innovation & energy

The magazine of the EnergyAgency.NRW

Linking sectors: Transformation of the energy system

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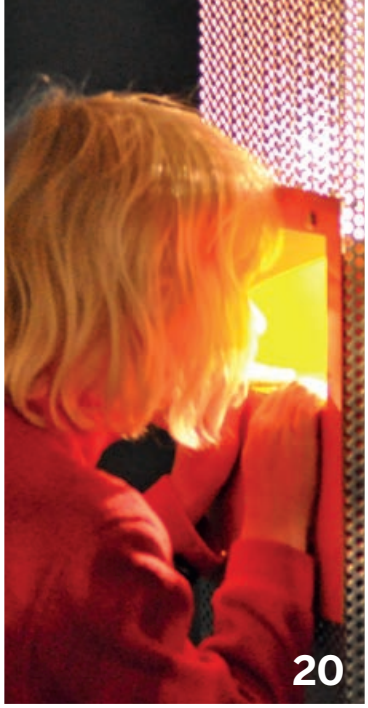
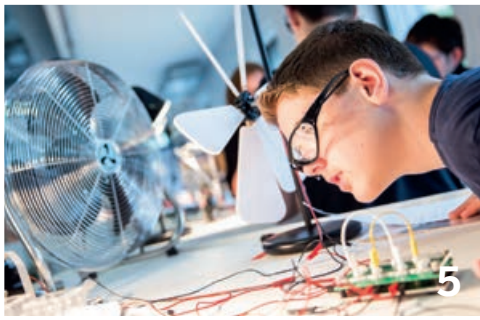
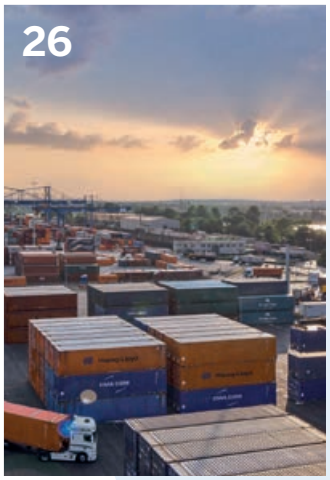






Dear Readers,

The debate on energy policy lives from ideas and terms. There is so much discussion about some of the concepts that even the experts can no longer agree about what they are actually supposed to mean. For instance, the linking of sectors, namely heat, power and mobility. Even though everyone senses that the linking of sectors will be of great significance for pushing the energy turnaround into the next, decisive phase, there has to date been a lack of clear definitions, strategies and parameters. If the specifications of the Paris Agreement 2015 are to be implemented much greater efforts are needed in climate policy. This assumes a closer integration of renewables into our overall energy supply system. After all, renewable energy sources combined with economies and efficiency measures offer the greatest potentials for creating a climate-neutral energy supply. Furthermore this does not only apply in Germany, but also on the global level, as the (UN-commissioned) study of the Deep Decarbonisation Pathway Project shows. Renewable energy sources cannot and may not only contribute to the decarbonisation of power generation. They are also the key to a gradual move towards a climate-friendly organisation of the heat supply, mobility and industry. In economic terms the use of electricity for heating, mobility and to provide source products for industry offers good economic prospects when it comes to handling generation peaks. The more successful efforts to achieve energy efficiency are and the greater the share of the supply mix accounted for by renewables, the more frequently situations will arise where the supply of solar and wind energy will exceed demand. Instead of cutting back expansion it will be necessary in future to intensify the switch from centralised fossil-fuel-based and nuclear energy systems to a decentralised system based on renewable energy sources and a cross-sector approach. Intelligent technical solutions are available but it is still necessary to create the necessary legal parameters.

Not only does transformation of the system change the generation landscape. Energy use is in a state of flux and is having to face up to enhanced flexibility demands. Many exciting projects demonstrate that NRW is already making an innovative contribution in this respect and has the prospect becoming established as an energy system service hub.

Univ. Prof. Dr.-Ing. Manfred Fischedick
Vice President of the Wuppertal Institute for Climate, Environment and Energy

Trilux sets the pace for the energy turnaround

For the Arnsberg-based lamp manufacturer Trilux energy efficiency is at the heart of its brand: As from 2020 it is intended to manufacture only high-efficiency LED lighting. The company wishes to optimize its internal logistical processes by 2018 and thus make tremendous savings in resources. These are ambitious climate protection goals and they mean that the company will - almost inevitably - set the pace at KlimaExpo.NRW.

In its own words Trilux is Germany's market leader in energy-efficient and professional lighting. Its continuous product innovation makes the company a major player in Germany's energy turnaround. In 2012 the company set up an integrated environmental management system (ISO 14.001) and started publishing sustainability reports. With CO_2 footprints for its products Trilux also supports climate-friendly building systems.

250x KlimaKIDZ

"KlimaKidz" celebrates an anniversary: Trainers sent by EnergyAgency.NRW into schools since 2013 to teach fifth and sixth-graders about renewable energy have now been booked a total of 250 times. Around 7,500 children from all kinds of schools have, through this project, expanded their knowledge about the possibilities for climate-friendly energy use. "KlimaKidz" was launched by EnergyAgency.NRW in 2013 with the aim of inspiring school students in the 5th and 6th years of all secondary schools on everything to do with renewable energy sources. In a double lesson the "KlimaKidz" teaching unit has since given a playful insight into various facets of energy and climate protection. The "Klimakidz" project is offered free of charge by EnergyAgency.NRW in collaboration with the educational initiative "3 times E" of RWE AG for schools in North Rhine-Westphalia.

Contact:
hensel@energieagentur.nrw.de

EZ:W – the project with a difference in Willich

The new "Geothermal Heat Probe Test Site" at and in the Willich Energy Centre (EZ:W), which commenced operation in the spring, is a little different from the usual run of projects because: this research project has been financed without funds from the state and purely from the private involvement of companies and other partners. The aim of the project is to obtain sound comparisons with the efficiency and economic nature of various models, technologies and material properties of geothermal heat probes (single U probes, double U probes and coaxial probes), pressure grouts (standard, highly heat conductive or clay pellets) or heat pumps from various manufacturers.

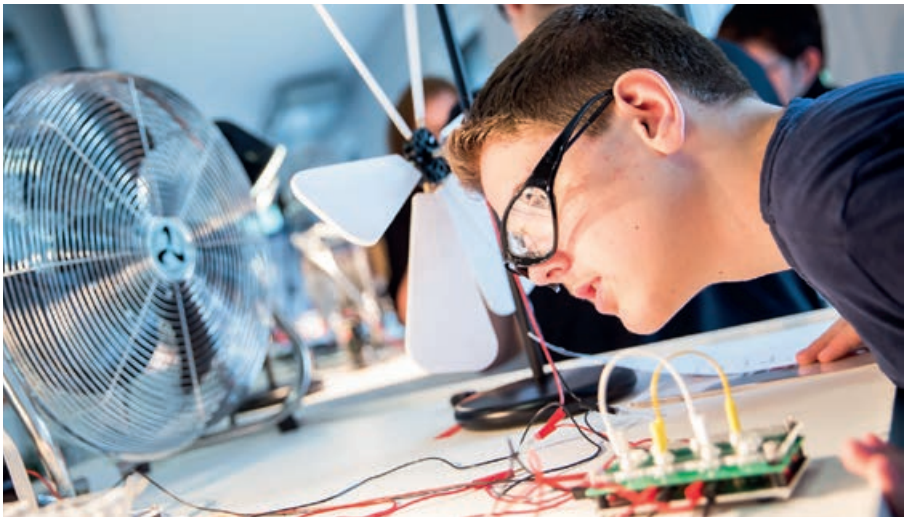
The probes under the car park at the "Gründerzentrum" (Centre for New Businesses) supply the underfloor heating in the Gründerzentrum with heat - and measuring instruments with data for the temperatures in the flow and return lines and the flow rates of the heat transfer fluid. The measured data can be monitored publicly on an internet site (www.energiezentrum-willich.de).

Contact:
thien@energieagentur.nrw.de

New hydrogen filling station

Shell opens the second public hydrogen filling station at the Wuppertal Nord motorway junction. More than ten fuel cell vehicles filled up for the first time and their drivers eagerly took them on a test run. These vehicles, fuelled with hydrogen, cause neither CO_2 nor harmful nitrogen oxides (NOx) or fine particle emissions. State Secretary Norbert Barthle from the Federal Transport Ministry as the fund provider and State Secretary Horst Becker, Climate Protection Ministry of NRW, congratulated those involved and also stressed the significance of hydrogen when it comes to cutting emissions in the mobility sector. Nikolas Iwan, CEO of H2-Mobility, was gratified that the struggle to overcome this chicken-and-egg problem had received a boost thanks to the funding of the first movers. By the end of 2018 he intends to increase the number of filling stations to 100. Linde supplies hydrogen from wind power electrolysis.

Opening ceremony with State Secretaries present: the second public hydrogen filling station in NRW is located at Wuppertal



11. "Fuel Cell Box" school students' competition

Five NRW teams in the lead

At the 11th NRW school students' competition Fuel Cell Box 2016 organised by EnergyAgency.NRW and H-TEC Education GmbH concerning hydrogen and fuel cell technology, the five best teams from the original 100 were honoured in the Centre for Fuel Cell Technology (ZBT) (www.zbt-duisburg.de) in Duisburg .

Among the first three the outright winner was the team from the Don-Bosco-Gymnasium (high school) in Essen with Jonas Deseive, Joel Kharim Notthoff and teacher Christian Lübbering, followed by Kreisberufskolleg (vocational college) Brakel with Leo Wiegand, Vinzenz Grawe, Lukas Niemeier and teacher Gerd Brüntrup. Third place was taken by Städtisches Gymnasium (high school) Herten with Petros Raptis, Jan Philipp Schramm, Yusa Özdemir and their teacher Marc Brode. Prizes were also awarded in the ZBT to the winners of the Fuel Cell Box BASIC Concept Competition, the teachers Ralf Poggemeier from Realschule (secondary school) Bad Oeynhausen and Peter Schick from Realschule Mechernich, each receiving a Fuel Cell Box BASIC. The competition's patron since 2010 has been NRW Climate Protection Minister Johannes Remmel. In this school year the competition was devoted to the storage of renewable energy sources using hydrogen and the subsequent use of the hydrogen as a fuel for the fuel cell. The fuel cell is to be used to ensure the uninterrupted operation of a computer centre. With the help of a kit, the Fuel Cell Box, an appropriate system was to be developed, including the hydrogen infrastructure, in order, as the final task, to simulate a model day for the uninterrupted supply of power from solar power, wind power and electrolyzers and fuel cells.

www.energieagentur.nrw/qr28

How biofuels and filters harmonize

Biofuels such as E10 are used to improve the CO_2 footprint of fuels. As with other liquid fuels, environmentally harmful vapours normally escape from the tanks of motor vehicles. That is why activated carbon filters are installed in petrol-fuelled vehicles. These take up the harmful hydrocarbons before they can escape into the environment. These activated carbon filters are now mandatory by law. But what is not clear is whether the addition of bioethanol to conventional fuel ensures continued serviceability of the activated carbon filters in cars. This question is now being tackled by a consortium consisting of the Oberhausen-based Institut Fraunhofer UMSICHT, the University of Siegen and other partners from the motor industry. The project is being funded by Fachagentur Nachwachsende Rohstoffe e.V. (FNR) to the tune of about 800,000 euros.

www.energieagentur.nrw/mobilitaet

The ie3 Institute of TU Dortmund University is researching a technology for providing self-generated power at a socket which is remote from the feed-in point. The protagonists are Dr. Jan Fritz Rettberg, ie³ Institute for Energy Systems of TU Dortmund University (left) and Thomas H. Krause, Westphalian University of Applied Sciences (right).

The transformation of our energy system

The growth of renewable energy sources in the power mix is leading to a fundamental restructuring of the energy supply system. From being centralised and top-down the supply system is shifting towards being decentralised and bottom-up. This transformation process also entails an ever closer linking of sectors.

Energy from wind and sun flows via decentralised generation plants from the distribution grid either directly to the consumer or further into the transmission grid. Whereas coal-fired, nuclear or gas-fired power plants can be regulated to a limited extent, electricity generation from wind and solar sources cannot be controlled at will - it depends on the weather. In addition, decentralised generation capacities account for a growing share of the total power and more electricity surpluses can be expected. To ensure a stable supply despite the fluctuating feed and to avoid having to adjust wind and PV installations downwards, various measures are required. Alongside an expansion of the grid and energy storage, the option of linking sectors is becoming more and more important. It creates a time flexibility which harmonises the fluctuation of power generation and the demand.

In brief, the structure of our energy system is currently undergoing an extensive transformation. In the heating and transport sectors, however, the development of renewable energy still has to catch up. Linking these two sectors with power production also offers extremely interesting opportunities for substantially reducing our fuel demand and CO_2 emissions. Using modern technologies electricity is converted into heat or vehicle fuel. The systemic and infrastructural challenges of the energy turnaround are tackled in a smart way across the various sectors.

Linking power, heat and mobility

One promising approach is the so-called Power-to-Gas process (PtG). PtG plants consist of an electrolyzer which uses electricity from renewables to breaks down water into a chemical fuel, hydrogen and oxygen. This process is one of the few options which permit medium- to long-term storage of electrical power in large quantities. Hydrogen can also be used not only to cover the need for flexibility in the power sector, but also for the production of renewable gases for the transport sector, Power-to-Liquid (PtL). Vehicle fuels from renewables can otherwise only be produced on the basis of biomass. Their potential is limited, however. Pipelines can also be used to transport several times the amount of energy that is possible through high-voltage cables. Power-to-Heat (PtH) is another complementary way to convert electricity into a different form of energy. Surplus energy can be stored in the form of heat or cold and distributed through local heating systems. An option which is just as significant is that of Power to Chemicals (PtC) with a link to the value chain of the chemicals industry, which is particularly prominent in NRW. And so there is a lot to be said for interlinking electricity, the heat market and the mobility market. It is all the more important for renewable energy sources to be expanded so that sufficient electricity is available for the two sectors heat and transport.

The centrepiece of sector linking: Power-to-Gas

24 demonstration projects in German are testimony to the technical maturity of PtG technology. There are at present at least nine further projects being planned or under construction. The individual applications and areas of use are highly varied and range from the conversion and feed-in of hydrogen, methanization, through to the local reconversion into electricity. Fluctuating, renewable energy sources can also be integrated efficiently in the mobility domain. For instance, with electrolysis the electricity-based fuels and vehicle fuels methane or hydrogen can be produced.

The fact that with PtG an energy supply system based 100 per cent on wind and solar energy is possible is illustrated by the demonstration plant in Herten. In another demonstration plant in Ibbenbüren surplus power from renewables is efficiently converted into hydrogen with a nominal electrical power of 150 kilowatt. Thanks to utilization of the waste heat an energy exploitation rate of 86 per cent is achieved in relation

to the calorific value. The hydrogen produced is fed into the regional RWE gas grid and can, for example, be converted back into electricity using CHP (combined heat and power) plants.

Mobility sector

In the mobility domain there are two possible technical routes. Electric vehicles can be operated sustainably and efficiently with power from renewables. Another bridge from the world of renewable electricity to zero-emission mobility is provided by fuel cell drives with hydrogen. As compared to pure electrical drives they offer short filling times and an inexhaustible quantitative potential for cars, public transport vehicles and light commercial vehicles. The estimated costs for an infrastructure with 10,000 filling stations, pipelines and large-scale storage facilities are less than what is spent on oil imports in two years alone.

To facilitate the market launch of hydrogen vehicles in Germany the expansion of the filling station infrastructure is being pursued energetically. There are now worldwide standards for the filling operation. In addition the filling time, like that for conventional fuels, is only about three minutes. The maximum range is currently between 500 and 700 kilometres depending on the type of vehicle. Models from three manufacturers are available at present. In 2017 a German company, Daimler Benz, will be offering an H_2 model. There are at the present time 21 public H_2 filling stations in Germany which permit filling to 700 bar - two of them in NRW. A further 14 filling stations are under construction. By 2023 it is intended to increase the number of hydrogen filling stations nationwide to 400, 50 per cent of the hydrogen coming from renewable sources. In NRW the climate protection plan also provides for the funding of bus filling stations. There are also initial pilot projects involving the use of hydrogen in the area of rail-bound public transport.

In Ibbenbüren RWE operates a Power-to-Gas project and is researching an innovative electrolysis process.

Battery-powered mobility

When renewable energy is used to drive an electric vehicle this improves its climate footprint over its whole service life by as much as 90 per cent as against a comparable vehicle with an internal combustion engine. Use of individual electricity storage systems also ensures flexible availability for the self-generated power. For example if the vehicle cannot be charged at home during the lunch break for work reasons, in other words when the photovoltaic system is the most productive, the electricity remains available for the charging operation in the afternoon or in the evening thanks to storage facilities. In this way, even if the PV storage system is not designed for the electric vehicle, annually up to 40 per cent of the self-generated electricity can be transferred to the vehicle. This figure can increase further if a smart charging control system is used. This increases the proportion of the self-generated PV power in relation to the consumption - which in turn also means that the household profits financially.

This hydrogen filling station is still an unfamiliar sight. But when hydrogen comes through as a technical solution to the problem of storage such filling stations will soon be commonplace.

Mobility concepts not only provide travel solutions but also a solution to storage problems. Here is the Audi-e-Gas plant in Werthe.

The electrode boiler which the utility Stadtwerke Münster put into service in February weighs about five tonnes. With this innovation the utility can handle the occasional electricity surplus obtained with renewables. Here electricity is converted into heat.

How the interplay between mobility and renewable energy may look in the future is illustrated by the research project SyncFueL. It even goes a step further: Normally private electric vehicles are charged up at home during the night, when the sun is not shining. The electricity generated during the day from solar energy is fed into the grid – or it feeds an additional battery in the cellar so that the PV electricity can also be used during the hours of darkness. It is the aim of SyncFueL to charge the vehicle battery everywhere with its own electricity as a "battery on wheels" and to be able to travel 100 kilometres for 1.50 euros in energy costs. To do this it must be possible to charge the self-generated electricity in the daytime - even if the vehicle is not standing at home.

The ie3 Institute at TU Dortmund University is conducting research together with other partners, Heidelberger Services AG and the Wesphalian University of Applied Sciences, into a technology which makes available self-generated electricity at a socket remote from the feed-in points as well. This is made possible by a charging operation in which the feed from a certain renewable energy installation is synchronized with the consumption at a remote socket.

This takes place with a "synchronized mobile Smart Meter". The synchronized mobile Smart Meter is connected to the socket, it authenticates itself and synchronizes with the Smart Meter at the renewable energy installation which is measuring the feed power – and then the synchronized charging can begin. This means, for example, that charging can take place at work during the normally long downtimes. The project is funded within the framework of the Model Region Electromobility Rhine-Ruhr to the tune of 1.8 million euros by the Federal Ministry of Transport and Digital Infrastucture(BMVI).

Electricity storage

Electricity is seen as the noblest form of energy. Electricity is so precious that - where it is not being used directly - it should be hoarded and "collected" in storage facilities. In the field of pure electricity storage there are a large number of efficient technologies available to balance generation and demand: as electrochemical storage systems, batteries for example, and as mechanical storage systems, pumped storage, for example. But storage systems are not simply storage systems and so they shouldn't be treated as such in the discussion. Depending on the technology storage systems can be deployed in various power categories, on different grid levels and with differing capacity. Optimum use depends on a number of different factors. Economical use depends to a major extent on the cost development for the respective technology and also on the value placed in future on the provision of flexibility and hence supply reliability.

If there is too much green electricity in the grid Stadtwerke Münster can switch on the electrode boiler within 30 seconds and store part of this electricity as district heat in the heat storage system.

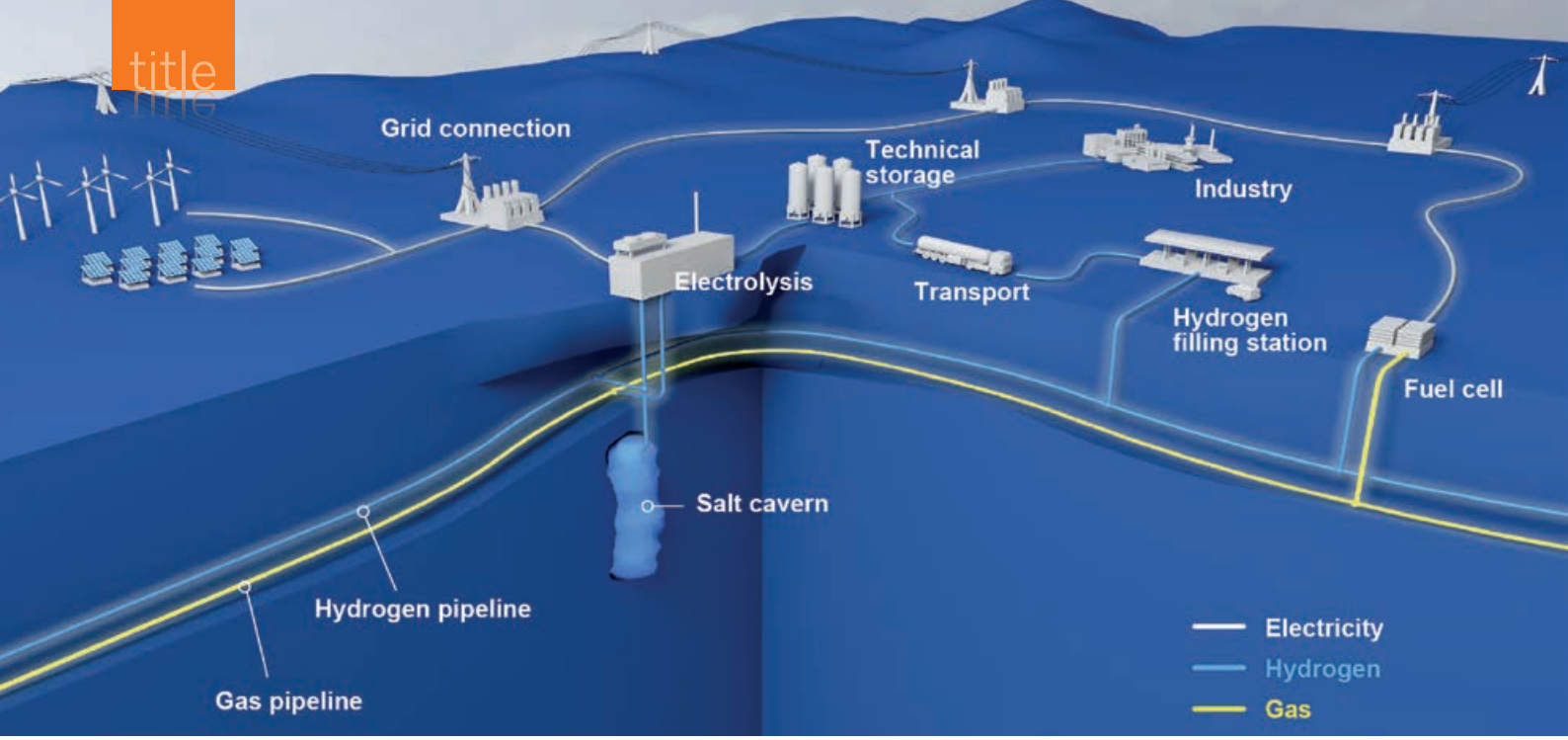
Heat sector

There are also technically sophisticated and economically presentable applications in the heat sector. Grid stability can be supported in addition by converting surplus electricity into heat and using it to supply heating. Furthermore heating generated by fossil fuels is substituted. An example of this is the electrode boilers integrated in local and district heating networks. In the long term and where there is a very high proportion of electricity from renewables, heat can be generated using an electrode boiler for a power range of 0.5 MW to 50 MW in industry and district heating. Furthermore, if heat storage systems are incorporated it is possible to uncouple from the heat demand for certain times.

The technical implementation here is relatively simple. An electrode heating boiler uses surplus electricity generated from renewables, in principle converts it into thermal energy like an immersion element and this thermal energy is in turn stored. If required, the heat is then fed into a connected heating network.

Business models are already being successfully impleneted by a number of municipal bodies, such as the utilities (Stadtwerke) in Münster and Lemgo. In

Steel plates installed in the wastewater ducts as shown in the picture act as heat exchangers. This means the heat can be recovered from wastewater in Aachen.



Münster a 22 MW installation was integrated in the existing heat storage system in 2016 and this is connected to the combined-cycle CHP plant belonging to Stadtwerke Münster. In its combined-cycle CHP plant Stadtwerke Münster co-generates electricity and district heating. Since 2007 there has been a supplementary heat storage system. Previously it was a coal silo and now it is used to store up to eight million litres of district heating water, which is subsequently delivered to district heating customers.

For smaller units such as households or small industrial concerns the decentralized and centralized heat pump is especially suitable in the PtH domain. As against electrode boilers, it exhibits greater energy efficiency, and so less electricity is needed for the same heating energy. Heat pumps can also be used in the winter for heating and in the summer for cooling. Heat pumps not only convert a certain quantity of electrical energy into heat, they also use ambient heat. Depending on the heat source, it is possible by this means to double the efficiency or increase it sixfold as compared to classic night storage heaters. This range is obtained by virtue of the variety of technical possibilities. In addition to the use of geothermal heat extracted by probes or flat plate collectors, air-to-water heat pumps have recently come into their own when heating systems are renewed. In NRW 10,000 new heat pumps were installed last year, which means that now more than 120,000 buildings are heated using heat pumps. Nationwide the equivalent figure is 600,000.

There are interesting pilot projects in the field of wastewater heat recovery. The utility Aachener Stadtwerke has created a wastewater utilisation system for the first time as part of the energy-related refurbishment of residential houses. This system utilises the residual wastewater heat from around 150,000 Aachen residents. Thanks to the hot thermal springs the wastewater here has a temperature of 15°C even in winter. At least 300 litres of wastewater flows per second through a duct in which stainless steel plates are installed as a heat exchanger. This means that cold water is heated from inside and is conveyed to the heat pump circuit in the heating centre. There are two heat pumps and two storage systems with a capacity of 1,200 litres. The water is heated up to a temperature of 55 °C and is conveyed to five apartment blocks via a local heating network. Heat is therefore supplied to about 160 dwellings via a separate water circuit.

First-hand information

The newly created Competence Centre for System Transformation combines and interlinks all relevant and adjacent themes and players within the Energy-Agency.NRW through the System Transformation platform. This includes not only topics concerning the energy infrastructure and storage and flexibility technologies, but also and in particular the linking of sectors.

On 20 September 2016 on the occasion of the annual conference of the System Transformation Competence Centre (KST) it will be possible to obtain more detailed information on the future development of our energy system and the linking of sectors necessary for this. Climate Protection Minister Johannes Remmel will open the event with a welcoming address. After an introduction to the subject in the plenary session, three parallel sessions will be held to discuss the linkage possibilities in the respective sectors.

www.energieagentur.nrw/sektorenkopplung

Fukushima as a Power-to-Gas site

Japan has ambitious plans when it comes to hydrogen. The Japanese Prime Minister Shinzo Abe announced in March 2016 that Fukushima was to be developed into the most important centre for hydrogen technology. With a new energy initiative it is intended to make the prefecture into the principal production location for hydrogen.

Japan Times reports that the Governor of Tokyo, Yoichi Masuzoe, and Masao Uchibori, the Governor of Fukushima, have signed an agreement to conduct joint research into the sustainable production of hydrogen from renewable energy sources. According to the plans, it is intended to convert surplus green electricity, obtained for instance from wind turbines and geothermal power plants, into hydrogen by electrolysis. The aim is to fuel about 10,000 hydrogen-powered cars per year. According to Prime Minister Abe these will be put into service in the public transport system for the 2020 Summer Olympics - for example to transport athletes from the Olympic Village to the stadium. It is also intended to demonstrate this new technology in various ways to the visitors to the 2020 Olympic Games - on the roads as well as in household use. The Olympic Village – consisting of 22 living quarters, training camps and restaurants – is to be supplied with hydrogen via a network of pipes. Each building will have its own fuel cell to generate electricity and hot water. According to the plans, after the Games the Village will be turned into a city of 10,000 inhabitants with a shopping mall and school. For Tokyo this is the biggest experiment to date with the new energy source, according to energy expert Takeo Kikkawa of Tokyo's Hitotsubashi University. The complete Olympic Village is a new construction and this is an ideal large-scale experiment.

The Japanese hydrogen sector offer great potential specifically for German companies: According to the report the Japanese government intends to examine a possible collaboration with home-based and German companies operating in this sector in order to implement the plans. With this new initiative the expansion of wind energy in the prefecture's coastal regions and the mountains is receiving a boost. The government wishes to implement a plan by which 1.3 GW of wind energy will be supplied by wind turbines in Fukushima for Tokyo. Geothermal energy, which is in plentiful supply in the region, will also profit from this.

Contact:
orthuber@energieagentur.nrw.de

Flexible structure and disruptive thinking: The players in ruhrvalley operate in an interdisciplinary network.

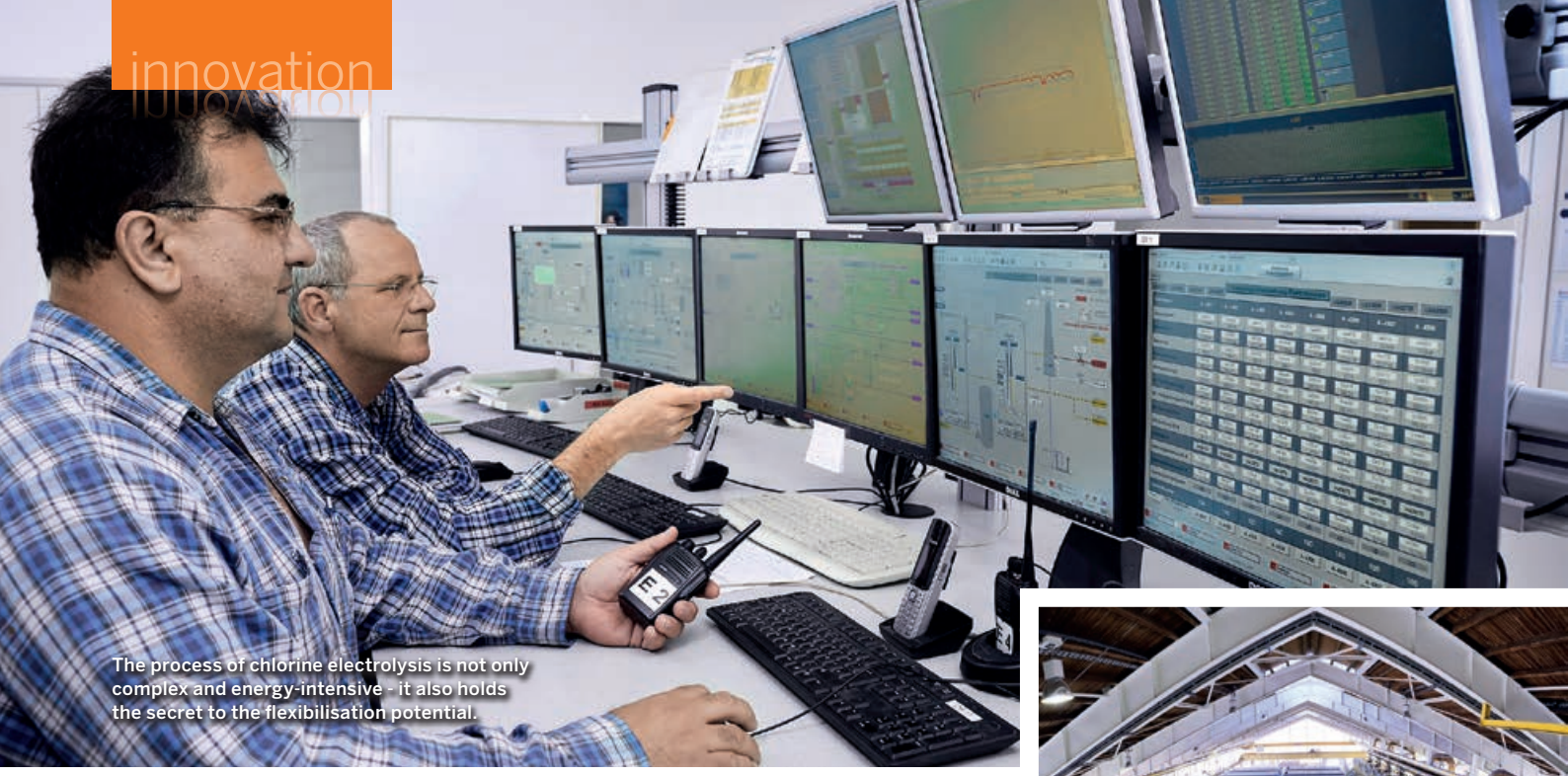
ruhrvalley is growing

In the metropolitan region of the Ruhr the seed of a new kind of collaboration has been sown. ruhrvalley networks regional companies, universities and start-ups.

ruhrvalley originally emerged in the field of electromobility at Bochum University of Applied Sciences. But ruhrvalley is growing: Today it is concerned with other subjects such as digitalisation, internet security or geothermal energy. Already technology-oriented companies from throughout the Ruhr region as well as the Westphalian University of Applied Sciences in Gelsenkirchen and the Dortmund University of Applied Sciences have joined together in the ruhrvalley network.

The aim is to create answers to the challenges of the 21st century. To do this, existing expertise and infrastructure from companies and universities are being combined with the flexible structures and disruptive thinking of start-ups. The network provides experts, forms interdisciplinary teams and is actively engaged in training the next generation.

Contact:
funk@energieagentur.nrw.de



The process of chlorine electrolysis is not only complex and energy-intensive - it also holds the secret to the flexibilisation potential.

Load management - a topic for the future

The energy world is changing; this is also an unmistakable fact in North Rhine-Westphalia. Chimney stacks now stand side by side with wind turbines, solar modules and biogas plants. This development is not only transforming the landscape, it is also changing the relationship between energy generation and its consumption.

To date the focus in consumption was always on how to save energy. This idea still holds true in a supply system based on weather-dependent renewable energy. Energy turnaround needs energy efficiency. To ensure the system transformation succeeds it is also essential to look at the use profiles.

When can electricity consumption be staggered and react to the volatile infeed of wind and solar energy? In which industrial processes is it worthwhile to produce when the electricity is especially inexpensive? What opportunities does a flexibilisation of demand bring for NRW? To address these questions the EnergyAgency.NRW has instructed Büro für Energiewirtschaft und technische Planung GmbH (BET Aachen) to examine what load displacement potential exists for North Rhine-Westphalia and how its economic strengths and metropolitan centres can be used to flexibilise the demand. The outcome is that the population density and economic structure are excellent in terms of making a major contribution to load flexibility.

Even today production processes are operated flexibly, for example at the PVC producer Vestolit from the Chemicals Park in Marl. With the purchase of a new membrane electrolysis system, an investment was made in an installation which, in a very short time, can be adjusted down and, as required, up again. Partial operation is of course also possible. A glance at the control panels shows that the energy turnaround has arrived at Vestolit. With the chlorine electrolysis process the company plays a part in the balancing energy market and shows that load management is already an income option on the electricity market.

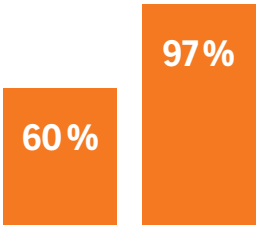
But it is only one of a number of flexibility options for the electricity system. When exploiting the load displacement potential it is also essential to consider that the time and scope must be in accordance with energy management needs. If too many flexibility options come onto the market too early due to additional incentive mechanisms, they will squabble over the business model. It is therefore worth above all going for the potentials which can easily be harnessed.

To ensure that load management can be used to a large extent if the proportion of renewables in the system and hence the need for flexibility increases, the notional barriers between generation and consumption must be opened up. The lower the energy consumption and the more reactive the total system, the more cost-effectively the high portions of renewables and system stability can be achieved. The deployment of energy efficiency and load management may be a further answer from NRW to the questions of the energy turnaround.

Energy from wastewater, clean as a whistle!

Sewage treatment plants are power-intensive. Depending on the cleaning process used, the local circumstances - such as proximity to a hospital - and the level of cleaning involved a sewage treatment plant can be one of a municipality's largest energy consumers. The 634 municipal sewage treatment plants in North Rhine-Westphalia had consumed about 1,200 gigawatt hours electricity in 2012 alone. Nationwide the accumulated annual power consumption of all public sewage treatment plants amounted to about four times this. There are about 10,000 in number in Germany, a slumbering potential when it comes to saving energy and costs.

After all, things can be different. The power demand of a sewage treatment plant can be substantially reduced by optimising the mode of operation and using an energy-efficient technology. Of course, priority must always be given to reliable compliance with the monitored readings. A sewage treatment plant's core function is simply to purify wastewater. And yet there is scope for improvement, as the energy optimisation of the Ruhrverband sewage treatment plant in Bochum-Ölbachtal shows. The heart of this treatment plant, the biological cleaning stage, only needs around 50 per cent of the previous amount of energy thanks to efficient machinery and ventilation equipment. At the same time the cogeneration plants which generate environmentally friendly electricity and heat from the sewer gas arising in the treatment process have been replaced by the latest generation of gas motors. They produce considerably more electricity than before with the same quantity of fuel. In all, it has been possible to raise the degree of self-provision of energy from 60 to more than 97 per cent at the Bochum-Ölbachtal sewage treatment plant. The energy needed to operate the plant is generated almost totally by the plant itself. The principal feature of so-called zero-energy sewage treatment plants is a balanced energy footprint over the year. They go for energy efficiency and optimised processes, and they use the energy potential in the treated wastewater. In some places other renewable energy sources, such as wind energy or PV systems, help increase the degree of self-generated electricity supply. In individual cases it also happens that the gradient in sewage treatment plants can be used to generate energy in the form of hydropower or that the wastewater heat present can be exploited. In general it is even possible that more energy is generated in this way than the treatment plant needs to purify the sewage. There are two such pioneering energy-plus sewage treatment plants in North Rhine-Westphalia: The public utility Stadtwerke Bad Oeynhausen saves about an annual 250,000 euros in energy costs through the energy performance measures it has taken at its sewage treatment plant. The sewage treatment plant at Kalkar-Hönnepel, operated by Abwasserbehandlungsverband Kalkar-Rees, achieves a self-generated energy supply of 126 per cent thanks to a wind turbine and the electricity generated from sewer gas.



Self-generated energy supply of the Bochum-Ölbachtal sewage treatment plant before and after optimisation.

Information on zero-energy or energy-plus sewage treatment plants in the Bioenergy Atlas.NRW: www.energieagentur.nrw/bioenergieatlas

From left to right: Florian Feuer, Philipp Bischoff, Christopher Stirner, Sara Rodriguez and Sven Pietsch of energieloft.de.

Energy innovations

Digital speed-up

Germany's research institutions produce innovative ideas daily, underpinned by unique knowledge and high technical competence. The digital innovation network energieloft.de optimises the information flow by the digital networking of research institutions and companies.

Founded by students and graduates of RWTH Aachen University, energieloft.de provides institutes with the opportunity to solicit third party funds digitally. "Our aim is for the scientist to describe his project idea and send it at the push of a button to all potential project partners from industry and/or science," founder and director Sven Pietsch explained. On the other hand the attention of companies is drawn by automated means to future stakeholding options in innovation projects with partners from the domain of science. Companies can also send their own project ideas or problems to the network.

More than 100 companies and more than 50 institutions have joined the network since it was launched in March.

www.energieagentur.nrw/qr29

Journalists' trip to the smart grids

"Expansion of the electricity grids is a key concern of energy policy. The networks must become more efficient and more intelligent to ensure that the fluctuating electricity generation from wind and solar energy does not jeopardise the stability of the grid. Only with efficient and modern transmission and distribution networks will it be possible to guarantee stable grid operation and a reliable power supply. This is crucial if the energy turnaround is to succeed throughout Germany and be a model for the world," said Economics Minister Svenja Schulze at the 12th Journalists' trip organised by EnergyAgency.NRW and the cluster EnergyResearch.NRW. Almost 20 media representatives were able to familiarise themselves with NRW as a model research hub for the energy turnaround.

Distribution grids for the future

One example here is at the University of Wuppertal where work is in progress on getting distribution grids up to scratch for the future. "iNES – Intelligent Distribution Grid Management System" is a development project in which the Chair of Electrical Energy Supply Technology headed by Prof. Dr.-Ing. Markus Zdrallek is a major player. The Intelligent Distribution Grid Management System is the first smart grid platform with which it is possible to realise individual visions of a smart grid. iNES makes it possible to monitor feed-in and load flow situations in real time in an existing local grid and, where necessary, eliminate critical deviations in a controlled fashion.

Efficient power transport

At the Chair of High Voltage Technology of Dortmund University of Applied Sciences a study is being made, among other things, of the technology of high-voltage DC transmission (HGÜ) under the leadership of Univ.-Prof. Dr.-Ing. Frank Jenau. This (HGÜ) is technically more elaborate than the transmission of alternating current, but it offers major advantages as compared to this conventional method. Even when energy is transported several thousand kilometres only a minimal amount of energy is lost.

Smart grids for towns

The project AmpaCity is an important module in the development towards an inner-city power transmission system of the future. For the first time a superconductor to transport power in a large city is being integrated in an existing power grid and being subjected to a hardness test for around two years. The project is being coordinated by RWE.

www.energieagentur.nrw/qr19

Flying the Atlantic with innovative battery technology from NRW

Is that possible: circling the earth in a solar- and battery-powered aircraft without refuelling? Two Swiss men from the "Solar Impulse" team, named after the aircraft itself, have now shown it is. And the battery comes from NRW.

"Solar Impulse 2" crossed the Atlantic Ocean as the first solar-powered aircraft to do so. Three days and three nights after take-off in New York the airplane landed on 23 June 2016 in Seville, southern Spain. The team including the pioneers Bertrand Piccard and André Borschberg pointed out that the solar flyer took exactly 71 hours and 8 minutes for the 6,765 kilometre Atlantic crossing - almost 20 hours less than originally estimated. The aim of the project is to promote the use of renewable energy sources and highlight the possibilities offered by solar energy. To do this it was necessary to deploy innovative technology, such as the use of lightweight materials. For the solar aircraft a completely new lithium-ion energy storage system was developed with an energy density of 243 Wh/kg. The four batteries make up about one quarter of the take-off weight. For Solar Impulse 2, Air Energy supplied the batteries. This Aachen-based company specialises in the development of battery systems based on lithium-ion cells.

Research initiative for the energy turnaround

The Federal Ministry of Education and Research (BMBF) presented the selected "Copernicus projects for the energy turnaround". In these projects technological and economic solutions for the restructuring the energy system will be developed jointly by science, industry and civil society over a period of ten years. The institutions involved include RWTH Aachen University and the research centre Forschungszentrum Jülich, who will conduct research as part of two outstanding project consortia into new grid structures and the storage of surplus electricity.

Two further projects are concerned with the realignment of industrial processes and the interaction between all sectors of the energy system. The consortia will commence work on the research projects this year. For the first funding phase to 2018 the BMBF is making available up to 120 million euros. Two further phases are planned for the Copernicus projects and these will take a total time of up to ten years. By 2025 it is intended to provide a further 280 million euros.

www.energieagentur.nrw/qr20

Anniversary

Five years of Rhein Ruhr Power e.V.

The association Rhein Ruhr Power invited representatives from politics, industry and science to the Chamber of Crafts in Düsseldorf to look back on five successful years of project work and to glance forward into the future. In the joint projects the members perform research and development tasks relating to the design, development and subsequent construction of the "Power Plant of the Future". Two key projects were presented: The project entitled "Partner Steam Power Plant" highlights technical designs for improving existing power plants so that they can more effectively compensate for fluctuating electricity feeds. The second key project is a contribution in the field of solar tower power plants, intended to cut costs and enhance competitiveness. NRW Science Minister Svenja Schulze and Dr. Georg Menzen from the Federal Economics Ministry (BMWi) stressed in their welcoming addresses the association's innovative strength and its significance for the energy turnaround.

Left to right: Dr. Georg Menzen of the Federal Economics Ministry; NRW Science Minister Svenja Schulze; Prof. Klaus Görner and Margit Thomeczek (Rhein Ruhr Power e.V.)

Rhein Ruhr Power is supported by NRW's Innovation Ministry and its projects are funded through the BMWi's CO-ORETEC programme.

„Löwenburg“ – passive house for active kids

Is there a better way to invest in the future? In Leverkusen the Löwenburg child-day care centre started up in February.

And the special feature is that not only the 120 girls and boys between six months and six years will benefit from this facility, but also the climate. The building has a useful area of around 2,200 m² and it was planned and erected by the Cologne firm of tr.architekten to passive house standard. This two-storey building with its theatre space, workshop, studio and its activity space not only offers a place where daily kindergarten activities are possible, but it also satisfies all the aesthetic standards with its modern form. This day-care centre is used as a company kindergarten by Bayer AG. The day–care centre's sponsor is the Leverkusen district association of the German Red Cross.

The day-care centre's structure with its elliptical layout is a stand-alone building on a level plot of land with an area of about 14,500 m². It was formerly used for agricultural purposes and it is located in the immediate vicinity of the Chempark in Leverkusen.

Large, triple-glazed windows in the outer shell of the group rooms provide a view in and out and connect the interior and exterior spaces. The compact building structure is of hybrid design. Solid wall and ceiling elements of reinforced concrete for the inner structures were combined with highly thermally insulated, prefabricated timber construction elements as external components.

The highly thermally insulated, heat-bridge-free timber components of the outer shell with U factors of 0.094 to 0.135 W/m²K combined with the compact form of the building are in accordance with the high energy standards of the project. The building is heated with a combination of evacuated tube solar collectors and gas condensing technology. The very comfortable warmth is given off through the underfloor heating system at a low temperature. Daylight is of major significance for this energy concept. Skylights in the green roof, light guidance in the glass doors and the three-stage room lighting ensure that daylight takes priority over artificial light.

Storing energy in hydrogen

More than 200 people attended the 7th German Hydrogen Congress headed “Hydrogen - Paving the Way for Decarbonisation”, which was held in July 2016 in the NRW regional representation in Berlin. They consisted of representatives of industry, science and politics and discussions took place on possible applications and the potential of hydrogen against the backdrop of the energy turnaround and the creation of new jobs. The energy turnaround can only succeed if, alongside the expansion of the grids, the conditions are created for storing renewable energy so that generation and use can be uncoupled in location and time. With hydrogen this is possible on the scale required. Hydrogen produced by Power-to-Hydrogen can be used in a variety of ways: to fuel motor vehicles, to be converted back into electricity in fuel cells, as a source of energy in connection with the natural gas grid and as a chemical raw material.

Contact: garche@energieagentur.nrw.de

New climate protection estate with 88 homes

A big occasion in Siegen: NRW Climate Protection Minister Johannes Remmel inaugurated the climate protection estate in the Charlottenstraße.

The project was already launched in 2011 by the housing association Wohnstättengenossenschaft Siegen eG and it encompasses three- to five-storey multifamily houses with a total of 88 residential units. When the existing buildings, some of which were built in 1910, were refurbished they were all fitted with intensive insulation to ensure that the three-litre standard (3 litres of heating oil per square metre per year) was achieved.

"In North Rhine-Westphalia we were already doing pioneering work 15 years ago with the launch of the 50 solar housing estates. The 50 solar estates have now grown into the 100 climate protection estates project. This provides blueprints for implementing the energy turnaround in metropolitan regions", Climate Protection Minister Johannes Remmel claimed.

The heat is supplied in each of the four building sections by means of a brine-to-water heat pump. To supply hot water a cogeneration plant with a capacity of up to 20 kilowatt electric and up to 43 kilowatt thermal was installed. All residences have their own ventilation units with heat recovery. To reduce the CO_2 emissions further photovoltaic systems with 62 kW_p have been installed.

"With the regional project "100 climate protection estates in NRW" the EnergyAgency.NRW is coordinating an undertaking which has already yielded numerous architectural and energy-related solutions. To date it has been possible to create 1,700 flats and houses in climate protection estates. Here in Siegen the housing association (Wohnstättengenossenschaft) is demonstrating in an exemplary fashion that highly efficient refurbishment and the intensive use of renewables are practicable and affordable," Dr. Frank-Michael Baumann, Director of EnergyAgency.NRW, explained.

www.energieagentur.nrw/klimaschutzsiedlungen

100 EnergyPlusHouses for Dortmund

Launched in 2011, the Dortmund campaign "100 EnergyPlusHouses" is now embarking– so-to-speak – on the second half.

This year the first 50 house will have been completed or are still under construction – including a kindergarten. A Dortmund EnergyPlusHouse is one which generates 1000 kWh more energy in a year than it consumes. Normally this energy surplus is obtained with a PV installation. Whereas to date this electricity has largely been fed into the grid, it is planned in future for the house to use it itself. Technical progress is the main factor that makes this possible. The storage of self-generated electricity is not only technically feasible, however, but it has also become more attractive economically.

The city funds the construction of EnergyPlusHouses, for example, by offering plots of land which are particularly suitable for the purpose and which guarantee a south-facing orientation and for the most part a lack of shade on the southern facade. This is intended to maximise the "solar gains". In addition quality assurance is offered free of charge.

Originally the campaign was aimed at single-family houses, but now the houses cover the whole spectrum - from flats to a kindergarten. Different forms of building services are implemented accordingly. The predominant form is a combination of heat pump and underfloor heating, but a solar house with a large hot water storage system over two storeys or a multi-family house with cogeneration plant are among the projects being implemented.

www.energieagentur.nrw/qr21

Using solar power in the Caribbean

A mega solar project in the Dominican Republic means a breakthrough for the Wesel-based company Soventix on the international market.

It's about the size of 65 football fields and it's the largest photovoltaic installation in the Caribbean to date. In Monte Plata, to the north of Santo Domingo, the capital of the Dominican Republic, an installation is currently being installed with about 132,000 solar modules and 1,000 inverters. The Wesel-based Soventix GmbH has already completed the first phase of this enormous solar power plant and put it into service in the spring. "With this project we are making a major contribution to the urgently needed power capacity of the Dominican Republic and we are strengthening our position in a market with tremendous growth potential," said Thorsten Preugschas, CEO of Soventix. A good 40,000 residents are to be supplied in future with the 50,470 megawatt hours of electricity which the solar farm will produce per year.

The project, which costs more than 50 million, is being financed by the Taiwanese investor General Energy Solutions and will reinforce Soventix' position as a solar equipment market leader in the Caribbean region. The government of the Dominican Republic recently launched an energy investment programme which is intended to make the country more independent of fuel imports. The country had the world's highest electricity price. It therefore wants to go for renewables and cut its greenhouse gas emissions by as much as 65 per cent by the year 2030. "With a high and predictable amount of sunlight, photovoltaics is already competitive against traditional power generation in many parts of the country and it offers the people and investors attractive prospects," according to Mirko Schieszl, Director EPC of Soventix. In addition more than 300 jobs were created in the region during the construction period.

Canteen kitchen throttles energy guzzlers' appetite

Contact:
kabus@energie-agentur.nrw.de

In the canteen kitchen at St. Francis Foundation energy guzzlers are losing their appetite.

A new control system from the company Ergo Power GmbH uses optical and thermal sensors to ensure that the ventilation only starts up when a bad atmosphere actually develops. The electricity demand fell thanks to this by more than 70 per cent and the heating demand by almost 60 per cent.

Increasing the efficiency of the ventilation systems in large-scale kitchens has often been neglected to date. Ergo Power GmbH, the company that developed the e-Power Control System, promises enhanced efficiency. The inlet and exhaust air is regulated by kitchen ventilation systems in accordance with need. The cooking intensity is monitored by thermal and optical sensors. If vapours or steam arise during cooking they are registered by the optical sensors and the ventilation system increases the air output. The same happens if the heat above the cooking plates increases above a certain level. This is monitored by thermal sensors. The sensors are also installed in the extractor hoods. In the St. Francis Foundation's motherhouse two ventilation systems have been retrofitted with sensors, frequency converters and the corresponding control unit. To ventilate the kitchen with an airflow of approximately 10,000 m^3/h an inlet air motor of 3.7 kW and exhaust air motor of 6 kW have been installed. The ventilation in the scullery works with about 4,500 m^3/h and has an inlet air motor with 3 kW and an exhaust air motor with 2.2 kW. Both installations together have an average energy requirement of approximately 43,000 kWh per year for electricity and 11,000 kWh per year for heating. Thanks to the need-related regulation the electricity demand has been reduced to about 10,000 kWh per year and the heating requirement to about 4,200 kWh per year. These great savings were achieved despite the relatively short operating time of about 8.5 hours per day. The investment costs for four frequency converters, three optical and two thermal sensors and the control panel with control unit amounted to approximately 18,000 euros. The investment pays off in less than two years.

Monitoring improvement on social media

For months the family Fois in the Aachen area were looking for a suitable home. They found it hidden by ivy and high hedges. But there's a lot to be done before this property can become their dream house. The aim is to implement an energy improvement programme to make the 1950s building fit for the 21st century. To do this a master plan was drawn up under the management of the firm of architects Architektenbüro Rongen from Wassenberg near Aachen and Dr.-Ing. Bernd Steinmüller, recipient of the much sought-after Passive House Pioneer Award. The improvement work is scheduled for completion by the autumn. EnergyAgentur.NRW is following the improvement project en route to the dream house in the social media. On Facebook (www.facebook.de/EnergieprojektTraumhaus) and Instagram (@energieprojekt-traumhaus) the improvement work on and in the house can be monitored.

Taking German know-how to South America

It is certainly worthwhile for medium-sized enterprises to access markets outside Germany. According to a study by the KfW bank group, companies that are active abroad are more productive and also more innovative and competitive.

Personal interest also played a part when Jens-Uwe Pietzsch, from hydrogeology specialists Hydronik, and Roland Gaschnitz from consultancy firm aix-otherm GeoEnergien came together in 2014 and established the company Firma hydro.therm in Chile. "We both feel a strong affinity with South America and want to undertake joint projects in Chile", explains Pietzsch. They have had the idea of working together for many years, but two years ago they finally established a joint company under Chilean law.

Following a visit to Chile with a delegation organised by the Federal Ministry of Economics, they were soon able to provide consultancy services for some projects. And this proved very worthwhile, as hydro.therm was then able to land a major order from Chile; the geothermal planning for a large hotel building in Santiago. Incentives for establishing the company were the solid legal foundation that was available and the need for know-how in Chile itself. And now they are trying to provide this know-how by means of their new project entitled, "Capacity Building", which is intended to educate competent experts on the ground and which is being implemented with the develoPPP.de funding programme of the Federal Ministry for Cooperation and Development (BMZ).

In February 2016, Pietzsch attended a workshop arranged by EnergyAgency.NRW on the funding programme develoPPP.de. Shortly afterwards, hydro.therm submitted a project draft together with other partners and is currently working on the application in close cooperation with the development organisation sequa gGmbH. The "Capacity Building" project involves a large investment for us, and also for the BMZ. Without the funding, the project would never be able to happen", says Pietzsch. With develoPPP.de the company is planning its first project within the framework of a funding programme.

Contact:
orthuber@energieagentur.nrw.de

EkoZet

Energy - Pupils hot on the trail

When does the air in a room become "too thin"? How can a fog machine trace escaping energy? And how can lighting be adjusted to achieve the best result – without lifting a finger? Starting in autumn 2016, the Rhein-Erft Energy Competence Centre (EkoZet) will be supplying answers to these and other questions to trainees and pupils from NRW.

In special learning modules, visitors to the centre will learn how to build stand-alone photovoltaic installations, estimate the energy they produce, and the best way to position photovoltaic modules. A further learning module will be concerned with "Smart Home". What is an intelligent building, and how can this "intelligence" be programmed? In the climate chamber, pupils can program and test an intelligent building based on the KNX standard under real conditions. With the "Christiani bike" for generating electricity, energy can be experienced as it happens and young researchers can discover where energy disappears to with the help of infrared cameras. Because heat dissipates in the atmosphere, they also engage intensively with the issue of climate change and the question "Why should we save energy?"

EkoZet itself, covering an area of 750 m² provides the best example: this energy-efficient passive building has a primary energy requirement of just 27 kWh/m²a and heats, cools and "electrifies" itself, and it also makes use of concrete core activation and geothermal and photovoltaic technology. In addition to providing practical education to pupils and apprentices, EkoZet holds courses for pupils in the school holidays. And then there are the "energy breakfasts", where "golden oldies" have the chance to find out more about energy and energy efficiency in day-to-day living.

www.energieagentur.nrw/qr22

New certificates ensure quality of wood fuels

When it comes to buying wood pellets, the two certification systems DINplus and Enplus have been providing market transparency for some time now. They assess compliance with the specified product standards and guarantee regular and independent quality controls. Enplus, in particular, has established itself as the market leader; more than 95 per cent of the wood pellets produced in Germany are Enplus certified. Now, the German Pellet Institute (DEPI) is extending its certification to cover other types of wood fuels. The first wood briquette producer was issued with the Enplus certificate in the middle of the year, and quality certification for wood chips is to follow at the end of 2016.

Wood briquettes are generally used in traditional single-chamber furnaces as an alternative or in addition to split logs. "The ENplus certificate guarantees the very best quality and therefore also ensures trouble-free and convenient furnace operation", explains Martin Bentele, Chief Executive of the DEPI. Certified wood briquettes fulfil the strict requirements for air purity laid down in the 1st Federal Pollution Control Ordinance as well as the requirements of international fuel standard EN ISO 17225-4. In addition, briquette producers must adhere to Enplus rules regarding internal quality assurance and provision of information to consumers. In February 2015 the DEPI also began development of a certification system for wood chips. The "HackZert" project is intended to guarantee supply of consistent wood chip quality in future. Up to now there has been no consistent grading system for this type of fuel, which means that chip-fuelled heating systems have fallen behind with regard to emission values. "Certification means not only that the emission behaviour of chip-fuelled systems will be improved, but that the entire heating system can be optimised", says Bentele. Introduction of wood chip certification is planned for this year.

www.aktion-holzpellets.de

InnovationCity roll out

Structural change continues

One of the largest structural change projects in the Metropole Ruhr has now launched under the name of "InnovationCity roll out". Based on the example of "InnovationCity Ruhr/ Model City Bottrop", 20 further districts in the Ruhr region will now experience an integrated development programme.

Minister President Hannelore Kraft announced the winners during the „InnovationCity" event in Oberhausen whose theme was "climate protection as a catalyst for the modernisation of city districts". They were: Castrop-Rauxel, Dorsten, Dortmund, Gelsenkirchen, Gladbeck (two districts), Hamm (two districts), Herne, Herten, Lünen, Moers, Mülheim an der Ruhr (two districts), Oberhausen, Oer-Erkenschwick, Recklinghausen, Waltrop, Wesel and Witten.

With the „InnovationCity roll out" project, the company Innovation City Management GmbH has developed a concept for learning and experience transfer, working with the companies Wirtschaftsförderung metropoleruhr GmbH, WiN Emscher-Lippe Gesellschaft zur Strukturverbesserung mbH and Wuppertal Institut für Klima, Umwelt, Energie gGmbH. The concept is based on the Bottrop model approach. The entire project aims to achieve a considerable reduction in CO_2 by means of analysis, concept development and then implementation of the concept in practice.

www.energie-agentur.nrw/qr23

13.9.2016

Wind Updates 2016

Annual conference of the wind energy network of EnergyAgency.NRW in the Gelsenkirchen science park.

www.energieagentur.nrw/veranstaltungen

15.9.2016

Mobility in transition

The Fuels and Drives of the Future network of der EnergyAgency.NRW and the Nature and Environmental Conservation Academy of NRW (NUA) invite you to their event on mobility in transition. Themes: alternative fuels and drives from the point of view of climate protection and security of supply.

www.energieagentur.nrw/veranstaltungen

16.9.2016

Benerkon Workshop

Conflicts can stifle the energy of energy cooperatives. The BENERKON pilot project, extending over several years, has examined typical issues that are subject to conflict in such cooperatives and has also looked at how those involved deal with conflicts. A one-day workshop with project manager Prof. Carsten Herbes collates the results into practical tips and conflict-solving instruments. Information and registration:

www.energieagentur.nrw/veranstaltungen

27.-30.9.2016

WindEnergy

The world's leading expo for Wind Energy will take place again in Hamburg in September. EnergyAgency.NRW, will also be there with its wind energy network, at the joint North Rhine-Westphalia stand.

www.energieagentur.nrw/veranstaltungen

28.9.2016

7th Expert Congress

The 7th expert congress of Photovoltaik NRW, the annual meeting of the photovoltaics network and the NRW photovoltaics market initiative NRW of EnergyAgency.NRW, will take place in Düsseldorf. NRW Climate Protection Johannes Remmel is patron of this event.

www.energieagentur.nrw/veranstaltungen

29.9.2016

KWK.NRW Forum

3. KWK.NRW-Forum, with the theme of "Cogeneration plant: high power for the energy turnaround". Thomas Heyer will be chairing the event. The issues of renewables and cogeneration plant, "green" district heating in the Ruhr Region and also new technologies will be discussed.

www.energieagentur.nrw/veranstaltungen

3.11.2016

Digital Energy World

Conference: "On the way to the digital energy world". The event is organised by the Cluster EnergyResearch.NRW and the Cluster EnergyEconomy. Among others, NRW Energy Minister Svenja Schulze and NRW Economic Affairs Minister Garrelt Duin will be joining the discussions.

www.energieagentur.nrw/veranstaltungen

3.-4.11.2016

Business delegation

With the support of NRW.International, EnergyAgency.NRW is offering the opportunity to join a business delegation to Denmark on the subject of „"Renewable energies and heating networks". The trip is aimed at representatives of public utilities, experts from the areas of research and business and also at representatives of local authorities. The delegation will be led by NRW Climate Protection Minister Johannes Remmel.

www.energieagentur.nrw/veranstaltungen

14.-18.11.2016

Chile

There is great potential for German companies in the energy market in Chile. This is why EnergyAgency. NRW is organising an industrial delegation to Chile, so that interested companies can find out about business opportunities in the country itself. The main focus is on the agricultural and food sectors and also on the construction sector.

www.energieagentur.nrw/veranstaltungen

24.11.2016

Biofuel conference

The Centre for Sustainable Resources NRW and the Fuels and Drives of the Future Network of EnergyAgency.NRW invite you to the NRW Biofuels Conference in the Haus Düsse agriculture centre. The focus will on the climate protection targets of the fuel market for the year 2020 and also on technical solutions for the use of advanced biofuels and regional concepts for greenhouse gas reduction.

www.energieagentur.nrw/veranstaltungen

24.-25.11.2016

Wind Energy Congress

The LEE Wind Energy Days in NRW are a meeting place for operators, planners and project designers. Numerous representatives from a variety of manufacturers and others will be presenting their goods and services and providing information on prospects for the use of wind energy in North Rhine-Westphalia. Exhibitors will include plant manufacturers, assessment organisations and insurers.

www.windenergietage-nrw.de

28.-29.11.2016

Workshop

13th Workshop on Photovoltaic Modular Technology in the Radisson Blu hotel in Cologne-Deutz. Theme: How manufacturing and system costs can be further reduced by means of technical innovation. At the same time, comprehensive quality assurance is needed for sustainable products and systems.

www.energieagentur.nrw/veranstaltungen

6.-7.12.2016

CO_2 Conference

Together with the Fuels and Drives of the Future Network of EnergyAgency.NRW, the nova Institute will be hosting the 5th conference on "Carbon dioxide as raw material for fuels, chemicals and polymers" in the Maternushaus. Among other things, presenters will be analysing new technologies for the use of CO_2 as a raw material of the future. The patron of this event is NRW Science Minister Svenja Schulze.

www.energieagentur.nrw/veranstaltungen

EURO-6 standard for Herne sweepers

Looking for a way to help a colleague with health problems so he could continue driving a road sweeper, the technical director of waste management company entsorgung herne AöR, Werner Hüttemann, discovered a EURO-6 standard single-engined large sweeping machine. This machine is a development by manufacturers Bucher Municipal und Allison which has a fully-automatic gearbox, and fulfils the declared aim of the search – which is to make life easier for the vehicle driver when working in city traffic. Automatic gears enable the driver to concentrate fully on the work of sweeping, and a further aim of the new design was that it should operate with only one engine (chassis engine) – in other words with a hydraulic drive system for the complete superstructure – in order to achieve greater efficiency and environmental friendliness.

Such a combination of fully-automatic gearbox to save operator effort and one-engine technology to protect the environment was previously not available on the market. The usual type of fully-automatic sweeping machines have two engines: the chassis engine provides propulsion for the machine, and a second internal combustion engine drives the cleaning equipment.

A two-engine solution has the disadvantage of high maintenance and operating costs, and some time ago an enquiry was made to long-time sweeping machine supplier Bucher Municipal and an initial pilot development project was started with a semi-automatic Telligent Gearbox from DB. However, in practice this and another technical solution proved unsuitable for everyday use. As these pilot projects had already taken from 2012 to 2014, a new approach was needed. The technical director of entsorgung herne had already made contact with the Allison engineers during a previous visit to the IAA, and this manufacturer offers the possibility to install a fully-automatic gearbox with “two power take offs”.

This environmentally-friendly technology has now been in use in the Herne inner city since October 2015.

Contact:
funk@energieagentur.nrw.de

„QuoRadis“

The navigation app for cyclists

www.energie-agentur.nrw/qr24

In the north of Cologne, in an old factory built of brick, you will find the company “side by site”. Together with the RadRegionRheinland e.V., this software firm had developed the “QuoRadis” app for cyclists, which was funded by the State of NRW and the EU. Michael Schlieper and one of his staff, Andreas Bürger, are proud to present the app. Whoever knows the free navigation app with all its information on sites of interest, accommodation and cycle repair service companies, along with numerous suggestions for cycle tours, might imagine desks at the developer’s site piled high with brochures and books with a large number of employees to study them. But instead we find clutter-free desks – the only things that are needed are a large monitor, a tablet and a Smartphone. And what is really special: companies in the tourist sector around Cologne and Bonn are working on a cooperative central database, into which the people who know the different areas best enter “points of interest”. “QuoRadis” also has access to these data. This means that cyclists are not only guided by a voiced navigation system, the special features along the route are also explained with videos and audio clips.

Burg Herrnstein hydroelectric plant

Bröl navigable again

The Burg Herrnstein hydroelectric plant on the Bröl tributary of the River Sieg is located in a former sawmill in Ruppichteroth in the Rhein-Sieg district, which has been owned by the Dukes of Nesselforde for over five centuries. In order to fulfil the ecological requirements of the European Water Framework Directive, the present incumbent, Graf Max von Nesselrode, has upgraded turbine technology and fish conservation in the plant to the latest state of technology.

Installation of a double-regulated Kaplan turbine has led to a clear increase in performance. Before the new installation, the plant had a capacity of 36 KW, whereas the new technology feeds up to 45 KW of installed capacity into the grid. With a fall of around six metres and a design flow of up to 1,500 l/s, the owner expects annual output of around 220,000 kWh of electricity. In addition to the erection of a small turbine house, the inlet building on the weir will be modified and provided with a twelve millimetre mesh horizontal fish protection sieve. At the same time, the weir will be renovated and a complex natural stone passage (“ladder”) will be created for fish.

Altogether more than 1,000 tonnes of natural stone were used in the construction of the fish ladder. 13 basins measuring 380 x 360 centimetres mean that all types of fish can pass through the rising section of the weir. At the same time, the existing weir was restored and stabilised. The entire project will cost more than 700,000 euros. The State of North Rhine-Westphalia has funded the creation of the ecology-friendly system and the fish conservation measures with a contribution of 200,000 euros from funds for implementation of the European Water Framework Directive. “Without the commitment and support of the regional government, this project would not have been realised in this way”, says Graf von Nesselrode.

www.energieagentur.nrw/qr25

Technologies from NRW investigate the cold side of climate change

In spring of this year, there was a threat that the ozone layer over the Arctic Circle could be depleted to a really frightening extent. More than 200 weather balloons were used to thoroughly investigate the unusual cold period in the stratosphere at this time.

Over the Arctic Circle, it is cold, freezing cold. But at 90 degrees below zero it is unusually cold this time. So cold, that the researchers from the Alfred Wegener Institute and the research centre Forschungszentrum Jülich are sounding the alarm – for these temperatures can make the ozone layer deplete at a record rate. The by-products of the fluorinated hydrocarbons which have collected in the atmosphere following many years of use by human beings attack the ozone layer with particular intensity after such long periods of extreme cold. When the first sunbeams then appear after the end of the polar night, the ozone layer depletes still more. We spoke about this to Dr. Jens-Uwe Grooß from Forschungszentrum Jülich.

What do you think about the current developments over the Arctic Circle?

Grooß: The processes which we can observe at the moment in the Arctic are no surprise, and they are not new to scientists. The depletion in the ozone layer is only the result of the lower temperatures. It is difficult to know if the ozone problem will become more serious or not, and we would have to examine the individual processes involved in order to find out. And this is one of my tasks. The studies already indicate a tendency towards colder stratospheric winters. More attention has been paid to temperatures in recent years, but it is not possible to foresee how the stratospheric temperatures will be next year. On the other hand, the volume of hydrocarbons in the atmosphere is diminishing.

What is the prognosis for the hole in the ozone layer?

Grooß: In the next 50 years, the hole will close, thanks to the international success of the Montreal Protocol of 1989 with its prohibition on hydrocarbons. Some questions regarding the depletion of ozone do still remain to be answered and the forecasting models are being improved all the time – the results of our measuring programmes are also helping with this. The World Meteorological Organization WMO therefore draws up a status report every four years and the Montreal Protocol is extended accordingly.

Were you shocked by the size of the ozone hole in the Arctic?

Grooß: This diminution of ozone in the Arctic is nothing compared with the hole in the southern hemisphere. In the Arctic, there was only a considerable reduction in ozone. We usually only talk about a hole in the ozone layer when the ozone column density falls below 220 Dobson units. Less ozone means more UV radiation on the ground. So much is certain: if there were no ozone in the stratosphere, most forms of life on earth would have no chance of survival.

Why is the Institute so interested in the Arctic?

Grooß: Because the Arctic is closer to us, but also because the Antarctic polar vortex is more stable and does not vary so much as the vortex in the Arctic – which is therefore more difficult to understand. With the measuring equipment that we have developed ourselves we are among other things world leaders in water measurement with our Fast In-situ Stratospheric Hygrometer (FISH). The stratosphere is very dry, and equipment like this is needed in order to provide precise enough measurements. And together with Karlsruhe we have also developed the "GLORIA" remote investigation equipment. "GLORIA" looks at atmospheric emissions in the infra-red range and is not only able to report on specific points, but can create a two-dimensional image of the trace gas distribution.

Do the individual research centres share their results?

Grooß: We work in close cooperation with institutions throughout the world, for example in Europe and the USA, and also in India and China. Based on these cooperations and the expertise of the individual institutes, we can better understand the overall picture of what is happening in the stratosphere. I have also developed a kind of early warning system at the research centre in Jülich in order to be able to provide information about depletion of ozone in the Arctic to the general public.

www.energieagentur.nrw/technologien_aus_nrw_erforschen

Good interim result for NRW Climate Protection Plan

Two years ago, Duisburger Hafen AG (duisport) used the NRW Climate Protection Plan (KlimaKonzept.NRW) of the regional government as a starting point to create its own integrated energy and climate concept.

As owner and management company of the inland port of Duisburg, Duisburger Hafen AG operates the port with an overall tonnage of more than 129 million tonnes and 3.6 million standard containers. Duisburg is the largest inland container handling port in the world and in recent years has become a leading logistics hub in Central Europe. The main shareholder is the State of North Rhine-Westphalia.

Thanks to its efficient traffic and logistics solutions, duisport saves more than 100,000 truck transports per year and therefore makes a considerable contribution to environmental protection. Overall, the traffic-related CO_2 emissions in the port itself will be reduced by 30 per cent.

The Chairman of the Executive Board of Duisburger Hafen AG, Erich Staake, explains: "For us, climate protection is an integral part of all our areas of business, projects and activities. This strengthens both our economic and environmental success.

We recognised the significance of sustainable logistics very early on and link this to technical innovations, an ecologically favourable transport chain and efficient use of space."

The success of the NRW Climate Protection Plan, which was launched two years ago, is something to be proud of: the purpose of the projects is to support so-called "other public bodies" in the creation of a climate protection project. Of 83 relevant institutions, 73 have already been signed up to the project. Thanks to their commitment to climate protection, together they have reduced their annual CO_2 emissions by around 1.85 per cent, in other words around 16,000 tonnes.

With its committed and ambitious policy, the State of North Rhine-Westphalia wants to become a trailblazer in the area of climate protection. The aim is to reduce the total volume of greenhouse gas emissions in NRW by 25% by the year 2020 compared with the level in 1990, and by at least 80 per cent by 2050. The state of NRW has set itself the target of making its administration carbon neutral by the year 2030. With the climate plan project "KlimaKonzept.NRW", it also includes the institutions which are known in German climate protection legislation as "other public bodies", which are not part of the regional administration as such and are not funded by local authorities. The intention of this project is to motivate institutions to develop and implement concepts for action on climate protection, mitigation and adaptation.

EnergyAgency.NRW has been available to institutions since the launch of KlimaKonzept.NRW" to provide advice and answer any questions.

Contact:
aster@energie-agentur.nrw.de

Journey through time

The history of wind energy

Wilfried Winkelmann lives for wind energy. Already as a small child, he began to work on his own creations and on building his first small-scale wind turbines from items of scrap. Today, the qualified mechanical engineer, electrical specialist and leisure pilot lives on his idyllic country estate in the midst of more than one hundred windmill exhibits. Here in Stemwede, at the very edge of North Rhine-Westphalia, a registered charity - which was established 18 years ago and from the beginning has had more than 240 members - operates the Mühlenheider wind energy museum. It is the only one of its kind in Germany and has the largest collection of unique windmills in the world.

It all started in 1992 with the first wind measurements and a citizen-owned wind farm, which went online in 1997 with ten lattice-tower wind turbines. "We were a small group of wind energy pioneers who tried to create a museum as a renewable energies project in the course of Expo 2000 in Hanover. The idea aroused widespread interest and a considerable amount of funding was assigned to the exhibition – but the local authority agreed to the plan too late and the whole vision suddenly collapsed", says the founder member of the charity, talking about the origins of the museum. But Winkelmann would not abandon his idea, especially since the Westfalia Windmill Route, which attracts numerous cyclists in the summer, leads right through the middle of the windmill exhibition in Stemwede.

Established in 1999, the windmill museum is now home to many types of wind turbines: from one exhibit from the time of the second world war through the very models such as the Lagerwey turbine, which in 1982 was the first privately owned turbine to feed electricity to the German grid, up to the inventions and ideas of determined individuals. A further exhibit is the former largest inshore wind turbine in Germany, with 80 metres hub height and a capacity of 1.5 MW which the charity recently recommissioned. The aim of the charity is to preserve the historic roots of modern wind energy use in Germany and to make it accessible to the public. And this requires real commitment and even love: individual guided tours, pre-lunch drink events with a wind energy theme and informative social events involve people from the surrounding area, as well as attracting tourists and classes of schoolchildren. And of course the museum plays a part in the Wind Energy Network of EnergyAgency.NRW.

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Editorial Board
EnergieAgentur.NRW
Kasinostr. 19-21
42103 Wuppertal
Dr. Joachim Frielingsdorf (v.i.S.d.P.- responsible under German press law), Uwe H. Burghardt, Sabine Michelatsch, Thomas Reisz, Thomas Vogel, Oliver E. Weckbrodt

Telephone: +49 (0)202/24552-26
Telefax: +49 (0)202/24552-50
Internet: www.energieagentur.nrw.de
email: pressestelle@energieagentur.nrw.de
Free subscription or changes to address of innovation & energie: email to mail@energieagentur.nrw.de

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Newsletter & Social Media

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NRW Nano Conference enters seventh round

On 7 and 8 December 2016 the 7th NRW Nano Conference will take place in Münster, organised by the science Ministry of North Rhine-Westphalia, the cluster NMWP.NRW and Wirtschaftsförderung WiFö Münster. Again more than 700 international experts and other interested persons are expected to attend this interdisciplinary exchange of views on current trends. Alongside expert papers from highly qualified speakers there will be a multifaceted exhibition with new developments and products in the whole field of nanotechnology as well as numerous exciting specialist sessions. Players from this sector will have the opportunity to present their company or instituted and its projects.

www.nanokonferenz.de

Energy savers NRW: Rheinberg leads the field

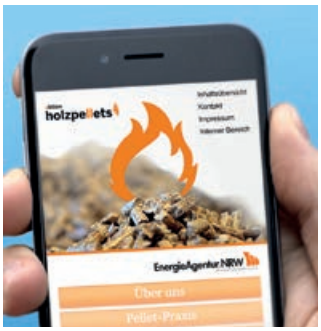
20 committed citizens and their energy-efficient residential houses in Rheinberg received an award from Peter Knitsch, State Secretary in the Environmental Protection Ministry. They were given the "Energy Saver NRW" plaque for their seven 3-litre houses and eleven real properties which get their electricity or hot water from the sub using solar installations. "It's quite exemplary how the Rheinberg citizens promote climate protection and innovative living. There is no other municipality in NRW which has been awarded so many plaques," according to Knitsch. Since the start of the campaign "Energy Savers NRW" in 2006 more than 330 awards have been presented in Rheinberg for energy-improved old buildings and efficient new buildings, and for the use of renewable energy sources. In all, 2,147 plaques were awarded in NRW between 2006 and 2015.

www.energieagentur.nrw/rheinberg_ist_spitzenreiter

CCF.NAVI for companies

Implementing a climate strategy in a company is a complex matter. To give some assistance in this EnergyAgency.NRW has developed the so-called "CCF.Navi". With checklists, sample templates and calculation aids users can check whether they are heading in the right direction. This service is supplemented by information on common climate protection standards, guidelines and statutory parameters. The "CCF.Navi" was created in the context of the pilot project "CCF – Corporate Carbon Footprint", which has supported eleven companies" in analysing and balancing their directly and indirectly emitted greenhouse gases. In this way the CCF extends the energy controlling and energy management to include the components greenhouse gas emissions and resources management.

www.energieagentur.nrw/ccf



A new look

After just 13 years of successful work by the Wood Pellets Campaign the time has come for a new image. A modern logo and a multimedia key visual give a new, brilliant design to the market initiative. EnergyAgency.NRW launched the state-wide "Aktion Holzpellets" wood pellets campaign in 2003 on behalf of the NRW Environment Ministry. This successful market initiative is supported by more than 100 companies in the pellets industry. The aim of ist activities is to provide information on heating using wood pellets and to strengthen trust in the heating technology and the fuel. Since the beginning of the market initiative the number of wood-pellet-fuelled heating systems has increased several times. This is attributable among other things to the Wood Pellets Campaign.

www.aktion-holzpellets.de

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