the excellent networking of research and industry in NRW this year, because this networking gives rise to innovative and practical ideas for the further development of the wind sector.
Climate protection in the regions:

One-stop advice

There is no local or district government – in other words there is no part of NRW which has not committed to “the other way of generating and using energy”, in other words to climate protection and the energy transformation.

Reason enough for the government of NRW to support this development – which is also supported by all the political parties – in the different parts of the region. The climate protection targets of the EU are part of the general scheme here, but our own efforts to reduce the CO₂ emissions in the most highly-populated region in Germany are also extremely important.

To help us reach local authorities and districts, industry, commerce and ordinary citizens more easily, existing advisory resources will be strengthened through the “Climate Protection in the Regions” project, which was initiated by the minister-president’s office and the NRW ministry for climate protection and is based at Energy-Agency.NRW. As early as 2012, EnergyAgency.NRW started to provide information to the different parts of NRW through its seven climate networkers (Klima.Netzwerker) in order not only to provide information about the EnergyAgency.NRW portfolio throughout the region, but also to provide targeted project support to players in the climate protection sector. With firm roots in the different regions of NRW, for example in district councils and in regional industry associations, for example, the climate networkers have already been able to implement some projects by providing all types of advice. NRW as sponsoring organisation has now added seven new members to the team of the climate networkers at EnergyAgency. NRW. In future, the team will be deployed in the five administrative districts, at the Regional Association Ruhr (RVR) and also in the seven regional development organisations. These are Zweckverband Region Aachen (Fabian Müller-Lutz), Münsterland e.V. (Sebastian Niekamp), Region Köln/Bonn e.V. (Jeff Roy Lem), OstWestfalenLippe GmbH (Petra Schepsmeier), Südwestfalen Agentur GmbH (Julia Reifenrath), Bergische Struktur- und Wirtschaftsförderungsgesellschaft mbH (Cathrin Campen) and Climate Metropolis Ruhr 2022 (Nils Krüger). To these will be added Dr. Tobias Kemper, climate change adjustment networker at EnergyAgency.NRW.

Their tasks include proactive initiation of climate protection and climate change adjustment activities in the regions in close cooperation with the regional partners, and they will also facilitate dialogue between the different players in the field of climate protection and also to anchor KlimaExpo.NRW more strongly in the regions. With KlimaExpo.NRW, an instrument has been created which is able to present innovative climate protection projects which are also suitable for reproduction within a wider public. The climate networkers at Klima.Netzwerker.NRW support KlimaExpo.NRW in finding good examples of this. And beyond the development of theme-based routes and paths in the regions, the routes should be made accessible and meaningful to the wider public. The CEO of Zweckverband Region Aachen, Professor Christiane Vaeßen, also confirms that cooperation with “her” climate networker offers real added benefit for the regional climate protection activities. And the CEO of the economic development body Bergische Struktur und Wirtschaftsförderungsgesellschaft, Bodo Middeldorf, also sees advantages: “Working together with the climate networkers means that we can cooperate with local authorities, industry and commerce and also the world of science in order to promote activities throughout the whole of NRW – contributing to the implementation of NRW strategy as a whole and making the activities visible to a wider public.”

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www.energieagentur.nrw/klimanetzwerker
Lighting contracting in the natural foods shop

The solar cooperative Solargenossenschaft Essen is the first of its kind in NRW to enter the energy efficiency market. This community cooperative, which is managed by volunteers, has now modernised the lighting in a natural foods shop in Bottrop.

The shop did not have to invest one single euro of its own in the project, as the investment was taken over by Solargenossenschaft within the framework of an energy-saving contracting arrangement. “By changing over to efficient LED lighting, the owners are now saving more than 3,600 euros on their annual electricity costs,” says Prof. Rolf Schwermer from the Management Board of Solargenossenschaft.

The cooperative has invested around 12,000 euros in the conversion. This investment will flow back for refinancing during the term of the contract - paid for by the savings in energy consumption.

Often, commercial contracting services are only used to realise projects with an investment volume of more than 150,000 euros. Smaller organisations such as Solargenossenschaft Essen have up to now hardly made any use of contracting. But contracting does offer real opportunities to community energy projects. With their requirement for only modest returns and generally voluntary structures, they can also implement smaller projects in a way which is economically viable and therefore make use of energy-saving potentials that would otherwise not be utilised.

And upgrading of lighting systems can offer an interesting beginning. Professor Rolf explains why: “Conversion of traditional lighting systems to LED offers enormous savings potentials, sometimes as much as 70 per cent. This means that these projects pay for themselves very quickly, generally in between two to five years. In addition, the savings can be forecast quite accurately and differentiated from other forms of consumption.” As the investments remain in the ownership of the service provider during the term of the contract, it is also necessary to delineate the investment area within the rest of a building – in case, for example, the client becomes insolvent.

The solar cooperative firmly believes in the potential of this area of business; the next project is already in the implementation phase.

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Bernadette Müting-Spickermann is happy about ongoing promotion of sustainability.

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New Test Centre
A new test centre is being created on the Campus of the TU Dortmund University: at the end of March 2017, the foundation stone was laid at Emil Figge Strasse for the research centre into high voltage DC transmission (HGÜ). This year, a large test building and also an outside test area are to be created at a cost of around five million euros with funding from the federal state and from NRW itself. “This facility is unique in Germany and will make a significant contribution to the success of the energy turnaround”, says Professor Ursula Gather, Rector of the TU Dortmund University, at the foundation stone ceremony.

www.cef.nrw.de

Pellet heating:
NRW ranked third
When it comes to use of wood pellet heating systems, North Rhine-Westphalia is third amongst the German federal states. The most highly-populated region in Germany has now caught up from fifth position and is now in the top three alongside Bavaria and Baden-Württemberg. When the “Aktion Holzpellets”, a market initiative of EnergyAgency.NRW, was launched in 2003, there were only 644 publicly funded wood pellet systems in NRW. However, based on targeted publicity work and supported by the regional funding programme progres.nrw and also the MAP federal funding, the number of installations has considerably increased since then: now more than 30,000 households are using these climate-friendly heating systems.

www.aktion-holzpellets.de

Old heating boilers must go
Since 2014 the Energy Savings Ordinance (EnEV) has specified that after 30 years of operation, heating boilers have often reached the end of their working lives. This means that many property owners with a heating system that was installed before 1987 are due to have their boilers replaced this year. Estimates reveal that replacement is mandatory for more than one million old oil and gas heating systems in 2017. Property owners can read if their heating system has passed its mandatory end-of-life date from the nameplate, the chimney sweep report or the documents relating to the construction of the building. A study from the German Association of Energy and Water Industries (Bundesverband der Energie- und Wasserwirtschaft - BDEW) has found that 21 per cent of the 21 million heating systems in place throughout Germany were installed prior to 1990.

New map for networkers
When companies in North Rhine-Westphalia get together in matters of energy efficiency, success is not far away in the form of measurable savings – due to the huge benefit to be gained from exchanging experience and learning from one another. And it is now possible to see where these numerous networks have been established in a new interactive internet map of EnergyAgency.NRW, which clearly shows the regional distribution, the types of network and the possibilities of making contact (www.EnergyAgency.nrw/kpc). The map was created within the climate profit centre project “Klimaprofit Center NRW” of EnergyAgency.NRW. One important aim of the project is to offer advice in particular to small and medium-sized enterprises and remove obstacles to realisation of energy efficiency as an important competitive factor.

lucekerath@energieagentur.nrw

Newsletter & Social Media
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