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CEF conference: Research for energy turnaround
The upcoming restructuring of energy supplies confronts society with great challenges, and necessitates new solutions in all fields of technology. On 29 October 2014, the Cluster EnergyResearch.NRW (CEF. NRW) will discuss these challenges for energy research in NRW with the state’s science minister Svenja Schulze and high-ranking experts in Düsseldorf under the title of “Research for the Energiewende (energy turnaround)”. Further information: www.cef.nrw.de

1st Westphalian Energy Forum in Dortmund
The first energy forum specifically for Westphalia is to be held in the Dortmund Chamber of Craft Trades’ Hansemann Training Centre in the Barbarastrasse on 4 June. The Dortmund Chamber of Commerce and Chamber of Craft Trades, the city, with its Bureau of Economic Development, and the South Westphalia University of Applied Sciences are the organisers. The forum will focus on the best routes to the energy turnaround on the electricity and heat market, and on experience in energy management. Prof. Dr. Fritz Vahrenholt will present the opening address, entitled “Energy policy is more than just climate protection”. Attendance is free of charge. Internet information: www.energieforum-dortmund.de

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Everyone knows that there can be no energy turnaround without energy storage - the critical renewable sources, wind and solar energy, are dependent on the weather and the time of day. Pumped storage power plants, or PSPs, for short, are the only storage technology currently available on a large commercial scale - in terms both of capacity and of energy. PSPs are nothing more than gigantic batteries with an electric motor driving a pump which raises water from one basin at a lower level to another basin at a higher level. When the system is reversed, the returning water drives a turbine, causing the stored potential energy to be converted back to electrical energy by the generator. This method makes it possible to match the fluctuating load curve of continuous electricity production in conventional power plants.

Solar-power installations have disrupted this "business model", since the load peak at midday coincides with their production peak. So why continue with PSPs? Firstly, as 1-hour or 1-day storage facilities to cover short-term lack of wind or sunshine, or in conjunction with a decentralised supply system. It would be illusory to think that gaps of several days in the TWh range due to wind calms could be bridged using pumped-storage plants in the GWh range, however. Secondly, for the provision and supply of standby capacity for grid stabilisation. Wind and solar installations are not easily predictable and controllable generating systems. They achieve only greatly fluctuating feed-in, with steep and high gradients in some cases. These facts can be counteracted by PSPs, with a still high efficiency, thanks to their extremely short start-up times, their high load-change rates and their good part-load behaviour. Thirdly: PSPs can contribute to emergency capacity and to making the existing range of power plants more flexible. They are, therefore, a mature technology which also constitutes an essential element in the electricity turnaround.

Pumped-storage power plants are an ideal tool for balancing out deviations from forecasts - but only given appropriate payment. The electricity turnaround will thus also necessitate a market turnaround. But who is to develop this new market concept? Not the state, which has only a guiding and co-ordinating function. Here, all the participants, including the industrial-scale power generators, must act, contributing expertise, farsightedness and an awareness of their responsibility. Time is getting short: all nuclear, and a number of conventional, power plants are to be decommissioned by 2022. Failure of the energy turnaround, or even merely the occurrence of supply difficulties, would be a blot on Germany’s copybook. So who better here to play the pioneering role than North Rhine-Westphalia - the energy state par excellence!
The upper reservoir of the Rönkhausen pumped-storage power plant at Finnentrop.
What is a pumped-storage power plant?

Pumped-storage power plants can make an important contribution to the energy turnaround. The reason: they provide a solution for one of the crucial problems in the energy turnaround, that of storing the fluctuating energy obtained from the renewable sources of wind and sun.

Pumped-storage power plants store electrical energy by pumping water up to an "upper reservoir" and releasing it again through turbines into a "lower reservoir" when needed. The turbines drive generators to produce new electrical power. Energy is therefore stored in the elevated location of the water, and can be fed into the grid again after reconversion to electricity. Pumped-storage plants proved their value in the past because they assist in making the electricity grid regulatable by absorbing surplus electrical energy. They are also useful in permitting more constant loads for base-load power plants, which cannot be regulated so flexibly. "Pumped-storage plants are an option for storing energy not centrally generated, and achieving flexible electricity production. They hold an energy reserve to cover peak demands and can be used to stabilise grid frequency. And pumped-storage power plants are also 'black-start capable', i.e., they can be started up from their shut-down state without assistance from the electricity grid. This is particularly important for getting the grid working again in case of a power failure affecting a wide area", comments Dr. Frank-Michael Baumann, director of EnergyAgency.NRW on the ranking of this technology.

The history of pumped-storage power plants goes back to the 1920s. One of the pioneers who developed the technology for large-scale pumped-storage power plants up to practical relevance was the engineer Arthur Koepchen, who was born in Velbert, in the Lower Bergisch region. RWE AG’s "Koepchenwerk", commissioned in Herdecke, on the Ruhr, in 1930, bears his name.

A classic pumped-storage power plant has the turbine, the generator and the pump installed on a single shaft. When electricity is needed, the water flows through the turbine from the upper reservoir into the lower reservoir and supplies the drive power for the generator which, for its part, yields electricity. When there is a surplus of electrical energy in the grid, the generator functions as an electric motor, driving a pump which returns the water from the lower to the upper reservoir.

The plant’s storage capacity depends on the size of the reservoirs, i.e., on their water content. The height difference ("head") between the upper reservoir and the turbine also influences output. Pumped-storage plants are usually designed to permit the generators to produce electricity at full load for between four and eight hours.

Every pumped-storage plant requires more power for upward pumping than can be recovered during downward flow of the water, however. These losses occur, for example, during the charging and discharging sequences as a result of friction losses from the flowing water, as a result Continued on Page 6 >>>
backing development incentives and the construction of new and environmentally safe pumped-storage power plants in our state”, notes State Secretary Peter Knitsch, of the NRW climate ministry, on the political framework.

Pumped-storage power plants’ ability both to absorb and yield energy makes them particularly important for Germany’s Energy Region Number 1, and for power-plant management, in particular. Pumped-storage plants are notable, above all, for their high flexibility of operation, and they are therefore eminently suitable for the provision of standby capacity. “The generating capacity of pumped-storage power plants can be available within minutes if necessary, and can, in addition, also be flexibly regulated within a broad range”, affirms Stefan Prott, of EnergyAgency.

NRW’s Hydropower Bureau. Pumped-storage power plants, thanks to their “black-start capability”, can generate electricity even during total power failures, and can thus be used to restart other power-generating facilities.

Pumped-storage projects pushing ahead

Pumped-storage projects are currently being pushed ahead fast at a number of locations in North Rhine-Westphalia. Trianel GmbH, an alliance of more than eighty municipal utilities, with headquarters in Aachen, intends to construct a water-storage power plant costing some 500 million euros on the territory of the towns of Höxter and Beverungen by 2019/2020. The feasibility of this project is currently under examination: the councils of the towns involved indicated positive support for it as early as July 2011. The new Nethe power plant is to have a net output of 390 MW, with a storage capacity of 4.2 million cubic metres. Flow will be 195 cubic metres per second, across a head of 223 metres. The Nethe water-storage power plant could meet the annual power needs of around 200,000 four-person households, assuming uninterrupted full-load operation for 6 hours/day. Current planning envisages construction of this water-storage power plant as a so-called “down-shaft power plant”. Here, a shaft of 80 to 100 metres in depth is sunk using well-drilling methods. The turbine is located at the base of the shaft, having
been lowered into it from the surface by means of cranes.

“Compared to other storage methods, pumped-storage power plants are established technology, have a high efficiency, and high projected cost-effectiveness. They are, what is more, technically mature and have been proven in practice over decades”, says Prott, summarising the benefits that underscore the project. These, however, should not blind us to the fact that the “design” of the current electricity market means that no decisions in favour of investments in new pumped-storage projects can be taken at present.

According to Trianel studies, the site in the County of Höxter is one of the three best locations anywhere in Germany. Of particular importance: the Nethe water-storage power plant enjoys remarkably high acceptance by the populations of Beverungen and Höxter. One of the greatest challenges concerning the lower reservoir here is protection of the Amelunxen and Ottergen urban districts against flooding. Trianel has submitted to the municipalities involved an undertaking not only to maintain anti-flooding provisions in their present form, but to significantly improve them, if the project goes ahead.

HOCHTIEF Solutions AG is pursuing another pumped-storage project in North Rhine-Westphalia, in the Lippe District. Upper and lower reservoirs with a head of around 300 metres are to be constructed. The pumped-storage power plant, with a volume of recirculating water of 2.5 million m³, would have installed capacity of 320 MW. Given taut planning, approval and implementation, the plant could go into operation as early as 2021. Even during the development phase, HOCHTIEF is backing early, transparent and prompt information for the public. In addition to the Lippe District project, HOCHTIEF is also planning the construction of new pumped-storage power plants at three other locations in Germany.

An alliance of North Rhine-Westphalian water authorities, consisting of the Aggverband, the Wasserverband Eifel-Rur, the Ruhrverband and the Wupperverband, has initiated a feasibility study in order to determine the pumped-storage potentials of five selected river dams in North Rhine-Westphalia. The results of the study, completed in 2012, confirm technical feasibility, with outputs ranging from 55 to 700 MW. No significant impairments by existing utilisations of these dams are anticipated. With project costs ranging from around 100 to more than 600 million euros, cost-efficiency cannot be achieved under current market conditions, however. No investment decision in favour of the implementation of pumped-storage at any of the dams examined has therefore been made up to now.

2. Pumped-storage plants in use

Three pumped-storage power plants are currently operating in North Rhine-Westphalia.

Finnentrop
A pumped-storage power plant was constructed on the Dahlberg hill, near Rönkhausen, between 1964 and 1969. The upper reservoir has a total capacity of 1,034,000 m³, while the lower reservoir holds 1,320,000 m³. The two reservoirs are connected via a 936 m long headrace tunnel with an internal diameter of 3.60 m. The head is 274 m. Since its commissioning, the 140 MW power plant at Glingetal, near Rönkhausen, has been used to cover peak loads.

The operators are Enervie Südwestfalen Energie und Wasser AG, the Mark-E alliance of companies, the Stadtwerke Lüdenscheid municipal utility, and Enervie Asset Network.

Koepchenwerk
The Koepchenwerk plant on the Hengsteysee lake in the town of Herdecke is an “oldie but goldie”. Repeatedly modernised - most recently in the 1980s - the project, completed as long ago as 1930, was the second and, at the time, largest pumped-storage project in Europe, and is now Germany’s oldest operational plant of this type. The Koepchenwerk is a peak-load hydropower plant. When there is surplus power in the grid (at night, for instance), water is pumped from the lake up into the upper reservoir a good 160 m above. When demand for electricity rises again, the water flows through pipes and a large...
for abandoned coal mines. Height differences ranging up to 1,000 m into the earth provide potentials for the use of decommissioned mine shafts as energy-storage facilities.

In the 1980s, the Dutch government commissioned the Technical University of Delft to research underground water reservoirs around Limburg. This resulted in the concept of creating storage capacity in former mines. The use of abandoned mines as underground storage facilities is now also being investigated by scientists at universities in the Ruhr region. Working title: "Development of a practical concept for the use of mining-industry facilities as underground pumped-storage power-generating plants". The University of Duisburg-Essen, the Ruhr University of Bochum and the Rhine-Ruhr Institute for Political Research and Social Consultancy are playing the leading scientific role here, while the RAG mining corporation and DMT GmbH & Co KG are the co-operation partners from industry. Not all underground passages are the same, however: totally different conditions apply in coal mines than in ore deposits, for instance. One reason for this can be found in the differing stabilities and densities of the rocks encountered. Following initial investigations, the participating bodies are cautiously optimistic, however; according to Prof. Dr. André Niemann, of the University of Duisburg-Essen, speaking recently at a conference organised by the UA Ruhr alliance of universities and EnergyAgency.NRW, there is much to indicate that technical feasibility exists. So it’s quite possible that some abandoned mines may be “reactivated” - as lower reservoirs for a pumped-storage power plant.

The use of pumped-storage on mining spoil heaps is also under discussion. On the basis of a feasibility study commissioned by RAG and RWE Innogy, the two companies have since 2011 been examining the question of whether the Sundern spoil heap, near Hamm, could be the future site of a pumped-storage power plant operating in combination with wind turbines. RAG and RWE assume an output of 15 to 20 MW. The head is to be some 40 m, with a storage capacity in the upper reservoir of around 600,000 m$^3$. This project is not being pursued for the time being, however, due to currently prevailing economic boundary conditions.

The Koepchenwerk plant on the Hengsteysee lake in Herdecke

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The Sorpe dam and reservoir near Sundern, in the hilly Sauerland district, were originally planned for water-control purposes; a pumped-storage power plant was nonetheless integrated during the 1925 to 1936 construction period.

The effective head between the upper (reservoir) and the lower reservoir (surge tank) is 56 m. The two spiral Francis turbines have a displacement volume of 8.1 m$^3$/sec. Each generator set has an output of 3,600 kW.

In low-load operation, the turbines are operated as pumps and the generator as an electric motor. The latter has a rating of approx. 3,000 kW in this mode. Average annual energy generation is around 11.5 million kWh.

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3. Research into pumped storage

The essential feature of pumped-storage power plants is generally their greatest drawback: they need a height difference, a “head”, i.e., special topographical conditions. There are both underground and surface alternatives, however. This is how highly-regarded researchers envisage the future of pumped-storage power plants in the Ruhr region in times of structural change: underground pumped-storage installations as a follow-up utilisation
Solar-diesel hybrid: Old and new bear efficient fruit

In practice, “energy turnaround” does not mean a strict “either/or” choice between fossil and regenerative energy sources. The combination of the old and the new can in some cases bear astonishing and, above all, efficient “fruit”. The Düsseldorf company Rheinland Solar GmbH & Co. KG produces surprises with its solar/diesel hybrid system. We asked managing director Oliver Loritz what is behind this technology.

Mr Loritz, what is a solar-diesel hybrid system, and how does it work?

In many parts of the world, reliable power generation is possible only using diesel-powered machinery, because there is no public transmission grid. Fuel prices have risen drastically in recent years, however, with the result that costs for fossil-based power generation are now significantly above those for production using a solar-energy system. In addition, the costly transportation and local storage of fuel also complicate power generation from diesel-based systems alone.

A hybrid system combines the advantages of controllable generation using diesel-powered machines with the lower-cost, reliable solar-energy source. Combining diesel generators with photovoltaics systems makes it possible to save up to 40 per cent of high-cost fuel. This is because the new, smart fuel-save technology from SMA assures a stable system at all times. High-returns investments in hybrid systems generally pay back within two to four years.

What gave you this idea?

Rheinland Solar is a medium-sized enterprise with around twenty employees, and has specialised in the planning and installation of photovoltaics projects and storage systems since 1996. In the context of international expansion, we installed Germany’s first pilot diesel-hybrid system in cooperation with Energiebau Solarstromsysteme GmbH. We consider the combination of these two technologies to be ideal for use in high-sunshine regions that are remote from supply grids. We decided to market this fuel-save technology internationally while considering how to apply our many years of experience in the planning and installation of photovoltaics systems to other sectors. We have succeeded in finding a high-ranking partner in the diesel-systems field, one with whom we can jointly conduct design, planning and installation activities. Customers in Indonesia, Chile, Angola and Morocco have put their trust in our experience and are now using these systems successfully.

Would use also be conceivable in NRW? Where, for example?

The first system has already been installed in NRW, but it is only a pilot installation and a showcase. This application is especially suitable for remote regions, since diesel-hybrid technology makes it possible to reduce diesel-fuel consumption by up to 40 per cent during the day. This technology has a future in sunny regions where electricity is produced using diesel-powered generators. We would be pleased to advise internationally active companies from NRW on the potential applications.

Is any practical experience on climatic impact and cost-efficiency available?

Cutting fuel consumption reduces CO₂ emissions and achieves a smaller carbon footprint per megawatt hour generated. In addition, less operating hours means less wear and longer service-lives for the diesel-powered generator sets.
**Energiewende in miniature**

Hinrichs Edelstahltechnik is domiciled in Harsewinkel. Founded more than ten years ago as a one-man operation, the company now employs six people. It makes, from stainless steel, everything the customer’s heart might desire: from systems for the foodstuffs and pharmaceuticals industries, up to and including exclusive interiors and even speakers’ rostrums. Around one year ago, CEO Christian Hinrichs had a wood-pellet heating installed for the large building used both for production and as office space. This 105 kW system replaced an obsolete gas-fired predecessor. Hinrichs was kind enough to answer our questions on the reasons for and benefits of this miniature energy turnaround.

What were your reasons for changing to wood pellets?

Our building used to be heated using gas. The old condensing-type gas appliance had an extremely poor efficiency, however, and this caused unnecessarily high energy costs. The old system was also very labour-intensive, particularly for its maintenance and management. In addition, we wanted to change direction and back renewable energy. We looked for an alternative which would be more economical in the long term, since we wanted to supply not only the existing 500 m² building, but also a planned extension, with heat both cost-efficiently and sustainably.

Did you consider any other renewable sources of energy, apart from wood pellets?

The choice was between wood pellets and wood chips. We had to exclude the latter, however, since we do not have the necessary storage capacities. We then decided on a system supplied by HDG Bavaria.

What’s your opinion of the pellet heating system after one year of operation?

We’ve not had a single problem up to now, and the labour input is negligible. The ash pan is still only a quarter full, which means, at least in theory, that it only needs to be emptied once every couple of years. The storage silo is filled by the supplier, so there is also no work involved for us there, and the heating system itself operates totally self-sufficiently.

You only need to lubricate the bearings after every 150 hours of operation, and that only takes around five minutes. The heating system was serviced recently, a two-man job that took around an hour and a half. Could I be anything but satisfied with our new wood-pellet heating system?

And what economic benefits does the new system have for you?

Our calculations indicate that we’re saving an average of 30 per cent on operating costs compared to the previous gas-fired system, mainly because the new system is not so labour-intensive. We also usually top up the pellet silo when pellets are cheap. The price of pellets didn’t drop significantly during the summer of 2013, however, and rose again anyway in the winter, so the cost benefits were, of course, rather smaller. But we would nonetheless have had to invest more time and money, if we’d continued to heat the building using gas.

EnergyAgency.NRW’s new film on EA-TV in the Internet provides further information on this and other systems: “Practical Examples of Large-scale Wood Pellet Installations”. Information: e-mail peters@energieagentur.nrw.de
...making sure good ideas don’t flop

Many innovative products and services developed for the consumer sector are not taken up by the population at large, despite apparently being of technical, social and financial benefit to the target group. One decisive reason for this can be found in the fact that, ultimately, they do not meet specific needs in everyday routines and existing structural boundary conditions. In many cases, too, they are also used differently than expected, which can result in undesirable (rebound) effects. Extensive market, consumer and sustainability potentials thus remain unused.

Conceptual solution strategies can be found in interactively shaping value chains. This involves user participation in the development of the product or service. It may then be possible to achieve practicable and sustainable innovations. This is where the Europe-wide SusLabNWE project comes in. The project’s essential aim is to determine what mechanisms have resulted in higher energy consumption, despite the introduction of energy-saving technologies (heating systems, showers, flat screens, etc.). The SusLab project in particular targets the creation of the necessary R&D infrastructure. The central research question is: How can a research infrastructure suitable for the user-integrated development, and user-accepted implementation, of basic system innovations be created for energy and resources-efficiency and climate protection at the “micro” level - in companies, households and districts - and also applied to other regions?

SusLabNWE aims to set up a knowledge network of so-called Sustainability Living-Labs, incorporating a new innovation and development infrastructure of research institutions, companies, households and users. The focus is on transdisciplinary research into human/technology interactions in a range of different product, technology and service sectors. The areas of application for Sustainability Living-Labs may be all fields of activity in the development, production and use of goods, e.g. accommodation, food, mobility, information and communications.

The aim of the pilot project is the optimisation of the “heating system/room heat” system on the basis of low-investment modifications.

The project is being funded under the EU’s INTERREG IVP programme, and co-financed by the Ministry of Innovation & Energy 2_2014 of the Ruhr West University of Applied Sciences.

The “Science Box” micro-house, equipped with a bathroom, bedroom and living room, is used as a mini research laboratory at the Bottrop campus of the Ruhr West University of Applied Sciences.

North Rhine-Westphalia and the Innovation City Ruhr/Model City Bottrop are the target regions for the German consortium (Wuppertal Institute, Ruhr West University of Applied Sciences and Innovation City Management GmbH). A preliminary survey, in which data on interior climate was collected and evaluated in more than eighty households, was conducted during the winter of 2012/2013, for instance. This showed that the heating and ventilation behaviour of the residents has a definitive influence on energy consumption. Initial estimates indicate that it is thus possible to achieve energy-savings of up to 30 per cent.

Targets and strategies for the road to sustainable energy generation are also the focus of the EU-funded R&Dialogue project. This consortium of fifteen participants from ten European countries aims to promote constructive dialogue between science and civil society, with the target of evolving a joint European vision of a society with low carbon dioxide emissions. This vision is to be elaborated in co-operation with various associations, citizens’ initiatives and research institutions - in short, with the representatives of the most important interests in the field of energy. In Germany, this dialogue is being managerially organised by the Jülich Research Centre (IEK-STE), in cooperation with the Cluster Energy Research NRW. For further information visit: www.suslab.eu and www.mdialogue.eu
Bioenergy when needed: Biomass energy storage

A high percentage of renewable energy in the energy mix will increasingly necessitate effective storage technologies and flexible systems for needs-orientated energy generation: it will be necessary to balance out time-of-day and seasonal fluctuations in the production of regenerative energy. Biogenic energy sources are also part of the bandwidth of available energy-storage methods, extending from compressed-air storage systems and pumped-storage plants, up to and including various types of battery.

Chemical energy can be stored directly and in large volumes in liquid, solid and gaseous biomass. The solar energy converted via photosynthesis to carbon-containing compounds is incorporated into the vegetable biomass. A number of different conversion processes can be used for the energy-route utilisation of biomass present in the form of regenerative feed materials, agricultural by-products, farm/forestry-waste fertilisers, wood, biogenic waste and sewage treatment sludge. In many cases, the properties of the biomass in terms of energy-density, handling, storability, transportability and the replacement of fossil energy sources are then improved. Take vegetable oil, for example: the oil pressed out of oil-bearing vegetable matter can be stored and used for energy when needed.

Bioenergy on call - to a certain extent, this is also possible using buffer storage systems. Where heat is generated by the combustion of biomass, the hot heating fluid can remain available for the heating circuit for a prolonged time if a storage system is used. The burner is then operated at full load only once the buffer storage system is empty. And what works in a one-family household can also be applied to large biogas plants. The biogas generated can be held in gas-storage facilities for a number of hours. Large digester tanks and spherical gas tanks are capable, depending on their size, of temporarily storing many hundreds of cubic metres of biogas. Where corresponding CHP capacity and control technology is installed, electricity can be generated at times of need. Precisely this principle is applied at Bioenergie Steinfurt GmbH & Co. KG. A number of “satellite” CHP plant units are supplied with biogas from a 2.3 MWel biogas plant via an 8.2 km pipeline. They produce heat for a range of different properties, primarily when the power generated in parallel commands high prices on the electricity market. The operators thus make use of the instrument of direct marketing. In some cases, higher profits are achieved than is possible via purely EEG (Renewable Energy Sources Act) payments at full-load operation.

Probably Germany’s largest energy storage system is the natural gas grid, with its more than 477,000 km of long-distance gas pipelines, and gas pipes in the distribution network, spread around Germany. This system is capable of temporarily storing several billion kilowatt hours of energy. Only few of the 7,515 biogas plants installed throughout the federal republic by 2012 currently use this potential. Just 108 biomethane feed-in plants were upgrading biogas to natural gas quality in 2012, feeding in a total of 413 million standard cubic metres of biomethane into the German gas grid. One of these is the Königs + Nellen Pflanzenenergie installation in Neuss. This agricultural facility produces annually biomethane with an energy content of some 14 million kWh, and feeds it into the natural gas grid.

Various Power-to-Gas routes, which are to make it possible in the future to store surplus electricity from various regenerative sources in the form of methane, are still currently at the research stage. Bioenergy is capable of playing a central role here: in biological methanation, methane is generated via a combination of a hydrolysis system, which uses electricity to generate hydrogen, and a biogas plant, which supplies carbon dioxide as a byproduct of fermentation. Operation of this process is conceivable both within the digesters of conventional biogas plants and as a process employing special high-purity cultures, in separate reactors. In NRW, the Fraunhofer UMSICHT institute, in Oberhausen, is working on process-engineering stages which will optimise the use of biological methanation within electricity-storage concepts to balance out fluctuating energy supplies.

Information: e-mail wuebbeler@energie-agentur.nrw.de
New bio-based economy

The development of bio-refineries is steadily gaining in importance on the road to a bio-based economy. The question of how new technologies for the materials- and energy-route utilisation of wood and straw biomass can be developed is currently being intensively discussed. We took this as an opportunity to speak to Dr. Florian Kremer, director of the Excellence Cluster "Tailor-made fuels from biomass" of RWTH Aachen University on the progress made in breaking down lignocellulose.

What distinguishes a lignocellulose bio-refinery?
The technological concept of the "bio-refinery" promises the particularly resource-efficient use of regenerative feedstocks for the production of chemicals, materials and bio-based fuels. The most complete and waste-free conversion of all materials flows takes place in an integrated process. The "platform" chemicals thus produced are then converted to new, bio-based products - in our case, fuel. This concept is thus similar to that of an oil refinery, but with the additional challenges of the totally different and varying composition of biomass.

What are the expectations from these concepts?
In the simplest form of a lignocellulose bio-refinery for cellulose, the principal aim is higher recovery of useful products from black liquor, via the use of by-products, such as lignin, for example. This could improve the competitiveness of the existing cellulose industry. The lignocellulose bio-refinery for carbohydrates additionally offers the entire potential of the vegetable molecules, but is still only at the development stage. Rational-cost lignocellulose cracking is an important aim in this context. It is currently being studied via the development and optimisation of suitable pilot plants, and is also addressed in the fundamental research work of our cluster.

What options do you perceive for regional materials-flow management?
Here in Germany, agricultural residues (cereal and maize straw), and wood waste, are of particular importance as feed materials. The use of these does not cause any direct competition for resources with food and feeds production. Regional availability plays a decisive role, however. Competing utilisation options can also occur in the case of residues. We also aim to use our expertise to provide technology for lignocellulose bio-refineries abroad, however.

What extra value can partners from NRW offer?
Industrial biotechnology has achieved important advances in the field of fermentable carbohydrates in recent years. In the bio-refineries sector, we are noticing an ever larger number of tendering enquiries, to which we, of course, respond. Such technologies for the efficient use of biomass will be extremely important if advanced future biofuels, in particular, are to assist in decarbonisation in the transport sector. RWTH Aachen University’s Tailor-Made Fuels from Biomass research cluster - backed up by state activities, such as the Bio-Economy Strategy NRW - supports the development of these new growth markets.


Export – Focus on Africa

NRW companies in the renewable-energy sector have now discovered Ghana as an attractive market, and one which is interested, in particular, in all-in solutions for energy. Back-up services, such as maintenance, training and financing, are in demand, in addition to the construction of renewably-energy facilities. Ghana’s economy is growing. Reliable and stable energy supplies are needed to assure continuation of this growth. Frequent power failures, rising energy needs, and the fact that a third of the population does not have access to the electricity grid, urgently necessitate the expansion of capacities and distribution systems.

The Ghanaian government is therefore planning investments totalling some 4.2 billion US dollars. The deregulation of Ghana’s electricity market in 2007 has enabled non-state energy generators to enter the market via so-called “independent power producer” agreements. An Renewable Energy Sources Act became law in 2011, and the corresponding feed-in tariffs followed in 2013. It is the government’s declared aim to double installed capacity to 5000 MW by 2020, of which 10 per cent is to be generated from renewable energy sources. A capacity of 150 MW is planned for solar energy, and 300 MW for wind turbines.

The entire Ghanaian population is also to be connected to the grid by 2020, or have a stand-alone electricity supply. Solutions using renewable energy or hybrid systems are again favoured here. Off-grid solutions are also conceivable in the energy-intensive mining sector. Ghana possesses optimum conditions for solar energy, in particular, with solar radiation rates of 4.4 to 5.6 kW per m² per day and 1800 to 3000 hours of sunshine per year. The government has taken care to create investment-friendly boundary conditions in the form of tax incentives for solar panels and converters, along with other subsidies. Energy-Agency.NRW and NRW International are planning a business trip to the “WACEE” fair in Ghana this November.

Further information: Julia Dierl, Energy-Agency.NRW, 0211/86642-291
Offshore rotor blades still growing

They look enormous - the offshore rotor blades which harness the sea wind and convert it to green electricity. Together, three of these around 82 m long ‘sails’ harvest a circular area of 167 m in diameter - equivalent to three soccer pitches. These massive dimensions enable the 7 MW wind turbines to operate at full output for around 50 per cent of the year, yet another stage in making wind energy calculable and base-load capable.

These “white giants” were made by EU-ROS, a developer and manufacturer of rotor blades for wind-power installations domiciled in Berlin, with production plants in southern Poland and on the island of Rügen, and active in this sector since as early as 1996. The company now employs thirty persons in design and 280 in production.

Exposed to enormous stresses
All the stresses which could act on the rotor blade during twenty-five years of offshore operation were calculated during development. Carbon fibre, previously found predominantly in aerospace and motor-sport, is used by the tonne, due to the extreme size and enormous loads. This material is exceptionally stiff, and thus makes it possible to limit blade weight to “only” 33 tonnes. In addition to its high specific price, it has yet another drawback, however: it is electrically conductive. For this reason, a complex system to provide complete protection of the rotor blade against lightning strikes was developed and tested in minute detail in test laboratories, as were the blades’ structural properties. On the one hand, the blade is bent at maximum load in all four directions. To simulate operating loads, it executes a total of four million oscillations, during which the blade tip deflects seven metres up and seven metres down. A rotor-blade service-life of twenty-five years is thus simulated in four months. The precise accordance of the calculated and the measured data confirms the engineers’ assumptions.

Hand-crafted: making rotor blades
It was also necessary to overcome certain hurdles in production. Rotor-blade manufacturing is largely done by hand. Experienced employees place glass fibre and core materials in dry state in the half-shells of the mould. Impregnation with epoxy resin under vacuum then follows. The manufacturer uses for processing of the carbon fibre a so-called TOW-PREG procedure, which originated in light-aircraft engineering and has been further developed for rotor-blade production. After curing, the two half-shells are positioned one above the other and adhesively bonded. The workers do not grow in parallel to the dimensions of the blade, however, and it has therefore been necessary to modify existing production processes and tools, or develop new ones.

Slender low-wind blades
The technological advances made in this special offshore project also benefit new land-based development, of course - particularly in the 2 to 3.5 MW range, with rotor diameters from 100 to 135 m. Since the highest-yield locations have now all been taken, project planners and wind-turbine producers now demand long, slender, lightweight low-wind blades, which achieve good yields even at lower wind velocities. Increased length also means increased stresses, however, for which reason the materials must be used even more efficiently. Only precise knowledge of structure, materials and local stresses make it possible to economise on materials without sacrificing quality and reliability.
Composites sector: Focus on wind

Many might think that the wind-energy industry meets up only at wind trade-fairs, such as the recent EWEA, held in Barcelona in early March. Other industries are also involved in wind-energy installations, however. The JEC Composites Show took place in Paris at the same time as the EWEA, for example. It is one of the world’s leading technical fairs for the composites industry, and provides a comprehensive overview of the entire composites value chain, from production of feed and composite materials, up to and including downstream services.

Ultra-light materials will play a large role in the establishment and use of alternative sources, such as wind energy. They permit the efficient utilisation of the latter with wind-power systems and blade aerofoils previously inconceivable.

The renowned JEC Innovation Award in the “Wind Energy” category was presented to SAERTEX, of Saerbeck, at this year’s JEC Composites Show. This research project supported by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety and Projektträger Jülich (PTJ) was started a good three years ago with the declared research target of further automating the manufacture of rotor blades using new production systems. The three participating partners, SAERTEX, the Institute for Integrated Product Development (BIK) of the Faculty of Production Technology at the University of Bremen (the project co-ordinator) and AREVA Blades (Stade) can now be justly pleased at this international recognition of their joint work.

More than 60 m long Rotor blades, and those for offshore wind-energy installations, in particular, nowadays reach more than 60 m in length, and consist mainly of continuous-fibre-reinforced plastics. Layers of glass fibre and carbon fibre with surface areas ranging up to 130 square metres must be positioned without folding one on top of the other, transferred to a mould, and then bonded with man-made resin. The preparation of these layers is done mostly manually even today, and is extremely labour-intensive and prone to error. The layers must be correctly shaped as quickly and accurately as possible, with no kinks or dislocations. Thanks to a combination of automated cutting, automated deposition of the materials and the use of preform technology, these operations are now set to become easier. Complex 3D components are geometrically defined using computer-assisted development methods. Supported by sensor systems, computers firstly control cutting of the fabric to size, after which it is automatically adjusted to the required form (preforming) on a special, recently developed shaping table. This system sufficed to convince the JEC jury members.

Coating products Yet another application is the coating of rotor blades. 3M, of Neuss, produces structural adhesives, sealing compounds and mastics which assure the lightness, mechanical strength and long-term stability of the blades. Special coatings also reduce erosion, thus enhancing the efficiency of wind-power installations. Other NRW composites-sector companies are also enjoying success with their products for wind energy. BWH-Bücker Kunststoffe GmbH & Co. KG, of Emsdetten, supplies nacelle and boss claddings, for instance. ILME GmbH, of Wiehl, produces salt-spray-resistant lightweight connector housings suitable for use in offshore installations, in particular. This year’s JEC Composites Show in Paris demonstrated that wind energy is an ever more important market for the composites industry.
The transformation of our existing energy system into an energy supply with major elements based on decentralised renewable energy sources will necessitate fundamental changes in electricity grids. This applies, in particular, to medium- and low-voltage distribution grids, since they receive a major portion of decentralised wind and solar power feed-in. New consumers, such as heat pumps and electric vehicles, must be added to this. These significant changes in grid utilisation will also generate increasingly large volumes of data relevant for management of operation and the maintenance/expansion of power grids. These challenges can be mastered only using modern information and communications technology (ICT).

The Cluster EnergyResearch.NRW, in co-operation with the Cluster ICT, has founded an Energy & ICT workgroup, the aim of which is the definition of the challenges anticipated at the ICT/energy interface, and the evolution of conceptual solutions.

One of the priorities is the attainment of NRW’s climate-protection and emissions-prevention targets. “We need, not least of all, to transfer the anticipated growth in freight traffic to other modes, such as inland waterways, for instance. LNG could be an environmentally friendly and, at the same time, economically rational alternative for shipping and heavy-goods vehicles. We therefore consider it necessary to explore the economic and ecological potentials, both for North Rhine-Westphalia and, across the border, for our neighbours in the Netherlands”, comments Dr. Frank-Michael Baumann, Director of EnergyAgency.NRW. Inland shipping is even now an environmentally relatively low-impact transport system. According to information from the Federal Waterways and Shipping Administration (WSV), the distance a tonne of freight travels by ship is 3.7 times greater than for a lorry, for the same energy input. In other words: if a lorry carries a tonne of goods 100 km, a ship will carry the same tonne 370 km using the same amount of energy. As the WSV states, inland shipping has a correspondingly low share in total goods-traffic pollutant emissions, since it possesses the lowest specific energy consumption of all modes of transport. CO\textsubscript{2} emissions from a river-going ship, for example, are 33.4 gram per tonne-kilometre. Inland shipping carries an annual around 25 per cent of all long-distance domestic freight traffic.

The use of LNG generates numerous environmental benefits: no fine-particulates emissions, no SO\textsubscript{2} emissions, 80 to 90 per cent less NO\textsubscript{x} emissions, and a CO\textsubscript{2} saving of 10 to 20 per cent. The addition of biomethane could result in a cut of up to 80 per cent in CO\textsubscript{2}. A number of challenges remain to be overcome if LNG is to be used on a larger scale as a climate-friendly and environmentally friendly fuel for shipping, however. Germany as yet does not have a single LNG bunkering terminal for fuelling of ships, for example.

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Solar research and test centre for Morocco

The German Aerospace Centre (DLR) is evolving on behalf of Masen (Moroccan Agency for Solar Energy) a plan for a research and test centre for solar energy in Morocco. This centre’s long-term aim is the setting-up of a competitive solar industry in this North African country. The project is a component in Morocco’s “Solar Plan”, under which solar power plants with an output of 2000 MW are to be installed by the year 2020. The project is receiving financial support from the German government, routed via the German Agency for International Cooperation (GIZ) GmbH. Solar power plants have the potential to capture a significant share of total power supplies in sunshine-rich Morocco.

One possible location for the new research centre is the city of Ouarzazate, where construction work on the first solar power plant under Morocco’s Solar Plan, a parabolic-trough installation with an output of 160 MW, has been ongoing since May 2013. The overall complex is to be expanded to 500 MW by 2015, with solar-tower and photovoltaics power plants also planned, inter alia. The DLR Institute of Solar Research is now developing a concept for a test centre at which research into efficient and rational-cost solar power plants for power supply, and into desalination plants, in Morocco is to be conducted.

The DLR researchers are also evaluating the potential wealth creation of a Moroccan concentrated solar power (CSP) and photovoltaics (PV) technology industry in the context of this project. The emphases are therefore also on basic and further training in the construction and operation of solar power plants, alongside the research activities. Mustapha Bakkoury, the president of Masen, attaches great importance to the establishment of research capabilities in his country: “In the Moroccan Solar Plan, our country has set a clear signal for the expansion of solar energy. We are very pleased to be able to build on the know-how of the DLR in setting-up our solar research and test centre. It will enable us to intensify co-operation between European and North African researchers even further, and to promote the establishment of a competitive solar industry in Morocco”.

Electrobus for Münster

The City of Münster aims to increase renewable energy’s share of overall power consumption to 35 per cent by 2020. The transport sector is also to make a contribution. For this reason, the first electrically propelled public-service bus is to start CO₂-neutral operation this summer.

The electrodebus will cover around twelve kilometres in each direction. Quick-charging stations have been installed both at the municipal utility’s depot and at the two terminal stops. These recharge the battery mounted on the vehicle roof, which has a storage capacity of some 86 kilowatt hours. Up to 50 kilowatt hours can be charged into the battery in only around five minutes. This high kW output and the short charging times mean that the changeover to E-buses will have no negative effects for the bus timetable or for passengers.

All this has been made financially possible by an EU promotion project entitled “ZeEUs” (Zero Emissions Urban Bus Systems). Electric buses employing a range of different technologies are being tested by a total of forty project participants in eight European cities. The project is to receive funding of 13.5 million euros from the EU up to 2017.

RWTH Aachen University’s Institute for Power Electronics and Electrical Drives (ISEA) is co-ordinating the E-bus demonstration within the framework of the “Electrochemical energy conversion and storage-system technology” (ESS) research group. The Institute for Fluid Power Propulsion and Control Systems (IFAS) at this university developed the innovative charging-station/bus connecting technology.

Information: www.kraftstoffe-der-zukunft.de
Arnsberg administrative district: more European Energy Award

The passing of NRW’s Climate Protection Act in 2013 brought the state’s municipalities and their endeavours in the field of climate protection into sharper focus, also acting, as they do, as an example for their citizens. To perform this function, many towns and cities throughout the state are making use of tools which will enable them to present their own energy balances and their climate-protection activities. Alongside climate-protection concepts, the European Energy Award (eea), a quality-management and certification system for sustainable energy and climate policies in the municipal context is an attractive option. The special benefit: municipalities can permanently improve their climate balance by means of a process-orientated graph, and have it checked and certified via an audit. In the ideal scenario, these efforts will then conclude with the receipt of the award.

In the Arnsberg administrative district, it has, above all, been the independent cities, such as Dortmund, Bodum and Hagen, that have been successfully participating in the eea programme for many years, and have repeatedly achieved certification. In order to also take the rural regions of southern Westphalia on board, the Arnsberg administrative district (Renewable Energy Project Group) and EnergyAgency.NRW (Climate. Networker) decided in 2013 on the holding of information events for municipal representatives, as a joint project for the counties of the Arnsberg administrative district. The organisers also received support from the municipal side, and had speakers report on the eea in practice. The project closed with a large concluding event in Arnsberg, at which the leading figures in the district government were also represented.

The fact that the eea long ago became a success story in NRW is demonstrated by the evaluation report submitted by the state’s climate ministry in 2013. This report confirms that municipalities that participate in the eea are able to achieve energy-consumption savings potentials significantly higher than the state average. The state supports municipalities’ participation in the eea by means of its progres.nrw funding programme, with the Arnsberg district government. EnergyAgency.NRW organises the eea in NRW and presents the award to certified municipalities within the state. Information: Marcus Müller, Climate.Networker for the Arnsberg administrative district, e-mail marcus.mueller@energieagentur.nrw.de

Heating sector backs efficiency and sustainability

The last “Sanitation, Heating, Air Conditioning and Renewable Energy” trade fair in Essen told the whole story: efficient, cost-saving sustainable solutions are in demand throughout this industry. Energy-saving heating technology aroused particular interest, however. Among other things, the industry was showing recent developments in biomass-based heating systems. Austrian manufacturer KWB, for example, unveiled a new high-performance burner which automatically detects fluctuating fuel qualities and optimally adjusts grate-speed and air supply accordingly. Combination with a special combustion-chamber geometry then permits the achievement of efficiencies of up to 96 per cent, and exceptionally low emissions.

Operators of heating systems and furnaces with poorer waste-gas readings had the opportunity of obtaining information on filter technology from Schräder Abgastechnik, of Kamen. Schräder highlighted an electrostatic separator which reduces fine-particles levels by up to 80 per cent and can even be retrofitted to existing furnaces. Another pioneer in pellet-fired heating, ÖkoFEN, showcased a convenient and innovative controller which opens up new energy-saving options for the operators of solarthermal systems. The heating-circuit controller evaluates weather data live on-line and suppresses activation of the heating system when the weather forecast is good. Only free-of-charge solar energy is then used to heat the system’s buffer storage tank, saving costs for heat supplies. Information: e-mail doerr@energieagentur.nrw.de

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CHP in use – a funding balance

Johannes Remmel, NRW Minister for Climate Protection, Environment, Agriculture, Nature Conservation and Consumer Protection, gave the starting signal for the NRW CHP Impulse Programme in January 2013. The state government envisaged from this programme an increase in the percentage of electricity generated in the state using CHP installations to 25 per cent by 2020. The balance drawn after the first year is highly respectable. Two new state-government promotion instruments have been introduced as central elements in the impulse programme.

These are, on the one hand, the NRW/EU.CHP investment subsidy, which is financed from the progres.nrw “Rational Use of Energy, Renewable Energy and Energy-Saving” programme. This promotes high-efficiency decentralised CHP installations of up to and including 50 kW, or wish to install new systems, and who also themselves operate the subsidised CHP installation, are eligible to apply.

Around one year after the introduction of these funding instruments, an initial, positive, balance can be drawn. According to the funding statistics of the Arnsberg district government’s approval body, a total of 571 approvals were granted for the NRW/EU.CHP investment subsidy in 2013. An average amount of 8,000 euros per approval results, at a total funding expenditure of approx. 4.6 million euros. The system sizes most frequently subsidised (167 approvals) vary between 4 kW and 10 kW output. The majority (151) of the 571 approvals were granted in the Münster administrative district. Total newly installed output from installations funded with NRW subsidies amounts to some 414 MW.

An equally positive balance also results for the NRW/EU.CHP investment loan for 2013. Loans totalling some 12.4 million euros were approved for the financing of a total of thirteen projects.

In addition to the programmes operating since early 2013, investments in high-efficiency CHP installations with an electrical output of 20 kW were subsidised by the regional government via the “progres.nrw Market Launch” programme. This funding source is addressed to private persons and municipalities. A total of 441 approvals, with funding amounting to approx. 900,000 euros, was granted via this programme in 2013. In addition, projects for the development of energy technology to permit rational use of energy and the utilisation of inexhaustible energy sources, and for the demonstration of newly developed energy technologies, can also be funded via the “progres.nrw Innovation” programme. Applications can be submitted to Projektträger ETN at the Jülich Research Centre.

The corresponding guidelines for the Innovation Programme were recently extended by three years, up to 31 December 2016. Information and advice on these funding programmes can be obtained from Energy Agency.NRW at www.kwk.nrw.de, www.energieagentur.nrw.de (Fördernavi) and from the NRW.Bank at www.nrwbank.de/ kwk.

More efficiency to cut taxes

The series of free “Energy taxes and ways to cut them by increasing efficiency” events started in April 2014. The concept of these events was developed for small and medium-sized enterprises by EnergyAgency.NRW in co-operation with the NRW Efficiency Agency and the NRW.BANK. The events feature specialist addresses by the three institutions: EnergyAgency.NRW, highlighting savings potentials and needs for action in the field of energy taxes, the NRW Efficiency Agency, reporting on resource efficiency in practice, and the NRW.BANK, providing an overview of sources of funding for efficiency-enhancing projects. Opportunities are also provided for interchange and networking between the participants.
Efficiency buildings and the craving for labels

Facing a choice between “active” and “passive”, we usually choose “active” - because it sounds better. A dull feeling - probably from around the lumbar region - says: “active” is somehow “good”, “passive” is somehow “bad”. But when we, so to speak, add the brain to the lumbar region, there will, perhaps, be a “Just a minute!”. In the case of houses, it is the “passive” ones that are “somehow” better - because they are more energy-efficient. And the same also applies to commercial and industrial buildings. A talk with Bochum architect Dietmar Riecks, of Banz+Riecks, makes it clear that, in energy-efficiency, the label is not always the decisive factor.

You studied at the Technische Universität Darmstadt up to 1991 - the eve of the founding of the Passive House Institute. Were you influenced even then by the passive-house concept?

At university? No! Architecture students consciously avoided the subject of energy in those days. We had heard that the old “living and the environment institute” was also working on architectural topics up there on the Mathildenhöhe. But that had nothing to do with us! And even if we had looked a little closer at the passive-house concept, we would have rejected it, because we would have found its requirements to be restrictions on our creativity.

In Bünde, however, you designed and completed a whole industrial building to passive-house standards, in the form of the Hettich Holding production shop. Have your priorities changed?

No, not significantly. We concentrate on the overall efficiency of buildings. Passive houses focus, initially, on heating needs. The balance is the important thing, and no weak points are allowed. But, when you’re skiing, a tiny hole in your pullover won’t mean that you necessarily get chilblains. Skylights to exploit daylight in industrial buildings are similar: installing them to passive-house standards in industrial buildings would be considerably more complicated and expensive than using conventional types. But I’m a great fan of them, because they improve the building’s overall energy balance and because isolated weak points can be balanced out by the “whole”.

It almost sounds as if you were an opponent of the passive house ...

No, that’s not true either. But “passive house” is a label, and the world is addicted to labels, often without knowing what’s behind them. It’s all part of the times, or of marketing trends. Certificates are channels of communication, and that assists in marketing. Anyone who has a Green Building certificate feels good about it - although he or she may not know exactly why.

But these people and companies do at least have an efficient building, and that is good, isn’t it?

I’d prefer them to build a “smart” building, from conviction, rather than from their need to follow a fashion. This conviction then might result in the perception that it’s not so important to have a label stuck on the wall but, instead, to raise the efficiency of buildings in general. You need creativity for that, and creativity needs freedom. But check-lists and regulations don’t create freedom. I’m genuinely afraid of having too many regulations, because, in practice, they impede the maximisation of efficiency. The next Energy Saving Ordinance will specify the efficiency of building components in even more detail, but this won’t make it any easier to build efficient buildings, and it’s certainly not always logical.

So what standards for efficient buildings do you use for your work, then?

I used to work at Thomas Herzog’s firm in Munich. Herzog is the pioneer in energy-efficient building planning. Our task, in my view, is to evolve from this our own independent aesthetics for contemporary architecture.

And what importance do you attach to Integral Planning?

That, ten year ago, was still a buzzword. Everyone used it, nobody knew what it meant. Integral Planning makes me, the architect, a co-ordinator. I co-ordinate a process of technical optimisation of the building. And I can only recommend it to anyone who has not yet tried it - it’s enormous fun. And, above all, it’s such a great experience when co-ordination at an early stage avoids the frustrating discovery that, in the end, things do not all come together as they should.

In the past, some colleagues have complaint that planners may plan
efficiency in, but that the tradesmen on site lack the necessary skills and qualifications. Is this still true?

No. There are no problems, at least, in the field of high-efficiency industrial construction using the primary material "wood", work which is not entrusted to the carpenter round the corner. The crux, anyway, is testing for air tightness in accordance with DIN 4108. Part 7. And, knowing that, it’s up to me, as the architect, to myself ensure the structurally right solutions.

What part do public subsidies for efficient buildings play? Are they necessary? Or is efficiency still competitive even without them?

Public subsidies always involve the problem that the application and approval procedures before planning and building can start cannot really be reconciled with normal project scheduling. The prospect of subsidies often tends to result in efficient-building projects not being implemented with the necessary speed and the necessary confidence. In fact, energy-efficient building doesn’t need subsidies. Using the Integral Planning process, architects can achieve high-performance buildings that are no more expensive than the customary conventional or only apparently innovative "glass" buildings of current times. The precondition is, however, that architects recognise the primary challenge of our age.

Your commercial buildings reveal a preference for wood. Where did this originate?

The advantages of wood are indisputable. A timber-frame structure functions as a half-timbered design used to, and not only in residential, but also, expressly, in commercial buildings. The space between the wooden members is filled with insulating material, and that is highly cost-effective and efficient.

But not many have got the message yet ...

No, that’s true, most people still think that using wood as a building material is only for the muesli and sandals brigade. But timber-frame building is the future, there’ll be no getting around it if we are serious about increasing efficiency. It is more demanding, in building-physics terms, but it has the advantage that wood does not leave any thermal bridges. What’s more it’s faster and therefore more economical.

What’s blocking the way, the wallet or the brain?

The decision in favour of an efficient building is taken via the brain - because we’re talking about commercial and industrial buildings. In our firm, we’re currently considering buying an electric car and charging it with power from our own PV system at our carport. It’s rational. There are, nonetheless, a few basic doubts. What’s going to happen if the car’s range proves not to be sufficient to get us to an appointment on time, or if the sun doesn’t shine for a good while? We take the bus or the train! Once we have accepted this, the electric car will be just as much a matter of course in our firm as efficient industrial construction.

A newspaper has quoted you as saying that you want even leaner buildings. What do you mean by that?

The leaner, the better. And “lean” means: as little building automation as possible. That, of course, is not a widely held or a very popular view. Engineers who plan building automation systems have no interest in doing without them, because it’s so lucrative for them.

Are these the opinions that once induced a newspaper to refer to your firm as one of the leaders in Germany?

Possibly, I don’t know. And maybe we are in the field of energy-efficient industrial building using wood. But even if we are, we wouldn’t phrase it that way in public.
Fresh ideas for a good climate

What can children do to protect the environment and the climate? What projects already exist? What others are possible? EnergyAgency.NRW and the Detmold regional government are generating new impulses for this topic in East Westphalia-Lippe with the first Climate and Environmental Competition for pupils in years three to six in the region. The focus is on everything that protects the climate and the environment.

“ChildrenIdeas – IdeasChildren”. The competition is addressed to pupils of both sexes in years three to six, and the aim is that of arousing their interest in climate and environmental protection. “We live in a wonderfully beautiful region”, says Bernd Wesemeyer, who supported the project while government vice-president. “A schools competition makes children more aware of this, and it instils in a play-based and creative way the desire to protect animal and plant life, and the landscape”. As he notes, bringing climate protection and school together provides a good opportunity of familiarising the younger generations with this crucial topic and awakening their creative potential. Lothar Schneider, director of EnergyAgency.NRW, continues: “Climate and environmental protection demand commitment by every single individual. The earlier children become interested in them, the more sustained the learning effect is”. Commitment to the environment also pays off in the short term. The three most creative and convincing projects from every school year will be rewarded with super prizes ranging from 200 to 500 euros in value. First prize is a day-trip to the Rietberg climate park. All the winners are to submit their projects to the regional government in October. The awards will be presented by government president Mari-anne Thomann-Stahl and EnergyAgency.NRW director Lothar Schneider.

Monopoly now climate-friendly

Hasbro, of Soest, is one of the world’s leading games and toys manufacturers, marketing such products as Monopoly and Play-Do modelling putty, for instance. The company decided not to adopt the merciless rules of Monopoly for its own corporate policy, however, and instead backs global business ethics principles. Its aim here, among other things, is that of reducing its ecological footprint. One consistent step in this direction has been its conversion of the lighting system in its central warehouse in Soest to energy-efficient LED technology. Hasbro replaced all its fluorescent tubes with LED alternatives. ILS GmbH, Warstein-based planner and supplier, was involved from the consulting right through to the implementation stage. The result: Hasbro very clearly “passes Go” with its, in climate-protection terms, ultra-modern lighting system. Two different technologies were used: the simple route is the “retrofit” solution, which works for lights with a magnetic ballast unit. Here, the fluorescent tube is merely replaced with an LED one and the starter changed. Power consumption is reduced in this case from 64 to 72 W to 25 W. In addition to the rather better luminous efficiency of LEDs (around 110 lumen/W compared to 80 lumen/W in the case of fluorescent tubes), LEDs’ directional illumination, above all, is capable of achieving significant improvements with no losses from the light source. Conversion is more difficult if an electronic ballast unit (EBU) is fitted. At Hasbro, this was the case with 236 luminaires. The light source then needs to be modified, with the operating approval then being transferred to the master electrician performing the work.

The project was completed within four working days without interruption to operations and achieves savings of around 33,000 euros annually. This, set against investment costs of 50,000 euros, indicates a pay-back period of sixteen months. The staff also like the new lighting system, since LED lighting makes their work easier, particularly for order picking. Further information: e-mail buschmann@energieagentur.nrw.de
Power-saving Check: old fridges out in the cold

In low-income households, an ageing refrigerator or an excessively large deep-freeze are frequently among the worst “power gluttons”. On average, the refrigerator alone accounts for around a quarter of household electricity consumption. The “NRW combating energy poverty” model project aims to provide practical help here; tight household finances often also result in a vicious circle in costs and climate protection - old appliances push electricity costs up, but efficient new ones are too expensive. For this reason, recipients of Unemployment Benefit II, social assistance and/or housing benefit in Aachen, Bochum, Dortmund, Cologne and Krefeld are now entitled to a 100 euro voucher against the purchase of an energy-efficient A++ fridge. The precondition: the new appliance must save more than 200 kWh per year, and the old one must be disposed of correctly. Around 150 families have already become cool and calculating energy-savers in this way since the autumn of 2013.

Fridge replacement is a new element in the “Power-Saving Check” project of the Caritas charitable organisation’s mobile energy-advisory services in NRW. Comprehensive trained power-saving helpers firstly determine and analyse the energy and water consumptions of the participating households. During a second visit to the household, the energy-saving items necessary in each individual case, such as energy-saving bulbs, switchable multi-socket strips and flow restrictors, of an average value of 70 euros are installed. In addition, the power-saving helpers - themselves former long-term unemployed persons - provide tips for energy-efficient everyday behaviour in one-on-one advisory sessions. EnergyAgency.NRW is responsible for ensuring that they provide competent and up-to-date technical advice. Fridge replacement augments the previous activities under “NRW combating energy poverty with the power-saving check”. The Germany-wide “Power-saving Check PLUS” also offers a comparable package for low-income households at many locations. Visit the following Internet site for more precise information on the participating locations and on contacts: www.stromspar-check.nrw.de

CO₂ benefits environment at Dortmund supermarket

The Schulenburg REWE Centre in Dortmund-Hörde is setting standards in climate-protection: the supermarket here uses CO₂ in the cooling systems that supply its refrigeration equipment (cooled and deep-freeze) instead of conventional halogen-containing refrigerants, which bear part of the blame for the greenhouse effect. The refrigeration systems are used not only to supply the refrigeration equipment, but also for air-conditioning. In addition, the shop integrates refrigeration with a heat-recovery system which, in combination with a heat pump, supplies the heating. “This concept - a refrigeration system featuring integrated air-conditioning and a heat pump - is the first of its kind in Germany, and has only been installed four times anywhere in the world”, notes Dipl.-Ing. Matthias Kabus, of EnergyAgency.NRW. NRW climate-protection minister Johannes Remmel took the opportunity of seeing it for himself during his Future Energy tour, which also took him to Hörde.

Environmentally friendly halogen-free R744 (CO₂) is used as the refrigerant in the cooling systems. Heating of the shop via heat recovery using a heat pump eliminates the need for additional air-conditioners and heating boilers. Energy-savings of around 35 per cent compared to conventional technology have been achieved here for an extremely low extra investment (less than 10 per cent of the total investment). A calculation indicates, specifically for this shop, annual operating-cost savings of approx. 18,000 euros, and CO₂-savings of some 110 tonnes. The pay-back period is less than one year. FSZ-Nattland GmbH, of Schwerte, developed a complex control system to make the equipment as efficient as possible. “This system is unique in the world in this configuration, featuring this specially developed control system”, affirms Hartmut Brückner, director of the Schwerte company. FSZ-Nattland GmbH is a service-provider and operates a remote service centre manned 24/7 by specialists. In-house software development enables the company to offer its services to its customers on an all-systems and all-sources basis.
Survey: many energy suppliers promoting E-Mobiles

The willingness of energy-supply utilities in NRW to increase the use of renewable energy sources and energy-efficiency by means of their own promotion programmes is falling. EnergyAgency.NRW’s annual survey of 150 regional energy utilities in the state indicated: in 2014, only sixty-nine companies (46 per cent) are offering subsidies for customers in their supply territories. As a comparison: in the previous year, the figure was 55 per cent supporting efficiency technologies and renewable energy with local promotion programmes. “This is the first time in more than ten years that less than 50 per cent of the utilities have offered subsidies. We can only speculate on the reasons for this decline. It is possible that flexibility of changing suppliers is restricted by the ‘customer-tie’ involved in the use of subsidy programmes. These days, customers no longer wish to be tied down for a prolonged period, they want, instead, to be able to react quickly to rises in energy prices by changing their supplier”, surmises EnergyAgency.NRW’s Dipl.-Ing. Günter Neumert.

Where subsidies are on offer, the focus is on the E-Mobile: in 2013, only 30 per cent of energy suppliers supported the purchase of electric vehicles - from an E-bike up to an electric car - but this figure has risen this year to over 85 per cent. The Troisdorf and Werl municipal utilities, for example, provide 1,500 euros toward the purchase of a new electric vehicle.

Subsidies for natural gas remain a “top runner”. Around 84 per cent of the energy utilities provide financial support for conversion of heating systems to natural gas - an increase of 2 percentage points over the previous year. In addition, more than 50 per cent of energy suppliers offer an electricity tariff for heat pumps.

EnergyAgency.NRW has compiled an overview of all promotion programmes provided by NRW energy-supply utilities on its Internet site www.energieagentur.nrw.de (subject portal Subsidies).

Coordination centre for CHP model municipality

In the context of the “CHP Model Municipality NRW” competition announced last year by NRW climate minister Johannes Remmel, a coordination centre for technical and subsidy-related support and advisory services for the participating municipalities has now been set up at EnergyAgency.NRW and Projektträger ETN.

This competition provides subsidies totaling 25 million euros for municipal projects using combined heat+power (CHP) cogeneration. The “CHP Model Municipality NRW” competition is part of the state-wide 250 million euro CHP Impulse Programme. In supporting this programme, the state government is pursuing its aim of increasing the amount of electricity generated using CHP installations to 25 per cent throughout the state by 2020.

The “CHP Model Municipality” competition is intended to support the municipalities in the setting-up and expansion of their CHP generation. Twenty-one municipal projects submitted from among the total of fifty-one participating municipalities have received positive funding decisions. The coordination centre will support the municipalities taking part in this competition. Sabine Schneider, of EnergyAgency.NRW in Wuppertal, is responsible for providing advice on practical topics concerning CHP, while questions concerning funding for the competition and concerning state subsidies will be dealt with by Dr. Manfred Wilms, of Projektträger ETN, in Jülich. In addition to providing technical and funding-related support and advice, the coordination centre will also permit the making of contacts with know-how sources and advise municipalities eliminated from the competition on the implementation of their projects. The winning municipalities’ concepts will be publicised by the coordination centre in a brochure and on-line (www.kwk-kommunen.nrw.de). The competition was unveiled on an EnergyAgency.NRW exhibition stand on the subject of “CHP” at the 21st “Energy Efficiency 2014” technical fair in Cologne (6 to 8 May 2014).

The twenty-one municipalities which received positive funding decisions from the NRW climate-protection ministry for the development of “fine concepts” during the first phase of the competition are Aachen, Alpen, Bad Laasphe, Bergheim, Bielefeld, Bottrop, Brakel, Düsseldorf, Eschweiler, Geldern, Hamminkeln, Herten, Iserlohn, Krefeld, Much, Münster, Oberhausen, Olten and Soerbeck. The joint concepts submitted by Solingen, Remscheid and Wuppertal, and by Ostbevern and Telgte, are also to receive funding.

Information: Coordination centre telephone number: Tel. 0202/24552-795, Contact: Sabine Schneider, e-mail: sabine.schneider@energieagentur.nrw.de, www.energieagentur.nrw.de and Manfred J. Wilms, Projektträger ETN, e-mail: m.wilms@fz-juelich.de.
mission E still on success course

“mission E” developed by EnergyAgency.NRW remains on course for success: the Institute for Federal Real Estate (BImA) is highly pleased at having received an award for this motivation campaign aimed at achieving energy-aware user behaviour.

The German UNESCO Commission has named “mission E” as the project of the UN “Education for sustainable development” decade. This distinction is awarded to initiatives which implement in exemplary fashion the aim of this global United Nations educational offensive: inculcating sustainable thinking and action.

Motivation campaign for energy-aware behaviour

The Institute for Federal Real Estate (BImA) is the central service-provider for federal properties. Its principal tasks are uniform and consistent management of federal properties, property administration and sales, and federal forestry management. The BImA initiated its “mission E” in April 2012, in co-operation with EnergyAgency.NRW. Its aim in implementing this campaign is that of reducing energy consumption in the federal government’s civilian official properties which it manages. At the same time, it focuses employees’ attention on the topics of energy and the environment more sharply by means of disseminator-training events and campaign weeks, and thus also targets sustainable management of finite resources in the employees’ private lives.

Campaign starts at LANUV in Essen

“mission E” has also kicked off successfully at “LANUV”, the NRW State Bureau for Nature Conservation, the Environment and Consumer Affairs (Essen site). The campaign is aimed at motivating all colleagues at LANUV to save energy at the workplace - without sacrificing any comfort or convenience. “mission E” started at LANUV in January with an extensive campaign week which included tours of the offices, addresses, and a well equipped showroom. Energy-aware behaviour at the workplace makes it possible to reduce LANUV’s energy consumption significantly without major investment costs. The authority’s CO2 emissions and energy-costs have, for example, been permanently cut. EnergyAgency.NRW has been and remains a steadfast partner for LANUV’s “mission E”, supported the campaign from the start, and is there to assist LANUV’s “mission E” team at all times.

What are the aims?

“mission E” aims to reduce electricity and heat consumption, and thus also CO2 emissions, caused by the “human factor”. This applies not only to energy consumption at the workplace, but also to employees’ private households - the diverse opportunities provided by the campaign also enable employees to learn how to cut their own private energy consumption without having to sacrifice comfort or convenience. This conserves natural resources, protects the climate, and relieves the burden on each employee’s purse.

More office efficiency

EnergyAgency.NRW has published a new information brochure. Entitled “The energy-efficiency office - Trends for power-savings at the workplace”, it is concerned with boosting the energy-efficiency of office equipment.

Office machines account for around 3 per cent of total electricity consumption in Germany. Information and communications technologies are found to consume more than 10 per cent of electricity in Germany when the energy needs for server operation and computing centres are added. Across Europe, servers alone even now consume a quantity of energy equivalent to the annual output of 3.5 nuclear power plants. This brochure examines potentials for increased efficiency, extending from procurement up to and including use.

Power-saving office technology is on the way. Industry analyses demonstrate that corresponding products and innovative conceptual solutions are increasingly in demand. The market for energy-efficient information and communications technology is set to expand by an average of 51 per cent in the next few years. The installed equipment in Germany will grow steadily as the service industry gains in economic importance, as sectors with only modest computer needs up to now, such as commerce and the manual trades, become increasingly computerised, and as the “fleet” of systems used by educational institutions and authorities is uprated in the mid term.

At the same time, recent studies show that environmental aspects continue to receive little attention at the procurement stage.

The brochure can be downloaded from EnergyAgency.NRW’s Internet site (www.energieagentur.nrw.de/brochures).
**Light in the consultancy jungle**

EnergyAgency.NRW has developed, in the form of its Energieberatung.Navi energy-consulting web navigator (www.energieberatung-navi.de), a handy Internet tool that provides an overview of free and subsidised advisory energy services in North Rhine-Westphalia. The available range is extremely large and diverse.

The new tool from EnergyAgency.NRW’s Consulting department in Wuppertal now provides users in detail with the services they would expect from a subsidised consulting service and informs them what services cannot, on the other hand, be provided, assuring clarity and avoiding the possibility of false expectations. Interested parties can now also obtain information on the costs of the service and the qualifications of the advisors. Where appropriate, there is also a specimen report which additionally shows the customer what “product” he or she will receive at the end of the process.

Great expertise on questions concerning climate-protection is available in NRW. There is an extensive pool of qualified advisors who provide individually tailored services. The new web-navigator does not show this market, and interested persons can research services of this nature by using EnergyAgency.NRW’s provider data-base, for example.

Further information: e-mail: twardowski@energieagentur.nrw.de

**New wind-planning navigator on-line**

In its new WindPlanning.Navi (www.windplanung-navi.de), EnergyAgency.NRW provides an aid on the path through the planning and approval procedures for wind-energy installations. This Internet tool illustrates how the planning and approval procedure for wind-energy installations runs at municipal level, what aspects are of importance at what time, and how the various procedural stages interlock.

With its extensive information and explanations on the expansion of wind energy, the WindPlanning.Navi, which has been developed on behalf of the environment ministry of the state of NRW, is aimed, in particular, at the citizens affected, and also at the towns, cities and municipalities conducting the associated planning. The tool is intended to enable citizens to form an overview of this demanding process, in order to be able to understand and evaluate the processes involved in the creation of a wind-power installation better. The WindPlanning.Navi subdivides the planning and approval procedures for wind-energy installations into the “Potential-site analysis”, “Site utilisation plan” and “Approval procedure” phases. It also indicates how and at what junctures citizens or authorities can influence the ongoing processes.

Further information: e-mail: schulz@energieagentur.nrw.de

**Trial living in a passive house**

Trying it is better than reading about it – this could be the motto for the opportunity offered by the Sommer engineering consultancy. The Lower Rhine firm is offering test living in a passive house in Geldern.

Knowledge of passive houses tends to be extremely academic and theoretical: a thickly insulated outer skin ensure a low U value (overall coefficient of heat transfer), then come multiple-glazed windows that permit only extremely little heat to escape to the outside, maximum air tightness, no heating system, but ventilation and heat-recovery systems instead. And this is supposed to be the basis for a decision on whether one’s future residence is to be a passive house - without really knowing how it feels to sleep with a ventilation system.

The test property is a modern, cubic “Sommer Bauhaus” built to passive-house standards. It has 150 m² of living area, was completed in 2014, and is located on a climate-protection estate in the “Gelderner Nierspark” development zone, not far from the centre of this old Lower Rhine ducal residence town. The idea of suggesting a passive house to potential owners by means of trial residence - or actually attracting them to it - is not new, however. Precisely such an opportunity has already been on offer in Grossschönau, in Austria’s heavily wooded Upper Waldviertel, since 2007, and has been taken up by around 5,000 guests up to now. The IG Passivhaus interest group also offers an overview of trial living in passive houses in Germany, Austria and Italy on its Internet site (ig-passivhaus.de). Costs for a four-person family for two nights in Geldern are 249 euros, by the way - including cleaning after their departure. Further information: sommer-passivhaus.de
More than a third of Europe’s total energy consumption is used for the operation of buildings, mainly for their heating. Building to passive-house standards makes it possible to save up to 90 per cent of this energy. The remaining energy needs can then be easily met using renewable energy sources. Just how that works in practice was the topic examined by the participants at the International Passive House Conference in Aachen in numerous addresses, and also during excursions. Eight tours under the expert guidance of EnergyAgency.NRW were made to twenty-eight selected passive-house properties in the region. Not only residential and office buildings, but also schools and nursery schools, a church and a clinic, threw open their doors. Building clients and users explained the special challenges of the individual new-building and modernisation projects. A particularly impressive example of a multi-family residential complex to passive-house standards was found in the Cologne district of Süll, where sixteen apartments, with an underground car park and two common-user rooms, have been created in an extremely densely populated inner-city location thanks to the initiative of a private consortium of builder-owners. “Not only the technical details, but above all the cost-saving approaches of this concept are of particular interest”, notes Joachim Decker, of EnergyAgency.NRW. “The idea of sharing space, to minimise overall land needs, for example. This is a trailblazing solution for energy-optimised, climatically aware living in densely built-up urban locations”. The new, classical passive-house building for a fire brigade in Aachen demonstrated how to handle high thermal loads in office and other non-residential buildings: the IT systems of the deployment control centre, complete with intensively cooled server rooms, and also the low manning levels, presented a particular challenge during building-automation planning here. Another excursion took its group across the border to Eupen, in Belgium, where there was an opportunity among other things to visit the country’s first passive-house standard university. The building for the “Auto-nome Hochschule” (AHS) independent university is the first stage in a far-reaching project for this region, under which eight educational institutions, totalling some 65,000 m² in area, are to be energy-efficiently modified, extended or built from new.
Workshop “Energy turnaround in the head”

What does dopamine have to do with the success of the energy turnaround? This neurotransmitter, also known as the happiness hormone, is responsible for the “reward” system in our brain. It is decisive for our motivation and our drive, and thus also for behavioural changes. Without the secretion of adequate quantities of dopamine, we remain fixed in our habits - and the targets of the energy turnaround, for example, remain purely dreams. Not only technical know-how, technological innovations, research and political decisions but also, very importantly, we ourselves, with our motivation and our approach to climate protection and our aware use of energy, are the essential protagonists for the energy turnaround.

“You have to like people, otherwise the energy turnaround has no point!”. This statement by engineer Prof. Jörg Probst set the heads of the more than ninety participants buzzing right at the start of the interdisciplinary “Energy turnaround in the head” workshop organised in Witten by EnergyAgency.NRW. Scientists from selected disciplines, climate specialists and other experts met in the inspiring setting of old and modern architecture at the historic Haus Witten to exchange knowledge and experience, formulate practicable principles and reinforce their capabilities for change. The concept and format of the event provided optimum preconditions. Under the sensitive chairmanship of Dr. Matthias zur Bonsen, the stimulating mix of papers and small, highly motivated think-tanks and workgroups quickly generated a creative workshop atmosphere. The impulse addresses alone gave thought-arousing answers to the central question of “How and under what conditions will the energy turnaround take place in people’s heads? How can attitudes and behaviour patterns be changed?”

“Nobody can be changed by mere explanation. People only change if changing involves an advantage or a reward”. With these remarks, Bremen brain researcher Prof. Dr. Gerhard Roth dispelled all illusions that the conscious, thinking part of the brain is responsible for behavioural changes. Instead, the subconscious exerts the greatest influence, and requires a double reward for the abandonment of entrenched habits. Mere appeals to the intellect, he noted, are useless. We are all guided subconsciously by the questions of “What’s that got to do with me?” and “What’s in it for me?”. Not only clearly defined messages, but also the prospect of rewards in the form of savings, bonuses, social standing and the enjoyment of success are therefore necessary to induce involvement in climate protection. His conclusion: Changes in behaviour can be attained only slowly, by means of practice, social integration and credible examples. For Jörg Probst, climate protection is a cultural issue. Before planning and implementing energy-efficient projects in a company, the building-automation expert assesses the people involved intensively, and seeks answers to the questions of their wishes, expectations and capabilities. “Interest, not reason, is the source of any process of change”. Only in this way can personal behaviour and a joint strategy be evolved. Economist Prof. Dr. Niko Paech, on the other hand, advocated radical changes in our consumption behaviour if the necessary reductions in per capita CO2 emission are to be achieved, subsequently tripping off lively discussions on specific project ideas, such as swap meets, communal repair workshops for electrical appliances, and central tool-rental facilities. At the latest after the addresses by educational scientist Prof. Dr. Gerhard de Haan on learning processes and organisation developer Dr. Cornelis Rasmussen on the conditions for successful change management, the climate experts were unanimous in amending the event title to “Energy turnaround in our hearts”. Because, only the stimulation of our emotions activates our reward system, and will bring us further toward the climate turnaround.
Joining in climate protection

The “Cologne saves CO₂” campaign is an appeal for popular participation. Many of the city’s celebrities are setting a good example and committing to climate-protection.

Our response to climate change is one of the century’s greatest challenges. Around 11 million tonnes of greenhouse gases are emitted in the city on the Rhine alone. But every “consumer-on-the-street” has excellent opportunities of saving CO₂.

Just how is shown by the KölnAgenda association on its www.koeln-spart-co2.de participation platform, where citizens can post their personal contributions to climate-protection and obtain tips on saving CO₂ emissions at the same time.

Well-known supporters of “Cologne saves CO₂” include TV star Janine Kunze, cabaret artist Wilfried Schmickler, compere Ralph Caspers (photo) and weather forecaster Claudia Kleinert, who all help in reducing greenhouse gases with their personal behaviour. On this interactive website they relate what they are doing to save CO₂ - by not taking internal flights within Germany, for example, using eco-electricity, using public transport, or reducing their meat intake.

The crucial factor, however, is active involvement by the residents of Cologne and the surrounding region. They are therefore enjoined to participate in “Cologne saves CO₂” and post their CO₂-saving contributions on this participation platform. More than 650 contributions were published within the first three and a half months of the project. Together with the editorial team’s tips for energy saving, they make up an extensive archive of climate-protection ideas for all. And more than 19,000 website visitors have already benefited. The CO₂-saving tips had cut CO₂ emissions by more than 200,000 kg by mid-March. The campaign’s aim is to cross the 500,000 kg mark by the end of September. And this will not only benefit the city’s climate but also demonstrate that the subject of climate-protection has penetrated society and that the unequivocal setting of paths is required both in industry and in politics.

Registered users of www.koeln-spart-co2.de automatically enter a competition once they have submitted at least two CO₂-saving tips. An electric bicycle, an energy advice session, rickshaw trips and other attractive prizes beckon for the winners.

The City of Cologne, RheinEnergie and the Cologne municipal public transport operator are supporting the citizen-orientated “Cologne saves CO₂” climate-protection project. The KlimakreisKöl climate initiative and the Stiftung Umwelt & Entwicklung environment and development foundation are funding it.

Information: www.koeln-spart-co2.de

Climate-friendly music scene in Dortmund

Climate-protection has gained a new facet in Dortmund. The Westphalian metropolis now features another “Green Club”, the FZW, which was awarded the official Green Club Label, certifying energy-efficient events, by EnergyAgency.NRW in March 2014. EnergyAgency.NRW’s climate networker Marcus Müller handed the award over to the FZW operators.

The club was opened as a district community centre by the City of Dortmund in 1968, and has since developed into a focus of innovative pop culture known throughout Germany and offering more than 250 events every year. KfW consultant Andre Fastenrath performed the technical Energy Check, noting an annual savings potential of 17,200 kWh of electricity and 5,100 kWh of heat, equivalent to 4,400 euros in costs, or some 11.3 tonnes of CO₂. He estimated the necessary investments at 13,500 euros, with an amortisation period of a good three years. The organisers of the Juicy Beats Festival and the “Herr Walter” events ship are other Dortmund music-scene members already involved in the Green Club project.

The www.greenclubindex.de provides information on the project throughout Germany.

Information: www.koeln-spart-co2.de
This could have biblical consequences...

If faith can move mountains, what is it capable of with our cars? For the fifth time, the Catholic Diocese of Aachen put it to the test: “Car Abstinence” was the watchword in the run-up to Easter.

And to clear up any misunderstandings straight away: no one meant not drinking and driving - that’s a matter of course, anyway - but instead leaving the car in the garage whenever possible.

OK! When cars enjoy excessive popularity anyway, when they have already long not been the status symbol par excellence, especially with young people, when the apparent David (the good guy) decides to sling a stone at the forehead of the apparently Goliath-like nimbus, it may all result in biblical consequences. “Without a mobility turnaround, there will be no energy turnaround”, declares Renate Müller, chairwoman of the Catholic diocesan council in the Diocese of Aachen on the abstinence campaign, resolutely.

The diocese this year gathered hordes of allies around it, above and beyond denominational and national boundaries, including the dioceses of Trier and Mainz, the Evangelical Church in the Rhineland, in Hesse-Nassau and the Palatinate, plus the Catholic Church in the Grand Duchy of Luxembourg. Also not to be forgotten are other collaborators from the region, ranging from Aachen’s ASEAG transport operators, via the Verkehrsclub Deutschland (VCD) road-users club, up to and including EnergyAgency.NRW.

The campaign’s aim is not to dogmatically demonise the car, however. “But our intention with Car Abstinence is to draw attention to the fact that we do have mobility alternatives”, continues Renate Müller. And she means such totally worldly, even practical, things as car-sharing, bus and rail, or even bicycling. Being is becoming, or: The times, they are a-changing! Long ago, in the days of the Latin monastic orders, Creation was seen as imperfect, and technology was a welcome aid in perfecting God’s work, but our image of Creation has now changed radically. People who do without technology - wherever possible - at least when it causes emissions of greenhouse gases and depletes finite resources are now deemed to be demonstrating “everyday responsibility for Creation”. More than 20,000 motorists subscribed to these views in the past, and participated in previous Car Abstinence campaigns.

This year, numerous excursions - to a CHP plant unit and the NRW Geological Service, for example - were again included, in order to put the maximum of forty days of “abstinence” in a larger context and, perhaps, actually permanently change user behaviour. There was also a platform discussion on the question of “Mobility 2020 – What will move us tomorrow?”. If the organisers aspirations are fulfilled, it will be the car ever more rarely.

Further information: e-mail schulze-beuingsen@energieagentur.nrw.de

Climate networker for Regionalverband Ruhr

Since the start of the year, EnergyAgency. NRW has seconded a climate networker to the Regionalverband Ruhr (RVR) regional alliance of local authorities, in Essen. Matthias Strehlke is a qualified geographer, energy consultant for buildings, solar installation technician and, hailing from Gladbeck, a genuine son of the Ruhr. He knows the energy industry in the “coal pot” region from a number of angles, and has worked at his parent’s firm, for Ruhrgas AG, in Essen, and, since 2001, for EnergyAgency. NRW, on the topic complex of “Energy-efficient and solar building”. Thanks to a series of honorary posts in municipal politics - as a former member of the Ruhr Parliament, for example - the Regionalverband Ruhr is an “old friend” for Strehlke. Information: e-mail strehlke@energieagentur.nrw.de
Study into energy-turnaround project financing

The ambitious energy- and climate-policy targets set in Germany and NRW demand a high level of capital-intensive infrastructural investments in facilities, buildings and power plants. It is becoming apparent in this context that it will not be possible, for at least a part of these projects, for them to be accomplished solely by the market-proven organisations, such as the energy-supply utilities, within the framework of a few major projects. The resultant question concerns the financing of generally smaller, decentralised energy-efficiency and renewable-energy projects. The large number, minute detail, heterogeneity and decentralised natures of these projects, in addition to their linking to specific sites, present decisive financing challenges.

To approach this crucial question and validate existing innovative financing routes, prognos AG, in co-operation with svs Capital Partners GmbH, investigated on behalf of EnergyAgency.NRW twelve already completed projects and products in the categories of “Contracting and PPP”, “Participation models” and “Financial instruments”, and also various institutions operating on the financing market.

The terms “Contracting” and “Public Private Partnership” (PPP) are used when not only planning and installation, but also operational management, financing and the supply of various media, or the modernisation of technological building equipment, are outsourced to a professional service-provider. Of particular importance in this context is the phase of project initiation and development under the guidance of an accepted personage. This is decisive in ensuring a well-founded flow of information, in the identification and evaluation of potentials and risks, and in the expediting of the project. Contracting projects are funded predominantly by means of a “classical” project-financing model but can - particularly in case of high publicity and acceptance relevance - also be conducted with the involvement of citizens or by means of so-called “crowd investment”.

Where the focus is on publicity and acceptance relevance in energy projects, participation models - this term denotes here projects involving organisational and financial participation by citizens - plays a key role. In these models, too, special importance attaches to the phase of project initiation and development under the guidance of an accepted person. It is crucial here that the complexity of the technical, economic and legal interactions be capably handled and communicated to the citizens.

Various financial instruments, such as certificates of deposit (CDs), subordinated loans and crowd investment are options when the capital-investment aspect is the focus of participation models. It is decisive here to offer an easily understandable and trustworthy investment product that causes the least possible effort and expense for both investors, initiators and project clients, and also promises secure returns. Legal restrictions may complicate project development in the case of financial instruments. Consultation with experienced institutions and specialists at an early stage is vital here.

A high supply of equity, and also the willingness to make it available, given corresponding returns, for established renewable-energy and energy-efficiency projects, are observable in the context of the player analysis. The market as a whole has up to now only made extremely limited funding available for initiative products, on the other hand. In addition, changing financial-market regulations applicable to banks will also result in greater scarcity of finances available for initiative projects.

The complete analysis report, including the twelve project outlines, can be downloaded from www.energieagentur.nrw.de. Contacts at EnergyAgency.NRW: Dr. Katrin Gehles (e-mail gehles@energieagentur.nrw.de) and Christian Tögel (e-mail toegel@energieagentur.nrw.de)
Top marks for “KlimaKidz”

EnergyAgency.NRW launched its “KlimaKidz” project in early 2013 with the aim of capturing the enthusiasm of pupils in the 5th and 6th years of all secondary schools for renewable-energy topics. In a 90 minute lesson, the “KlimaKidz” teaching unit provides a play-based insight into a diverse range of facets of energy and climate-protection. The costs for “KlimaKidz” are borne by EnergyAgency.NRW, and its lecturers head the teaching unit. Interested teachers and educationalists can address questions, and book the “KlimaKidz” teaching unit by mail, to: hensel@energieagentur.nrw.de.

New Cluster EnergyResearch.NRW brochures

Climate-protection and the energy turnaround are a pivotal social task, and present civil society, the political world and industry in North Rhine-Westphalia with great technological and socio-economic challenges. The system integration of renewable energy sources, the development of marketable storage technologies, and the use of flexibilisation options in the electricity/gas/heat system are central tasks in the technological field. Other aspects of this transformation can be found in the socio-economic implications of the energy turnaround, such as consumer behaviour, rebound effects, acceptance, investments, and the fair apportionment of the costs of the energy turnaround. All these facets are addressed in differing ways by the work of the Cluster EnergyResearch.NRW. Just how versatile and innovative the corresponding players and their activities are is illustrated in three new Cluster EnergyResearch.NRW brochures on the topics of “Energy storage systems”, “Flexibilisation options in the power/gas/heat system” and “Transformation - Energy turnaround.NRW” (publication: early June). Information: www.cef.nrw.de

Climate-neutral events - a guideline

“Climate-neutral events” are booming. From town festivals, up to and including international conferences, organisers increasingly wish to meet their responsibilities and make their event climate-neutral. They encounter, on the road from planning to implementation, numerous facets where it is possible to save CO₂ emissions. Many are obvious, others require a closer look. A new guideline published by EnergyAgency.NRW helps with planning and running the event. Download the brochures from www.energieagentur.nrw.de/broschueren.

EnergyAgency.NRW’s international activities

EnergyAgency.NRW, in co-operation with NRW.International, is organising business trips to Poland and Chile this autumn. The Poland trip is to visit the RENEXPO fair, to be held in Warsaw from 23 to 25 September 2014. The one to Chile will be used to visit the Expo Eficiencia Energética in Santiago de Chile. This international exhibition and conference on energy-efficiency is to take place there from 15 to 17 October 2014. Business people interested in participating can register right now at international@energieagentur.nrw.de.

WindEnergy Hamburg

Hamburg will be the Gateway to the World of Wind Energy from 23 to 26 September 2014. The new global WindEnergy Hamburg technical fair at the Hamburg Messe exhibition grounds will provide a comprehensive overview of the current status and future of this industry, including its entire value chain, on-shore and offshore. The NRW state government, which is organising a joint state stand on the subject of “Innovations from NRW: Tailwind for the energy turnaround” in co-operation with the Cluster EnergyRegion.NRW and ProductionNRW, will be there.

In brief