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Dear Readers,

Any change is an opportunity to find a better solution. This is also illustrated by the contribution startups make as an engine of progress. They bring innovations to the market. This is true in particular with respect to the energy system, which is facing fundamental changes.

The future of North Rhine-Westphalia is especially affected by these changes. No other German state consumes and converts as much energy as NRW. This is due primarily to our state’s economic structure. To ensure that the people in NRW enjoy prosperity it is therefore absolutely essential to proactively shape these changes – for example, when it comes to exploiting the benefits of digitalization to stabilize the grids and sector linking in the face of increasingly volatile energy.

It is essential that NRW undergoes a new period of economic transformation (Gründerzeit). In the field of energy the conditions for developing a living startup culture, an active startup scene with new innovative companies are already very promising. Startups can also make use of the structures created over the past few years by the EnergyAgency.NRW. There are networks of companies, education institutions, universities, research facilities, technology centres and professional associations. And expertise is also available when it comes to finding funding solutions. In the EnergyAgency.NRW we have an energy startups platform where new companies can present themselves – a broad forum for them to project their service portfolios.

In the present edition of the EnergyAgency.NRW’s specialist magazine the parameters for startups in the energy domain are described. And examples are given of the innovative power of this startups location. After all, startups from North Rhine-Westphalia are already playing a major, cross-regional in e-mobility or storage technologies. The task is to strengthen and expand this role.

Prof. Dr. Andreas Pinkwart
Minister of Economic Affairs, Digitization and Energy of the State of North Rhine-Westphalia
Hot water storage:
New EU directive

Since September 2017 new rules have been in force concerning the installation of hot water storage systems. Whether it’s drinking water, combined or buffer storage systems – in the second stage of “Directive 2009/125/EC of the European Parliament and Council of 21 October 2009” the eco-design directive of the European Union (EU) provides for stricter limits for the still acceptable heat loss in storage systems of up to 2,000 litres capacity.

Initially it is mainly manufacturers who are directly affected by these tighter regulations; the systems they place on the market must now exhibit lower heat loss rates. The EU directive lays down that the category G for the greatest heat loss is done away with on the labels for hot water storage systems. Instead a new category A+ is added. Models which up to now have attained category D or worse may no longer be placed on the market. Dealers may, however, continue to sell their existing stocks – even when these do not meet the new requirements.

Households which already have a hot water storage system – for example in combination with a solar thermal installation – are not affected. There is no mandatory requirement to retrofit. “Precise details of heat losses for the storage system can be found on the label anyway,” Dr. Tim Schmidla of the EnergyAgency. NRW explains.

Fuelcellbox makes for clean shipping

For the 13th time the EnergyAgency. NRW is organizing the school students’ FUELCELLBOX competition. Over the entire 2017/18 school year the participating school students in the grades 9 to 11 will be conducting research into hydrogen as a source of energy and the fuel cell. NRW’s Economic Affairs Minister Prof. Dr. Andreas Pinkwart will act as this year’s patron.

The task is to neutralize the emissions from passenger ships in a local recreation area – with the help of a hydrogen-based fuel cell ship. Before they proceed to the practical development of the system the young people must first solve the problems in written form. On the basis of the solutions submitted 20 teams will then be selected by March 2018 and they will be given the opportunity to put their ideas into practice with the FUELCELLBOX.

Innovative energy use at boot 2018

Expensive yachts with efficiency technology, more or less normal houseboats with photovoltaic roofs to provide their own electricity, buoys which control inland shipping by means of solar power, submarines which dive with a fuel cell drive – renewable energies have long played a part in the maritime domain. After all, the energy turnaround is taking place everywhere. That is why the Energy Agency. NRW will also be exhibiting on the joint stand of the German Maritime Foundation (Meeresstiftung) in Hall 4 on Stand C03 at the trade fair “boot” from 20 to 28 January 2018 at the exhibition centre in Düsseldorf.
New EA.TV films

Two new films made by the EnergyAgency.NRW and presented on YouTube are devoted to initial and continuous training.

The first film is about energy scouts. Energy scouts are trainees who watch out for energy weak spots in their companies. The improvements they suggest invariably include surprising results and lead to enormous savings in terms of energy costs. For instance, at GKN-Walterscheid GmbH in Lohmar and Bau- und Liegenschaftsbetrieb NRW in Cologne. The energy scouts report about their successes and explain why it is worthwhile taking part in this trainee project.

In the second film the Wind Energy Network shows how to enter a career in the wind industry, which provides about 18,500 jobs in NRW. In North Rhine-Westphalia more than 3,400 wind turbines are in operation. They all have to be serviced regularly. But what are the essential prerequisites if one wishes to train as a wind energy service technician?
Startups and fresh impetus for the energy turnaround

Startups are all the rage at the moment. They are seen as the epitome of innovation and creativity. They are considered to be capable of speeding up processes of change. In economic terms startups are highly mobile on the market and they apply new products and business models.
And that’s true even if it’s only a matter of making a virtue of necessity, in other words if the business model envisaged has to be adapted constantly to reality. In fact the proportion of young companies which change the market is less than 5 per cent, as the entrepreneurship Professor Paul Reynolds found. And the rest do not change the market, but are changed by it. Whatever, startups are potentially attractive for the structural transformation of the energy system.

Startups are young companies – mostly not older than 5 years – which are defined by fast-growing scalable business models and this can help achieve rapid company growth. Companies such as AirBnB, Zalando and Trivago are now well established on the market and enjoy a high profile. Over the past few years rapidly rising development relates to the recognition that startups can provide solutions for the energy turnaround and that they breathe new life into the industry with supposedly disruptive business models. It is also claimed that startups have an impact on the general economy because they influence the technological renewal and the cultural development of companies.

Liberalisation, energy turnaround, decentralization, digitalization – a mere four terms can be used to describe in a nutshell the change in the energy industry over the past 20 years approximately. And the consequent explanatory template is as simple as it is common: the established market players at different stages of the value chain have since had to face greater competition, fundamental changes in pricing and a comprehensive systemic transformation. And with these challenges the established market players are, it is claimed, occasionally out of their depth. In particular due to the fact that the previously successful business models have come under pressure from the energy turnaround and “established practices” and rigid corporate organisations only permit fast adaptation to changed market conditions to a limited extent. Furthermore, under certain circumstances it is proving difficult to develop innovations from the ongoing company activities and the existing corporate structures and cultures. With this in mind there is a tendency to declare that startups offer the greatest hope for a better and enhanced future.

Regardless of whether this declaration is not only simple but also correct, the energy system needs the prospect of new solutions in order to cope with the growing complexity. The advance of digitalization opens up the way for fresh approaches and potential solutions, sometimes enhancing the degree of automation in existing systems and accelerating the market readiness of new technical developments or business models.

Practical experience suggests that startups offer beneficial structures for thinking through digital innovations and solutions and developing prototypes. The image that has become widely accepted is that of mostly young interdisciplinary teams characterized by a high level of IT expertise. On the other hand, when startups fail it is primarily because of tension and conflict within the team – as discovered by the American Noam Wasserman in “The Founder’s Dilemma”. And, according to a study by the Institute for Work and Occupation Research (Institut für Arbeits- und Berufsforschung), the average age of German company founders is 38.6 years.

In the field of digitalization and automation, and Industry 4.0 and high-tech in particular, the typical cases would be spin-off from universities and research projects which provide the engine of progress. And now every fifth startup is actually based on a digital business model. There are sound reasons for this: they offer simple scalability without any appreciable increase in costs and relatively low startup capital. The former Cologne startup NEXT Kraftwerke is, for example a highly successful supplier in the field of virtual power plants with a current annual turnover of more than 270 million euros and around 4,500 plants, which are pooled via NEXT.

Success through co-operation

Not every startup is automatically successful. According to the KfW development bank about 30 per cent are forced to hoist the white flag in the first three years, and only about 50 per cent survive the first five years. It therefore comes as no surprise that 70 per cent of startups collaborate with established companies. It is precisely the entrepreneur, in other words the one who “takes on risks to sell goods at uncertain prices” (Richard Cantillon 1775), who appreciates securities which established companies can provide. In fact studies on the risk behaviour of would-be entrepreneurs provide evidence that founders of startups actually shy away disproportionately from the (uncalculated) risk.

What does this mean for the energy turnaround? If one takes a closer look to compare the established players from the energy industry and the startups it becomes clear that the two groups have different

North Rhine-Westphalia is not only the No. 1 Energy Region, but also the leader when it comes to startups. Alongside the large startup metropolis of Berlin, NRW and specifically the Rhine-Ruhr region can boast numerous new startups. In 2016, for example, of 1,224 startups 19.1 per cent were founded in NRW (Deutscher Startup Monitor 2016). In the energy industry there are at present about 850 startups in the whole of Germany, of which about 100 are based in NRW. Nationwide the number for company registrations is declining, but the proportion of opportunity-based startups has risen sharply as compared to companies which are started up out of necessity.
features which can be mutually complementary in a co-operation situation. For example, municipal utilities and energy supply companies have long-standing, established and regional customer connections and are mostly on a sound financial basis. Depending on their size, they have wide-ranging experience with various elements of the energy value chain. Company founders and startups, on the other hand, still have to become established, sometimes with a lack of references, and in particular they have to demonstrate how they are being financed. Given this the two groups can profit from one another: co-operative approaches achieve common learning curve effects and a competitor will become a partner.

DO YOU SPEAK STARTUP?

Unicorns = These are startups valued as being worth more than 1 billion US$.
Accelerator = An accelerator is an institution which helps startups to develop rapidly through coaching.
Elevator Pitch = This is a brief presentation (lasting approximately the time of an elevator journey). It is intended to convince and investor of a business idea in a short time.
Incubator = Incubators are institutions which set enterprises off on the road to their establishment as companies and give them the related support.
VC = VC is the abbreviation for venture capital (capital invested at the risk that it could be lost) and can either refer to a person who invests it (a VC) or to the venture capital itself (the VC).
Business Angel = This is an experienced entrepreneur who supports would-be entrepreneurs with funds and practical experience.

Thanks to their interdisciplinary structures startups also make it possible to break down the classic boundaries in the industry and hence to bring the energy turnaround one step forward. Energy producers and consumers are no longer necessarily separated from one another. Electricity, heat, transport and industrial sectors are coming together increasingly and digital business models facilitate both sectoral and cross-sector corporate developments. Platforms, software as a service and energy services play an increasing role. This role is being provided more and more, but not exclusively, by startups.

Anyone who has founded a startup and is an entrepreneur in the energy industry or is seeking contact with energy startups can consult the EnergyAgency. NRW. It provides impartial, independent and free assistance in connection with energy-related matters and projects.
Successful startups from and for NRW

GreenSynergy – monitoring and optimizing generation facilities
The Bonn-based startup GreenSynergy provides a universal monitoring portal which is independent of manufacturers to monitor and optimize photovoltaic installations. The portal offers innovative functionalities and automatic monitoring to optimize energy generation and maximize the profitability of every photovoltaic installation. GreenSynergy takes the transmissions of the usual data loggers on the market, unifies and standardizes them and on the basis of this data provides flexible functions. The portal offers solar power engines and operators in particular simplified monitoring and enhanced efficiency. In the context of a white label solution the GreenSynergy logo and name are replaced by the logo of the solar power engineer. This creates a clear bond with the customer since customers come into contact on a daily basis with the operator’s solar power engineer’s name. After a successful start in the field of photovoltaics the next goal is to integrate other kinds of power plant such as wind turbines or hydropower in the monitoring portal.

e.GO Life – the new Aachen electric car
e.GO Mobile AG is developing the inexpensive electric vehicle e.GO Life on the campus of RWTH Aachen University. The new model is a city vehicle which is especially suitable for use as a second or third car for large families or as a fleet vehicle. Pleasurable driving is guaranteed since the car exploits to the full the technical advantages of the electric engine. The e.GO Life will be launched onto the market in the summer of 2018 with three power ratings: 20, 40 and 60 kW. The basic version, 20 kW, manages an actual travelling range of 104 km and will cost the same as previously, namely 15,900 euros. The e.GO Life 40 reaches 150 km/h and has an actual travelling range of 114 km. The e.GO Life 60 accelerates from 0 to 50 km/h in 3.2 seconds and with a 23.9 battery it achieves an actual travelling range of 154 km.

Logarithmo – data analyse yields knowledge
Logarithmo assists companies in the energy industry in gathering as much knowledge as possible with the lowest possible effort. A digital platform has been created for this purpose and on this numerous applications for data analysis and visualization, optimization of forecasting from the Cloud – in other words an appstore for energy-related processes. For example, there is a simulation tool to examine the impact of electric vehicles and renewable energies on the regional power grid, or there is an application for optimizing tenant electricity consumption. The range is being steadily expanded and encompasses the individual creation of interactive applications.

Physec – data security and the protection of critical infrastructure
The Bochum-based startup Physec not only puts forward innovative security and connectivity concepts, it has already won a number of startup and business plan competitions. As a spin-off of the leading European Horst Görtz Institute for IT Security from Bochum, this startup has specialized in applied cryptography on the Internet of Things (IoT). With its KRITIS Box the company offers a modern Virtual Private Network solution (VPN) for protecting critical infrastructure, a solution which is also important for the energy industry. The decentralized architecture of the VPN solution is intended to render cost-intensive configuration and administration superfluous. Using state-of-the-art cryptographic primitives so-called post-quantum resistance is ensured, which is essential in particular for long-term use (> 20 years).

statmath – forecasts in the energy domain
statmath GmbH is a supplier of solution-oriented online applications, tools and data records for data science and forecasts in the fields of demographics, energy and Industry 4.0. Essentially this invariably involves linking various data sources, the targeted search for patterns and structures in large quantities...
The scooter sharing system works using an app. After registering with the supplier the user searches for and reserves a vehicle locally via the app. Through the app the helmet box is then opened, the key is removed and off the user goes. At the final destination the scooter can then be parked wherever it does not obstruct other road users. The rental period is then terminated using the app.

emmy makes sure that all the scooters are always available with a fully charged battery. The company’s employees can replace empty batteries as required. It is therefore not necessary for the hirer to worry about the availability of charging points or sockets. emmy thus offers an interesting collaborative service for municipalities and public utilities.

### ATHION digitizes energy supply in industry

For companies energy is frequently the means to an end: it is critical for production but often not a part of the core business – yet this is currently changing in many companies. Rising energy costs, more short-term electricity products and the roll-out of intelligent measuring systems mean that companies have to manage their energy systems efficiently and that they can now do this. This requires specific knowledge in three areas: a technical understanding of the energy and production systems, knowledge of state-of-the-art IT processes and energy-related expertise.

When developing a market-ready IR corporate solution for this important digitization step, company founders Yvonne Mertens and Christoph Kosmehl were able to call on the knowledge they gained through professional experience in strategy consultancy, industry and IT startups. Athion was therefore created in 2015 with the aim of providing energy services as a modular SaaS (Software-as-a-Service) solution. This makes it possible to tackle in a precise form the companies’ requirements and to ensure that customers do not have to invest in their own IT or hardware.

Only a few months after the start of distribution in 2016 the first DAX companies and SMEs became customers. With the SaaS solutions the Athion customers get for their real properties an energy system which is optimized at all times for the factors of energy efficiency, market prices and production stability.

“The economic efficiency of the energy system can be enhanced by as much as 30 per cent,” Yvonne Mertens explains. “Furthermore a big step can be taken in the direction of digitization.”
Innovative and young: Volterion GmbH from Dortmund is an ambitious company operating in the environmental industry. CEO Dr. Thorsten Seipp explains what his company makes specifically and what factors are important for its success.

**What motivates you to go to work every day?**

**Seipp:** A great team who are a joy to work with, and an exciting product. Every day brings something new and no day is like any other. A co-founder I have been able to follow the development from an idea, through patent registration and first prototypes to the present product and I have watched every step with great pleasure.

**What makes you stand out from other products on the market or why is your company so special?**

**Seipp:** Volterion GmbH produces and markets small-format redox-flow batteries with power ratings of 500 W to 30 kW for home and industrial use. With the new kind of energy storage systems self-generated electricity from photovoltaic installations can be retrieved even at night and during low-sunshine hours. Volterion takes the well-established redox-flow technology as the basis and makes it competitive and suitable for a mass market by applying new production techniques. The special feature of our batteries is that they have a very long service life and can be recycled. Furthermore with them it is possible to store large quantities of electrical energy over longer periods.

**How high are the costs for installing your redox-flow battery and who can benefit from its use?**

**Seipp:** With our batteries storing one kWh costs about 12-15 cent/kWh. Our batteries are especially interesting for commercial operators who want to cut their power price or want to use PV electricity at night as well.

**What do you need to continue being successful as a company?**

**Seipp:** Good regulatory parameters and a lot of people who want to give new technologies a chance. It’s also important to find employees who find working in a startup fun. Not everyone can take the great workload and work independently in small teams. But the reward of the work is a high degree of freedom and the opportunity to put one’s own ideas into practice without having to go through long decision-making procedures and to experience success directly.

**In your view, what has to happen to ensure the success of the energy turnaround and what political parameters have to change?**

**Seipp:** The use of self-generated electricity and electricity storage systems must not be put at a disadvantage. If this is achieved a PV installation with storage system will then be worthwhile without any external funding.
North Rhine-Westphalia boosts energy research

Three universities in North Rhine-Westphalia have won approval from the state for their pioneering projects.

The University of Münster and RWTH Aachen University were granted three million euros for the development of batteries free of hazardous substances. The University of Duisburg-Essen received around 700,000 euros for the Euro preparation of a study on the potentials of the flexible use of conventional power plants in the context of the energy turnaround.

Innovations are the engine of renewable energies
Economic Affairs and Digitization Minister Prof. Dr. Andreas Pinkwart: “The future potential of renewable energies depends on the economic parameters, and specifically on innovations. By focusing on energy storage free of hazardous substances the project from Münster and Aachen provides major impetus in this respect. Our support also goes to the endeavours of the University of Duisburg-Essen in maintaining the stability of our power grid involving the maximum use of volatile energies through flexible power plant technology. As long as there are no energy storage systems of adequate size available this is the correct approach.”

University of Duisburg-Essen
As a result of the considerable addition of renewable energies highly flexible fossil-fuel-fired power plants are essential as a bridging technology to ensure adequate stability in the power supply. As the expansion of the generation or conversion processes of renewable energies progresses the conventional power plants will not stand up in the long run to the changing energy requirements and temperature loads. With its project the University intends to formulate the challenges for a highly flexible power plant stock of the future. Overall this will lead to reductions in CO₂ – despite the use of fossil fuels.

A spin along the Rhine at Düsseldorf

The startup “Sono Motors” had set up a test drive station for a few days in Düsseldorf and Gianna Bergmann, consultant at EnergyAgency.NRW, took their Sion for a spin. She was testing the first electric car which, along with the usual equipment, carries its own power source – photovoltaic modules which supply the Sion with electricity for up to 30 kilometres. Gianna Bergmann reports that the modules are not only useful, but are also optically enhanced in the transparent car roof. On the road the Sion is quiet and the acceleration is as immediate as in comparable electric cars.

In addition to many other ideas for an innovative future of mobility Gianna Bergmann finds the integrated software particularly interesting in that it simplifies use of the car in a carsharing scheme, for instance. One eye-catching feature under the dashboard is a strip of moss which filters the air in the interior.
The statistics show that the energy turnaround must not only refer to electricity, but also to heat: around 285 million tonnes of CO\textsubscript{2} emissions (equivalent) come from the heat sector – this represents 38 per cent of the energy-related CO\textsubscript{2} emissions.

“If not now, when?” This was the call of the working group AG4 co-ordinator at the Power Plant Technology Network at the EnergyAgency.NRW, Udo Wichert of AGFW e.V. and Dr. Rolf Albus of the Gas- und Wärme-Institut Essen e.V. Together with stakeholders from industry, the supply sector, science and associations, they drew up a position paper entitled “Combined Heat and Power Generation in North Rhine-Westphalia – A Technology with a Future”. In the paper they make clear that the expansion of combined heat and power (CHP) is an indispensable element in the implementation of the energy turnaround.

At the present time electricity and heat are generated mainly in separate facilities: while centralized plants predominate in the electricity domain, heat is often generated on a decentralized basis. Combined heat and power plants can offer much more efficient and environmentally friendly solutions in both areas.

In the position paper the advantages of CHP are described concisely, from small plants to power plants performing all supply functions: within a property, via district heating or in industry. It is intended to inform the general public and to provide decision-makers sound arguments for improving the parameters for expanding CHP.

CHP as a single plant or as part of a supply system can thus be a major guarantor of a successful energy turnaround. This technology fulfils the conditions of the energy triangle between supply reliability, value for money and climate policy objectives, and it is also largely acceptable in the wider society. Furthermore it offers the possibility of integrating innovative technologies, such as the fuel cell, the use of hydrogen and the use of heat from renewables. The CHP system can be expanded in conjunction with heating networks which incorporate CHP heat from waste-fired power plants and the great potentials of industrial waste. Major cuts in CO\textsubscript{2} can be achieved in this way.

Stakeholders in the industry will be presenting their joint CHP position paper in Düsseldorf at the CHP.NRW Forum of the EnergyAgency.NRW. It can be ordered through the brochure ordering system of the EnergyAgency.NRW or downloaded as a PDF file.

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**30th International Electric Vehicle Symposium & Exhibition (EVS30) in Stuttgart:**

**components from NRW on show**

After Barcelona (2015) and Montreal (2016) the “Electric Vehicle Symposium & Exhibition” was held this year for the first time in Germany. As a meeting point for the whole electromobility industry it enabled manufacturers, users and decision-makers to form an up-to-date impression of all forms of electromobility in Stuttgart as well as to discuss new trends and possible uses for the electric powertrain. The “Fuel Cell and Hydrogen, Electromobility NRW Network” of the EnergyAgency-NRW represented the federal state of NRW on the joint German stand. It was possible to present all the e-mobility competencies to the international specialist public, the media and policy-makers. Those exhibiting on the joint stand were the company Leopold Kostal from Hagen and Wystrach from Weeze, as well as the scientific institutions of the Ruhr University Bochum (Energy Systems Technology and Power Mechatronics Unit), the Gelsenkirchen University of Applied Sciences and the Zentrum für Brennstoffzellentechnik GmbH (ZBT) from Duisburg. The Network reported at the accompanying conference on the European procurement programme for fuel-cell buses JIVE and the related hydrogen filling stations in the MEHRLIN project.
In September the German Aerospace Centre (DLR) opened the Test Facility for Thermal Energy Storage in Molten Salt (TESIS) in Cologne.

With this technique it is possible to store large quantities of heat at a high temperature level and in a cost-effective manner. With molten salt storage 100 tonnes of molten “solar salt” circulate at temperatures of between 300°C and 500°C and this is heated and cooled alternately. The molten salt is a non-toxic liquid which is not under pressure. It can easily be pumped and is also not combustible.

These storage facilities have already been tested through their commercial use over a number of years in solar thermal power plants at sites where there is high solar radiation. The aim of this test facility is to make it possible to introduce a high-temperature storage facility for industrial purposes as well. Numerous industrial production processes – such as in the chemical industry – need large quantities of heat in these temperature ranges and can achieve enhanced flexibility in their processes with molten salt storage. This test facility enables industry throughout the world for the first time to test technical components for molten salt storage under actual use conditions.

The aim of the research work is to demonstrate the technological feasibility in order to make this innovative energy storage system market-ready for specific applications in industry as well. Together with industry it is intended to develop new and cost-efficient heat storage systems for regulatable renewable electricity and in order to flexibilize energy-intensive industrial processes and power plant installations.

In all, the so-called single-tank stratified storage facility with filler materials offers the potential of lowering the capital costs in the two-figure percentage range as compared to the systems currently available on the market.
Biogas facility as local heating plant

Formerly farmers, now energy producers – the Körner family can look back over a successful re-organization of their own establishment. In 2011 a biogas plant went on stream after a two-year planning period. This traditional establishment on the edge of Dingden, a district of the Lower-Rhine town of Hamminkeln, grew thanks to a flourishing sugarbeet operation and was looking for another economic string to its bow. Christian Körner and his father Johannes decided to go for biogas production so as to exploit the existing expertise; the popular sugarbeet was to remain a major component of the business concept.

The Körners’ biogas plant has on annual average an output of 600 kWₑ, and in the winter months this can be upped to as much as 800 kWₑ. Three combined heat and power units with 600 kWₑ, 450 kWₑ and a satellite with 250 kWₑ, at the local sports hall also belong to this establishment. The latter produces electricity and heat all year round and supplies not only the sports hall mentioned, but also an open-air swimming pool, a nursery school, a school and a refugee hostel with biogenic heat. The local heating network which has grown gradually over time also connects the main heat consumer, the neighbouring Klausenhof educational institution. On average 85 per cent of the heat generated by the CHP units is fed in. Recently it has been possible to operate the two CHP units on the plant site flexibly.

The substrates used include sugar beet, maize silage and liquid manure as well as grain in small portions and depending on the market price. A large part of the input substances is bought regionally. The operators lay great store by flexibility with respect to the substrates used. In future the plant could also even ferment local organic waste, which has to date always had to be transported over long distances. It is this an option which would enable the biogas plant to be operated economically once the EEC subsidy expires? Time will tell.

Fact check:

Bioenergy in rural areas

Two third of the land area in NRW is mainly rural. Statistically every third NRW citizen lives “in the country” – an appreciable number given the settlement structures in the German federal state with the densest population.

Rural regions are at one and the same time residential and working area, recreation area and production site. Numerous small and medium-sized companies – especially in agriculture, forestry and the timber industry – are based here. Production of foodstuffs and renewable resources for use as material and a source of energy is among the cornerstones of rural value creation.

It is hardly possible not to think about bioenergy in relation to this system. Especially since it is partly obtained as a “by-product” anyway: sawmill by-products in the form of wood pellets are ideal as a fuel in local heating networks; liquid manure and dung from cattle-rearing generate electricity in biogas plants and at the same time heat for farms, country hotels and stables. In terms of sales bioenergy is the leading form of renewable energy: in 2016 more than 10 billion euros worth of sales were achieved in the whole of Germany by plant operations in the bioenergy sector. Money which flows directly into the rural area and gives rise there to consumption and structural effects.

The energy sector in NRW employed more than 14,000 people in 2015. They earn their extra cash in the numerous establishments engaged in the cultivation, harvesting, preparation or logistics of biomass, as marketers, planners or engineers, machine and plant manufacturers and not least as plant operators. The examples in NRW are too numerous to count: a vegetable growing operation in Greven obtains heat for its greenhouse form neighbouring biogas facilities. Wood chips are used to heat a horse sanctuary near Iserlohn. Bioenergy villages obtain biogenic heat via local heating networks and biomass farms, such as the one in Börninghausen, and they also offer wood fuel. Bioenergy projects in towns and in the country have been logged by the Biomass Network of the Energy Agency.NRW and included in its Bioenergy Atlas.NRW: www.energieagentur.nrw/bioenergieatlas
Driving schools now backing e-mobility

They’re not to be found everywhere yet, but they do exist, and there are more and more of them: driving schools that use electric vehicles for instruction. In Herten, the Werners Academy driving school received the municipal environmental award for reducing CO₂ emissions during driver training by 90 per cent with its electric car. In addition, “initial estimates” indicate that the use of this Kia Soul has cut the company’s petrol costs by more than a third.

The County of Olpe now has one, the Aachen region too – and so does Herten: driving schools using electric cars. The idea that it’s then only possible to qualify to drive an “e-car” is a misconception, however. “Only learning to drive on an automatic-transmission vehicle is less in demand, because you are then not qualified to drive a stick-shift vehicle. This is why we use the electric car for the novice driver’s first few hours in traffic, and then change to a stick-shift vehicle with a combustion engine”, states Claudius Ahlers, an employee at the Herten driving school. This procedure nonetheless makes a major portion of practical driving instruction more environmentally friendly.

Driving an e-mobile also needs to be learnt, however – there are indeed differences, compared to driving a petrol or diesel vehicle. An electric car accelerates more quickly, for example, and it generates practically no noise. The steering and the transmission system are also more precise, for instance for the finer points of parking the vehicle – an extremely important detail in driving lessons. As Ahlers says: “My impression is, however, that the e-car has actually made us more attractive to potential learner drivers”. And, in the experience of the driving instructor, some learners actually would have liked to change back to the e-mobile after their first few hours learning on a petrol-engined car.

Community wind farm with latest technology

Ten Type E-141 EP 4 wind energy installations (WEI) are to start operation to the south of Ahaus by the end of 2017. These machines, with a total height of 230 metres and a rotor diameter of 141 metres, are the first of their type installed in North Rhine-Westphalia. The overall project has an investment volume of 70 million euros and will generate electricity for 40,000 households.

The municipalities of Ahaus, Heek and Legden joined together as long ago as 2010 to examine the implementation of new wind-energy projects. A condition that WEIs may be constructed only provided they are operated as community wind farms was imposed during the planning procedure.

The founding of the Ahaus-Heek-Legden eG (AHLEG) energy cooperative laid the legal foundations for the creation of the community wind farm. Two planning associations consisting of a total of forty-five farmers pursued development of this wind farm. Approval was granted, with assistance by the BBWind company, in late 2016.

The AHLEG examined what assets could be incorporated into the cooperative and how marketing and recruitment of members could be organised. There was cooperation with radio stations and the local press, a website was set up to provide citizens with information, and a supervisory board and honorary board of management were appointed and have, since then, directed all further processes and procedures.

The acquisition of shares in the AHLEG, to which only citizens from Ahaus, Heek or Legden, and the employees of companies located in these towns, are entitled, gives citizens a financial stake in the project. Owners of local land and persons with WEIs in their immediate residential vicinity can obtain a direct stake in the wind farm’s operating company, over and above acquiring shares in the energy cooperative. There is, in addition, a so-called “proximity allowance”, which is intended for persons resident in the immediate vicinity of the installation site.
Energy-costs cut by nearly half a million euros

An energy-efficiency programme implemented at machine-tool manufacturer DMG Mori AG (formerly Gildemeister), in Bielefeld, revealed a lack of supra-location and supra-departmental energy-monitoring software. A new subsidiary then developed it itself, thus providing this traditional company with a new field of business.

Seven locations producing machine-tools, and also lathes and milling centres, in Europe and China, but no uniform procedure for quantification of energy consumption - that was the situation as far as energy was concerned at DMG Mori AG, formerly Gildemeister AG, domiciled in Bielefeld, in 2012. Background information: energy-efficiency was to be improved throughout the group. “DMG Mori 15-30” was the target adopted: reduction of energy-costs by 30 per cent by 2015.

Consumption data was, of course, to provide the basis for this programme, but it was not so very easy to obtain this data. Some of the factories did, indeed, use corresponding software systems for data acquisition and analysis, but the efficiency programme was aiming somewhat higher. The monitoring system had, naturally, to collate the data for the various locations at a central point. In addition, however, the data was to be available in comprehensibly prepared form not only to the technical departments, such as Maintenance and Production. “The result of research on the energy-monitoring market at that time indicated that what we wanted was not to be had at the costs budgeted”; reports Sebastian Braun, managing director of Gildemeister energy efficiency GmbH. The solution: make-it-yourself, via a new business unit, which would also market the product to customers outside of the group. Gildemeister energy solutions designed the “Gildemeister energy monitor”, which was, of course, firstly used for the company’s own efficiency measures at its home location. Energy-efficient ventilation and air conditioning systems, an LED lighting concept in the production shops, a low-loss compressed-air network, a higher-level compressed-air control system, supply of heat and cooling by means of geothermics and the procurement of an all-electric pool of vehicles, complete with the necessary charging infrastructure, have all become reality. The result: consumption has fallen by more than 3.4 GWh/a; this has reduced energy-costs by nearly half a million euros per year.

Gildemeister energy solutions, with 145 employees, is also pursuing new marketing routes: under the motto of “360 degrees”, Gildemeister energy efficiency is cooperating on roadshows with an LED manufacturer and lighting designer, a compressed-air system supplier and cooling/heating technology specialists, thus offering customers harmonised energy-efficiency solutions for the main energy-consumers in their companies.

Master mechanic Friedrich Gildemeister founded “Werkzeugmaschinenfabrik Gildemeister & Comp” in Bielefeld in 1870. Gildemeister was stock-market quoted as early as 1950. Following cooperation dating from 2009, Gildemeister AG traded from 2013 onward as DMG Mori Seiki AG, and was taken over by the Japanese machine-tool maker in 2016.


**Citizens back solar**

The BürgerEnergieGenossenschaft eG “BEG-58” community energy cooperative from the Ennepe-Ruhr County is something special among NRW’s around 100 energy cooperatives. Its successes are astonishing not only in figures: up to today, the 286 members have completed eighty-eight solar-power installations generating a total of over 2.6 MW. Equally astonishing is the fact that the cooperative has continuously constructed new solar installations ever since its founding in 2010. Despite all reductions in remuneration, BEG-58 has continued to implement new projects on the “classical model” and it still is today. Meaning, specifically: the installation of PV systems on leased roof surfaces and feed-in of all the PV electricity generated to the public grid - for payment under the EEG conditions. The year 2017 is promising to be the cooperative’s most successful to date, with no less than nineteen new installations planned in the first six months. The BEG-58 is thus exemplary of the - thanks to lower prices for photovoltaics modules - booming solar market.

Cooperative chairman Rolf Weber states several factors when asked for the secret of success - firstly, the many honorary “activists” that support the BEG-58. Another item that Rolf Weber mentions is that the BEG-58 is not profit-driven but instead has its origins in the Local Agenda 21 and environmental groups. It is thus able to implement projects from a return of as little as three per cent. “Social orientation also means for us: long-term, mutually trusting cooperation with our partners, such as the providers of roofs and the local craft trades”, emphasises Rolf Weber.

The BEG-58 thus generally works with one solar installation technician per grid territory. This permits rapid and plannable implementation for both parties. Relations with the local energy suppliers are also good. This is the result, inter alia, of the fact that the BEG-58 deliberately does not act as a competitor - with system-leasing offers or its own electricity tariff, for example.

www.energieagentur.nrw/qr94

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**Building-Check Energy**

**It’s all app now!**

Old buildings frequently have great charm - and, just as frequently, high heating costs. Because: they consume more energy than necessary. The “Building-Check Energy” can provide a remedy - by giving the building owner an initial impression of where and how to save energy.

The “Building-Check Energy” is performed by manual craftsmen who are additionally qualified as “building-checkers”. Residential buildings older than fifteen years with a maximum of four full storeys and twelve individual dwellings are eligible for checking. The craftsman checks the building on site. All information of importance at this visit is recorded via EnergyAgency.NRW’s new “Building-Check App”.

Not only the building fabric, i.e., walls, windows and roof, but also the heating system and heat distribution within the building are examined. In addition, the “building-checker” also takes a look at energy consumption over the past three years, in order to obtain an impression of possible savings potentials. The task of recording data can now also be performed by a specially trained employee. The “master” checks all the data and drafts for the building owner an easily comprehensible report which documents the energy condition of the building. Possibilities for modernisation are also outlined in a technically rational order. Whether Smartphone or Tablet, Android or iOS, the App is available for all mobile terminal devices in the stores for qualified building-checkers.

The “Building-Check Energy” is a project by the state for the Promotion of Training in the Craft Trades (GFWH). More than 280 million euros have been performed since the introduction of the Building-Check, and have tripped off investments of around 300 million euros. www.energieagentur.nrw/gebaeudecheck

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Two BEG-58 PV installations on the roofs of en|wohnen in the Schillerstrasse in Wetter (Ruhr), which were subsidised by AVU; the local energy utility: from left to right: Kai Sieverding (AVU, manager, Private Customers Market and Sales), Meike Riedesel (en|wohnen: Head of Department, Technical and Commercial Fleet Management), Manfred Kühn (managing director, en|wohnen), Rolf Weber (BEG-58, Chairman), Alexander Dyck (director, en|wohnen)

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Interested manual tradesmen who would like to perform the Building-Check Energy should contact Peter Dohmen of the GFWH on Tel. 0211 3007.707 or by e-mail to peter.dohmen@gfwh.de
Energy turnarounds are now taking place world-wide: the government of Argentina has, for example, set itself the target of achieving 20 per cent of total energy supplies from renewable energy sources by 2025.

By then, around 21 gigawatt (GW) of additional power-generation capacity will have to go on grid in order to meet demand for electricity, which is growing by around 4 per cent annually. Just on half of this is to originate from regenerative sources, equivalent to the addition of 10 GW of renewables capacity. A second tendering round in the context of the RenovAr programme set up in 2016 has now been started to permit attainment of this target. Tenders have been invited for a capacity of 1.2 GW of renewable energy, made up of 550 megawatt (MW) of wind energy, 450 MW of solar energy, 100 MW biomass, 35 MW biogas and 50 MW mini-hydropower.

Industry in Argentina is also being co-opted. A law enacted in 2015 stipulates that companies with connected loads of more than 300 kilowatt must obtain not less than 8 per cent of their power from renewable energy sources. Heavy penalties will be imposed on companies if this percentage is not achieved by the end of 2017. According to Cammesa, the state-owned energy wholesaler, some 7,500 industrial enterprises are currently affected by this ruling. The Argentine Ministry for Energy and Mining has now published provisions, under which energy-intensive companies can fulfil their obligation to use renewable energy sources. This act also provides for the expansion of the use of eco-electricity: by 2025, these companies must obtain not less than 20 per cent of their power from renewable energy sources.

The companies can initially obtain their energy from Cammesa, in order to meet the 8 per cent target. Another route is also to obtain the eco-electricity directly via a power-supply agreement with an operator of a corresponding generating installation. They can, alternatively, also operate their own photovoltaics, wind-power, geothermal or bio-energy facilities and use the electricity generated within their own companies.

Chilean guests in NRW:

Energy-efficiency in the foodstuffs industry

In the context of a climate-protection project funded by the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, Chilean businesspeople have undertaken a fact-finding tour in North Rhine-Westphalia, visiting foodstuffs-industry companies in the region which have energy-optimised their production by means of energy-efficiency provisions. The aim here was to provide them with inspiration and impressions for the long-term improvement of energy-efficiency in the Chilean agricultural and foodstuffs sectors, too. The German-Chilean Chamber of Commerce in Santiago de Chile has for this purpose been implementing the “Smart Energy Concepts” project of the International Climate Protection Initiative since 2015. The Chilean entrepreneurs thus visited various establishments in NRW, including the Mocambo coffee roastery, in Radevormwald. Mocambo is well known not only to numerous connoisseurs of coffee - the family-owned firm is, above all, one of the region’s showpiece projects, thanks to its energy-efficient production. Mocambo has installed a heat-recovery system which uses the hot waste-air from the roasting process to heat the building. Around 100,000 kWh of heat are thus recovered each year.

Visits were also made to the Gastroservice Rüther gastronomical specialists in Erwitte, the Tönebön butcher’s in Barntrup, the Höxter-Warburg agricultural-machinery cooperative, the 2G Energy CHP plant unit manufacturer and the Naarmann private dairy.

The visits to these companies were support by EnergyAgency.NRW, which has enjoyed cooperation with the German-Chilean Chamber of Commerce for many years.
Belgium is linked to the European wide-area synchronous grid via the Netherlands, France and Luxembourg. There is, at present, no direct ultra-high-voltage grid connection between Germany and Belgium, but this will now change, thanks to the ALEGro project. The around 100 km line will run from Oberzier for 41 km through the Amprión’s grid territory into Elia’s Belgian transmission-grid territory. The project is to be completed in the form of underground power lines, in 2020. It will then be possible for the two countries to exchange electricity by means of high-voltage DC (HVDC) transmission with a transmission capacity of 1 GW. HVDC technology permits lower-loss, higher-power transmission across long distances. Alongside the generalised aim of providing adequate grid capacity for European electricity trading, particular importance also attaches to this expansion project in view, above all, of the possible decommissioning of the Tihange and Doel atomic power plants. The necessity of this project has been confirmed at European and German national level by its inclusion in the list of PCI projects and in the Federal Grid Expansion Requirements Plan. A direct connection between Belgium and the United Kingdom is also planned for the future.

Transparency in building

Building-project clients can nowadays scarcely encompass everything now happening on the heat market. To support a successful building energy turnaround, the Ludwig-Bölkow Foundation and the Stiftung Energieeffizienz energy-efficiency foundation, with assistance provided by NRW state funding, have initiated the long-term ReferenzControlling-Gebäude (ReConGeb) project. The starting phase concludes with the provision, for the first time, of practice-tested tools for the implementation of sustainable construction projects to owners of single-family houses. Information on target data, guarantee agreements and checks support the achievement of genuinely environmentally friendly and rational-cost buildings and heating systems. The aim of the ReConGeb project is that of identifying the most cost-efficient provisions for the achievement of climate-protection targets for residential buildings. A range of support services for single-family houses has been derived from the project. It includes guarantee agreements for solar and heat-pump systems, which can be used to ensure that theoretically efficient system technology actually delivers in practice what it promises. For the first time in the residential sector, tried-and-proven standard measuring diagrams are being provided free-of-charge for private use for the purpose of quality assurance of widely installed types of heat-generation systems. To support planning and installation, the simplified system diagrams show the necessary measuring points, using which a system can be quality-assured and monitored year after year with the least possible effort.
The award, initiated by EUROSOLAR e.V., was presented in eight categories in cooperation with EnergyAgency.NRW. No less than four of the much coveted distinctions went to North Rhine-Westphalia, in the form of the ALDI SÜD group of companies, from Mülheim an der Ruhr, the Friends of Prokon e.V., from Dortmund, the StreetScooter initiative of Deutsche Post DHL Group, Bonn, and the :metabolon Bergisches Energiekompetenzzentrum, Lindlar.

Prof. Peter Droege, President of EUROSOLAR e.V., praised the initiatives and emphasised their contribution to the energy turnaround: “The many initiatives from municipalities, associations and companies demonstrate the exemplary motivation of numerous players and their will to take an active part in shaping Germany’s all-renewables energy supply future. As a pioneer in the energy turnaround, Germany is dependent on new, dynamic and successful initiatives to enable it to accomplish the holistic leap away from conventional energy supplies. The pioneering role which the prize-winners play with their achievements is especially important here, and is emphasised by this great distinction”.

“New technologies and secure energy-supply capacities are extremely important for our state. Projects such as those honoured with the German Solar Award are testimonies to the economically rational potential existing in the field of renewable energy sources in Germany. The award of no less than four such prizes to our state illustrates North Rhine-Westphalia’s exemplary function as an innovation state and a shaper of the future. Our aim in future must be to utilise even better the great potential for photovoltaics resulting from North Rhine-Westphalia’s urban structure, with its many vacant roof surfaces”, commented NRW economics minister, Prof. Dr. Andreas Pinkwart.

The German Solar Award 2017 went to:
- The Stadtwerke Heidelberg municipal utility in the category “Towns, municipalities, counties, municipal utilities”
- The elobau Werk 2, of Leutkirch, in the category “Solar architecture and urban development”
- The ALDI SÜD group of companies, of Mülheim an der Ruhr, in the category “Industrial, commercial or agricultural organisations/companies”, for extensive use of solar energy in the industrial sector
- The Friends of Prokon e.V., Dortmund, in the category “Local and regional associations/communities”, for untiring commitment to renewable energy sources in the hands of the citizen
- Frank Farenski, of Berlin, in the category “Media”
- The StreetScooter initiative of the Deutsche Post DHL Group, of Bonn, in the category “Transport systems”, for environmentally friendly urban logistics
- The Bergisches Energiekompetenzzentrum :metabolon, Lindlar, in the category “Education and training”
- The Stiftung Solarenergie - Solar Energy Foundation, Freiburg im Breisgau, in the category “One-world Cooperation”
- The Elbvororte environmental group, of Hamburg, received the “Special award for personal commitment”

The jury’s reasons for its decisions can be reviewed at www.eurosolar.org
23 and 24.11.2017
6th NRW Wind Energy Days, Bad Driburg

The 6th NRW Wind Energy Days are to be held in Bad Driburg’s Gräflicher Park on 23 and 24 November 2017. This central NRW industry forum for operators, designers and planners of wind-energy installations, and also for representatives of regional sub-supplier companies, is being organised by the NRW Renewable Energy Association (LEE) in cooperation with the North Rhine-Westphalian branch of the German Wind Energy Association (BWE NRW).

www.windenergietage-nrw.de

5.12.2017
Annual energy cooperative meeting

The Genossenschaftsverband – Verband der Regionen association of cooperatives, and EnergyAgency.NRW are organising for the fourth time the annual energy cooperative meeting. The focus will, again, be on current boundary conditions for energy cooperatives and possible fields of business. The place and date are the Science Park Gelsenkirchen and 5 December. Attendees can expect a series of papers in the plenum meeting in the morning and, predominantly, workshops during the afternoon.

www.energieagentur.nrw/qr96

29 and 30.1.2018
PV forum

TÜV Rhineland, in cooperation with EnergyAgency.NRW, is to initiate a new event format in the form of the “All Quality Matters – PV Module Technology & Applications Forum” in Cologne on 29 and 30 January 2018. The forum is, for the first time, aimed at international participants and will be held in English and German. The focus will be on topics such as the latest developments in module and component technology, characterisation and analytical methods, and also reliability and use. The subjects of energy storage and safety will also be examined. The target audience consists of technical experts, designers, constructors and operators of PV power plants, and also decision-makers, investors and asset managers throughout the value chain of the solar-energy sector.

www.energieagentur.nrw/qr97

6 to 9.3.2018
SHK Essen

EnergyAgency.NRW will have an even greater presence when the SHK opens its doors from 6 to 9 March 2018: the agency is enlarging its fair stand to accommodate great demand from co-exhibitors. For many companies, the SHK ESSEN is the ideal platform for the showcasing of their new products and services in the fields of energy-efficiency and the use of renewable energy. This trade fair, the most frequented national trade fair for the sanitary, heating and air-conditioning industry, with 560 exhibitors and 48,000 visitors last year, is an important attraction for decision-makers.

www.energieagentur.nrw/qr98

15 and 16.3.2018
CO2 conference

The focus of this conference, to be held in Cologne on 15 and 16 March 2018, is on technological innovations to permit the efficient, rational-cost use of CO2 as a source of energy and a chemical building block. Renewable energy obtained from the sun or the wind makes it possible to produce, for example, synthetic fuels (e.g. gasoline, diesel and kerosene) from CO2. More than 120 experts will be discussing the latest results, with an eye to the development of competitive products, at the congress. The conference is, for the sixth time, being organised by nova Institut GmbH, of Hürt, together with EnergyAgency. NRW’s Network Fuels and Future Propulsion Systems.

www.energieagentur.nrw/qr99
Two wheels make faster deliveries

Carpenter Dirk Schmidt backs CargoBikes to keep him mobile in Düsseldorf. And wins the city’s environmental award for it.

For some time now, master carpenter Dirk Schmidt has cheerfully been transporting loads of up to 100 kg through urban Düsseldorf, on a bicycle! His CargoBike enables him to transport around two hundredweight, including the rider’s own weight, of course. Schmidt’s nimble two-wheeler can even handle a washing machine or carpentry products of up to 1.20 metres in width.

Schmidt purchased the first single-track cargo bicycle manufactured by Bullitt in late 2014. It was followed in the summer of 2016 by a second, this time an eBullitt, featuring electrical propulsion.

The three employees of Schmidt’s woodworking studio cover up to 250 kilometres per months on the two cargo bicycles, saving themselves many hours of work. As Schmidt reports, „In the car, I need an hour to get to our paint dealers, but I can cover the distance in 35 minutes on the bike“. In winter, however, he does frequently use his company’s two vans, since he doesn’t want to turn up at customers’ wet. He can also not transport large items, such as a full-wall cupboard unit, for example, using the CargoBike. „The bike is a great advertising vehicle, however, people often remark on it to me“, recounts Schmidt, who has adorned the bicycle with his company’s address. He now also operates as a „bike pro“ at information events for the Chamber of Trades and Crafts, in order to convince other enterprises of the benefits of CargoBikes.

„We see these bikes as an opportunity, but many people, regrettably, still have barriers in their minds and cannot mentally conceive of delivering their orders using a cargo bicycle“. He finds this a pity, but takes courage from the growing number of companies that are now already using such bikes. Ultimately, this is also a way to reduce emissions of oxides of nitrogen and fine particulates in inner cities. Self-employed Schmidt frequently tinkers with the CargoBike and has modified it so that a hand-tool battery now drives the motor. He can thus now charge his cordless screwdrivers and his bike battery on site using only one charger. Schmidt aims to file a protected trademark for this with the assistance of the patent department of the Düsseldorf Chamber of Trades and Crafts.
The energy turnaround is obliging municipal utilities to rethink - the use of the existing business model, i.e., as a pure, centralised energy supplier, is getting difficult. Needed now are new energy services, but many municipal utilities have trouble evolving profitable new business concepts. Herne’s “Stadtwerke” (municipal utility) is showing how a new consulting concept can contribute to corporate success.

The “energy future” began long ago in the 150,000-resident city of Herne, driven, above all, by the local municipal utility. “Like, in principle, all municipal utilities throughout Germany, we are confronted with a major transformation, moving away from being purely an energy supplier, to functioning as an energy service-provider and helping customers to achieve tailor-made energy-efficient energy solutions”, comments Dr. Jürgen Bock, holder of procuration and head of the Technology department at Stadtwerke Herne. The problem: “Many municipal utilities have still not succeeded in developing energy services that are, ultimately, also profitable for the utility”. Dr. Bock continues.

Profitable advisory services
It was about three years ago when the responsible people in Herne began to consider how to compensate at least partially for falling sales of electricity and gas with new services. Only a little time later came the birth of an idea as to how a municipal utility can also play an important role for customers on a changing energy market. The principle: Stadtwerke Herne firstly offers its customers technology-neutral advice - every time a new heating system is needed, for example. The utility’s energy consultants determine whether a normal gas-condensing heating system is worthwhile, or whether a modern “hybrid energy-supply system”, such as combinations of heat pumps, photovoltaics systems, CHP plant units, electricity and heat storage facilities might not be more cost-efficient. “Customers can then decide whether they prefer to have the system implemented by the utility, or privately”. Bock tells us. “Most customers decide, even after the consultation, to continue working with us, however”. This has clear benefits: the utility has cooperation agreements both with the manufacturers and with the craft trades, and can thus assure trouble-free installation of the new heating system. “The customer needs to speak only to us, but no longer pays for our services - and the manual tradesmen also do not need to relinquish anything to us”, Dr. Bock explains. “We make our turnover from a ‘sales commission’ that is paid to us by the manufacturers with whom we cooperate. And we have, in addition, also negotiated corresponding guarantee agreements for our heat-supply services, which give us certain securities during the minimum ten-year obligation to supply of heat to the end customer”.

Nor do the manufacturers feel themselves outdone by this agreement. On the contrary: they also benefit from cooperation with Herne’s municipal utility, which has the interface with the end customers and thus boosts their sales. The Herne municipal utility has completed around 500 projects in some two-and-a-half years, recently also including some outside the immediate region.

Target group housing companies
The aim is also directed at residential property companies. Stadtwerke Herne thus equipped a major new residential construction project by Wohnungsgenossenschaft Herne-Süd eG (WHS) with an ecologically and economically rational geothermal heating system. A total of fifty-five residential units now obtain their heating energy from the ground. The available condensing boilers help out only when it is extremely cold. Klaus Karger, chairman of the WHS board, is highly satisfied: “This innovative energy concept now enables us to give our tenants guarantees of lasting low subsidiary costs, because we are no longer dependent on fossil fuels and their severe fluctuations in price. That was very well conceived: Klaus Karger, Dr. Jürgen Bock and Jamal Chmamri are pleased with Stadtwerke Herne’s new business model.
Objective:
The NRW state government’s aim with this funding programme is the furtherance of the use of available technologies for exploitation of inexhaustible energy sources and thus reduction of CO₂ emissions.

Target groups/Eligible for funding:
Communities, municipalities, companies

Funding focuses (selection):
- Thermal solar installations
- Photovoltaics systems incorporating electrical storage
- Geothermal wells
- Heat and cold storage systems
- Biomass plants

Further information:
www.energieagentur.nrw/progres.nrw

Further projects ongoing
But Stadtwerke Herne does not intend to rest on the laurels of the new “SMART TEC – stwh” energy-services brand. A car-free estate consisting of seven single-family houses which the utility is having constructed, as the project client, in cooperation with the AGIS PlanenBeraten firm of architects, for example. The municipal utility is testing a different energy-supply arrangement in each of these houses - a photovoltaics installation combined with the innovative “Redox Flow” battery-storage model manufactured by VoltErion: and this construction project has successfully qualified for the “Energie Umweltwirtschaft NRW” environmental lead-market competition.

progres.nrw Market
Launch at a glance

NRW currently has some 1,600 charging stations for around 36,000 hybrid and e-vehicles. Adventure can be guaranteed when sixty teams set off from Bielefeld, via Dortmund, to Düsseldorf as part of the E-Cross Germany Rally. One of them was from EnergyAgency.NRW.

Throughout the day, charging facilities were therefore provided at practically all stopping points. They took the form both of publicly accessible charging stations and specially provided plug-in sockets. There were, nonetheless, too many vehicles for too few parking spaces - and the grid itself was actually overloaded at one point. Sufficient incentive, therefore, for the drivers to cover the legs of the rally as efficiently as possible.

Power began to dwindle on one longer section nonetheless. At one stopping point, there had only been standard domestic plugs – charging time: around 8 hours! And that would have meant an extra overnight stay. The problem was solved by a quick-charge station located at a car dealer’s. After around 50 minutes of charging on a 50 kW charging station, the on-board computer indicated a range of 120 kilometres, meaning that there were no further problems in managing the final 40 kilometres to Düsseldorf!

Entirely in the spirit of the E-CROSS vision, all teams were committed to completing the rally “purely” electrically, and keeping the range extender switched off. Drivers were helped by the optional “Eco Pro+” mode available on the electric vehicles, which supports efficient driving and thus makes it possible to reduce fuel consumption.

The range extender boosts the vehicle’s range by around 120 to 150 kilometres. It takes the form of a combustion engine driving a generator, which then supplies a battery (rechargeable) and an electric motor with electricity. There is a 9 litre fuel tank mounted in the front of the vehicle for the engine. But, this time, it wasn’t needed...

Bielefeld to Düsseldorf rally:
Long-haul
electric
Idyll with cooling stream:

Development zone backs water/water heat pumps

A deep well, an idyllic artificial stream and good hydrogeological conditions will in future form the bases of regenerative heat supplies at the Eichholz development zone in Wesseling. The starting signal has been given for construction, featuring thirty-two single-family houses, a multi-family house and a residential complex, all to be supplied via water/water heat pumps. This system is referred as a semi-central heat-pump system (HPS), due to the central provision of water as a source of heat for the distributed heat pumps. Two further residential properties and a children’s day centre are to follow by 2019.

An idyll with a green centre is being created in Wesseling, with its central location between Cologne and Bonn: a stream of around 500 metres in length babbles through the residential zone, emptying into a pond system. The central element of the development zone, the water system was installed as long ago as 2014, in parallel to construction of the access roads. The sinking of the suction and return wells, to depths of 28.5 and 25.5 metres, followed. The supply and return lines are installed together in a trench. The battery limit between the supplier and the customers is located downstream the heat exchanger and the appurtenant shut-off valves. When a customer needs heat, the solenoid valve on the return side opens and fluid passes through the heat exchanger, in order that the heat pump can obtain energy from the water fed. The heat pumps in the residential properties are also used to generate hot water.

Water plays a central role in this residential zone. Precipitation water is routed via channels, near the surface, to “green fingers”, where it is discharged into a central percolation system (“green centre”). Also in the green centre is the course of the artificial stream, which is partially fed from return-side water from the heat-pump system and from precipitation water. The stream is designed for a maximum feed rate of 10 litres per second. Its water flows are not always sufficient, and it is therefore also fed with groundwater from the suction well. Thanks to the selection of a water/water heat-pump system, the heat supply here also makes its contribution to the topic of water.

Martin Kosub, head of technology at the Stadtwerke Wesseling GmbH municipal utility tells us why the Rhine-side region is especially suitable for this project: “The Rhine-side region offers extremely good hydrogeological conditions. The groundwater depth in the vicinity of this development zone is around 10 metres below the surface of the site. The groundwater aquifer is 15 to 20 metres thick, and thus has very high water yield”.

Current investment costs total around 785,000 euros (net) for both construction phases. The “Klimakreis Köln” climate initiative in Cologne has announced funding of 91,600 euros for this project. Additional funding by the Federal Office for Economic Affairs and Export Control amounts to 4,000 euros per heat pump. Also to be added are the subsidy for the district heating substation and the building service connection provided by the state of NRW via progres.nrw, amounting to 1,500 euros (up to 25 kW).
E-mobility: Charging-station funding starts

Climate-neutral efficient road traffic: electromobility is becoming ever more important for the energy turnaround in North Rhine-Westphalia. Electric vehicles make it possible, on the one hand, to significantly reduce pollutant and noise emissions, and thus to improve the quality of urban life in the long term. This development is also, on the other hand, economically important for the automotive and subsupplier industries located in NRW. In order to relieve the burden of CO₂ emissions in inner city areas, the NRW state government has, since 16 October 2017, begun subsidising private and corporate charging infrastructures such as Wallboxes and stationary charging stations with a charging capacity of a minimum of 11 kilowatt (kW) and a maximum of 22 kW.

And electromobility has other benefits, in addition to saving the climate: consumption is much lower, and therefore cheaper. Only 10 to 20 kW are needed to cover a distance of 100 kilometres - equivalent to only around two litres of fuel. Electric-car drivers can also leave out a good number of visits to the workshop: electric motors have fewer moving parts to suffer wear, and therefore require less maintenance and fewer replacements.

The specific scope of funding for the immediate-action program covers 50 per cent of eligible expenditure or a maximum of 1,000 euros (upper funding limit) per charging point on the forecourt or private park place. Public charging stations are also subsidised 50 per cent or up to a maximum of 5,000 euros per charging point. Eligible expenditure includes, inter alia, the costs for the charging station, the power electronics, the mains connection, plus installation and commissioning. Applications for funding must be approved prior to installation of the charging station, and only then can a contractor be commissioned for installation.

The source of the electricity is also relevant for the environmental balance, with the result that electric vehicles are, in particular, climate-preserving if operated on “green” electricity. It is therefore a precondition for application that “green power” or regenerative power produced on site be used. All electricity tariffs are permitted, for the time being, up to 31 March 2018. Funding is, however, then reduced to 30 per cent. Further information and application documents can be obtained at the www.progres.nrw.de Internet site or requested via e-mail from nrwdirekt@nrw.de.

www.energieagentur.nrw/elektromobilitaet-in-nrw
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MEET researching dual-ion battery systems
Electricity storage systems are an essential supporting element in the new energy system in the context of the currently ongoing system transformation. The MEET battery research center at the University of Münster is researching a storage system based on dual-ions in its INSIDER project. The project is notable, in addition to research into suitable electrolyte materials, for the development of a new functional mechanism for the electrolyte. The electrolyte functions as a transport medium and as an active material in dual-ion batteries. The modified battery systems have a high cycle durability.

Hydrogen Research Award
Mobility topics will be the focus at the 17th annual meeting of EnergyAgency.NRW’s “Fuel Cells and Hydrogen, Electromobility” in Düsseldorf’s Hilton Hotel on 30 November 2017. Current advances in setting-up the necessary infrastructures and in vehicle fleets will be showcased. An additional highlight will be presentation of the NRW Hydrogen Research Award by the state’s economics minister, Prof. Dr. Andreas Pinkwart. Bachelor and Master’s theses and dissertations from institutions of higher education in NRW on the fields of the fuel cell and hydrogen will be rewarded here. This award is intended to underline the importance of hydrogen as a source of energy for the energy turnaround.

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Geothermics: Certificates for Krefeld and Hövelhof
The city of Krefeld and the municipality of Hövelhof were both awarded certificates for the installation of additional new geothermal heating system during EnergyAgency.NRW’s 13th NRW Geothermal Conference held in Bochum’s Jahrhunderthaus. According to data supplied by the State Environment Agency (LANUV), Krefeld installed the most geothermal heating systems in 2016 - a total of 130 installations went into operation in the city last year. Hövelhof, in the County of Paderborn, was the winner in the “Municipalities” category, for the installation of thirty new geothermal heating systems in 2016. The State Environment Agency registered installation of a total of some 3,500 new geothermal heating systems in 2016, an increase in new installations by more than 20 per cent compared to 2015.

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E-world energy & water 2018 focuses on the Smart City
The E-world energy & water, taking place from 6 to 8 February 2018, will again be a forum for the energy industry. The trade fair here will focus on the topic of the Smart City. The NRW economics ministry (Hall 3, Stand 370) will also be there, together with EnergyAgency.NRW and the EnergyRegion. NRW clusters EnergyAgency.NRW and the two clusters will be organising their 22nd “Future Energy” technical congress on Tuesday, 6 February 2018. Exhibitors and visitors are invited to close the first day of the fair with the NRW Evening on the state stand at 6 p.m. on 6 February 2018.

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