Further thoughts on batteries

Biomass from flue gas  P. 09

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First climate (super)market  P. 15

On the hydrogen HyWay  P. 23
The heat pump marketplace NRW of the EnergyAgency.NRW will host the 10th Heat Pump Weeks from 31.01. to 14.02.2009 in North Rhine-Westphalia. The new Action Calendar with more than 200 events at 120 locations is available at www.waerme pumpenwochen.de. A printed version can also be ordered on the website. Dr. Frank-Michael Baumann, Managing Director of EnergyAgency.NRW: “The Heat Pump Weeks NRW which have been held up to now have brought heat pump technology closer to prospective house builders and house owners. Consumers have been very favourably impressed with the opportunities to use heat from the environment for low-cost domestic heating.” www.waermepumpen-marktplatz-nrw.de

For the fifth time, the “Bio refined” congress will take place on 24. and 25.03.2009 in the Rheinischen Industriemuseum in Oberhausen. What do integrated material and energy-related use of renewable raw materials contribute to solving our energy problems and replacing oil-based chemicals and materials and also fuels? At the “Bio refined” congress V, the Fraunhofer UMSICHT Institute and EnergyAgency.NRW: “The Heat Pump Weeks NRW which have been held up to now have brought heat pump technology closer to prospective house builders and house owners. Consumers have been very favourably impressed with the opportunities to use heat from the environment for low-cost domestic heating.” www.bio-raffiniert.de
Energy policy must focus on the keystones of security of supply, cost-effectiveness and sustainability. One important instrument for achieving this aim is to increase energy efficiency. Energy efficiency offers the fastest, most far-reaching and most cost-effective method of reducing consumption and environmental pollution. The second instrument, which is just as important, is the development of renewable energies.

However, there are obstacles to the development of renewable energies that have to be overcome. One of the greatest technical challenges is that of energy storage. The aim here is to overcome discontinuities, for example in the case of solar energy. Weather, day-night and summer-winter variations have a direct effect on the stability of the mains power supply. Ensuring consistent supply and availability, also taking variations in demand into account, is therefore a central requirement when it comes to further use and technical development of renewable energies.

Many companies are also very interested in achieving their own independent decentralised energy supply, as this option is becoming increasingly attractive from the economic point of view. Modern energy storage solutions offer the promise of individual solutions. For example, superconductive magnetic energy storage devices (SMES) in particular provide more security against short-term loss of power and power fluctuations in industrial production. This helps to avoid down times and the resulting high costs. Where heat storage is concerned, experts consider that the future belongs to thermochemical storage devices. These store heat almost without loss, even over long periods, and could be used in sectors where it is necessary to generate and use process heat, e.g. in the galvanising industry.

Neither should the effects on the economy as a whole be underestimated: energy storage devices can support the general power supply network. This means that fluctuations can be reduced, contributing to price stabilisation. The effects of additional storage capacity of one Gigawatt have been simulated by calculation at the TU Berlin: extreme peak prices could then stabilise at around 80 to 90 euro. A development which could benefit private households and productive industry alike.
Almost 300 specialists from twelve countries discussed all the technical aspects of energy storage at the Ausklang 2008 in Berlin. The third international conference for the storage of renewable energies held in the NRW representation building was very much concerned with this key question.

“The changeover to renewable energies is a race against time - for ecological, economic and social reasons. The replacement of traditional energy sources can, however, be achieved neither by the global energy economy nor by means of global contracts and agreements. The vital point is that of energy autonomy - as a political, technological and economic concept that can start a worldwide movement. The key to continuation of developments in this direction is optimisation of storage technology”, confirms Hermann Scheer, President of EUROSOLAR, who had issued the invitation to Berlin together with the World Council for Renewable Energy in cooperation with EnergyAgency.NRW.

It is a question of setting the framework for future energy supplies, according to Michael Geßner, Director of the Energy, Climate Protection and Mining Department in the Ministry for Economic Affairs, Small Businesses and Energy of the State of North Rhine-Westphalia: “While in past years it was often a question of definition of framework conditions, development of concepts or formulation of targets, technology has now made such progress that the future is finally becoming clear.” Progress with small integrated energy storage units is already evident in everyday life, in the form of higher-performance rechargeable batteries for mobile phones or computers. And it is not only electricity that is stored. Above all, thermal storage devices for solar-thermal power plants or industrial process heat, compressed air storage units and heating/cooling with wind energy are becoming more important.

“It can be seen that the level of maturity of so-called intelligent concepts is increasing”, says Scheer. Intelligent concepts are related above all to management strategies, in order to make use of different forms of generation, consumption and storage to implement a reliable and continuous energy supply with as little expenditure as possible. “The mains supply systems are stable, but the costs involved are even today quite high and are based on a catalogue of measures at different levels. This in turn is based on forecasts for generation and loading and also provision of reserve capacities”, explains Prof. Dr. Dirk Uwe Sauer from the RWTH Aachen. “If the proportion of renewable energies - whose generation is subject to extreme deviations - increases, considerable additional efforts must be made in order to keep the network stable. Intelligent management means that consumers and generators are switched on when this is useful for the balancing of supply and demand in the network. Intelligent meters are one component that can be used in order to report information regarding the actual requirements in the supply network to the consumers. Losses are minimised if electricity is always generated at the time when it can actually be used. All intermediate storage means that energy is lost. But even very good management strategies cannot obviate the need for energy storage. Technologies and strategies have to be developed and implemented for this purpose”, according to Sauer.

An important focus of the conference was energy storage for the mobility of tomorrow. “The sudden increase in the oil price in the first half of 2008 is a strong motivation to continuously drive forward the search for alternative drive methods. Lithium-ion batteries gain in significance in this context. Now it is a question of achieving readiness for production, in order to be able to bring hybrid electric vehicles onto the market with a real chance of success”, explained Prof. Dr. Norbert Hüttelnhölscher, Managing Director of EnergyAgency. NRW.
Progress with the optimisation of lithium-ion batteries, whose performance has increased considerably, plays an important role here. Now, such batteries with a capacity of 150 Wh/kg can store more than twice as much energy as the normal types of nickel-hydride batteries. The general opinion is that the lithium-ion batteries must above all become cheaper, and the lifetime should be in the range of 3,000 to 5,000 cycles. Sauer: “Both are realistic goals which can be easily achieved in series production with corresponding volumes. Then, the use of the batteries in vehicles and also for storage in the network becomes extremely attractive.” And only then will it be possible for the batteries to fulfil their task in vehicles and also for energy storage in the mains power supply network.

“We are observing that the subjects of renewable energy and transport are growing together. Two years ago, this was not the case, but now it is an important subject”, summarised Prof. Dr. Sauer. This means that the focus is moving away from central to decentralised storage, because the batteries are used in different applications – particularly vehicles – and are therefore financed. Sauer: “There is a gradual realisation that energy problems can only be solved by means of higher-level solutions over and above any individual sector. This makes matters more complex, but at the same time more efficient.” Further information and conference documents are available from: www.eurosolar.org and www.energieagentur.nrw.de

Energy storage for tomorrow

The question of heat and electricity storage is one of the most important aspects within the further development of our energy system. Well-known research institutions and universities in North Rhine-Westphalia are therefore focusing strongly on the area of storage technologies, as the following overview demonstrates:

**Electrical energy storage**

At the “Institute for Power Generation and Storage Systems” (PGS) of the E.ON Energy Research Centre at the RWTH Aachen, research is being conducted, among other things, into electrochemical storage systems and systems for the generation of hydrogen as a storage medium. PGS belongs to the RWTH Institute for Power Converters and Electrical Drives (ISEA), which has been conducting research in the field of storage systems for more than 20 years, with the focus on integration of accumulator batteries into various applications. Both PGS and the ISEA are led by Prof. Rik W. De Doncker supported by Prof. Dr. Dirk Uwe Sauer, Director of the Electrochemical Energy Storage Division.

The focus is also on “Electrical Storage Systems” at the University of Münster. (See Portrait on Page 7). Together with his current 30 members of staff, Prof. Dr. Martin Winter wants to create lithium-ion batteries with improved performance and a longer lifetime, but also higher energy still with maximum safety — and at a price which the user can afford. The interest of industry and the public in battery research in Münster is such that the North Rhine-Westphalian Innovation Ministry and the Westphalian Wilhelm University have decided to provide ongoing support for these battery-related activities.

**Thermal energy storage**

Thermal energy storage systems for solar power plants are being developed at the Solar Institute Jülich (SIJ) of the University of Applied Science in Aachen and also at the German Aerospace Center (DLR) in Cologne. This storage technology makes it possible to produce electricity as required (i.e. at times of highest income) and always to operate the power plant under the most favourable loading conditions while minimising losses from start-up and shut-down. The SIJ is driving forward with the development of a sand storage system. When used as a storage medium, quartz sand exhibits low specific costs per kWh of stored energy and, from the point of view of the plant technology, allows pressure loss which is almost independent of the plant size. In addition, it withstands storage temperatures of up to 900°C. In order to implement the storage concept, in which a so-called fluid bed cooler is used, a new type of air-sand heat exchanger is currently under development. At the DLR too, thermal energy storage systems are being developed for a wide range of temperatures and applications. For example, the DLR recently presented a new thermal storage system for solar power plants which is based on the storage of heat in concrete, together with its industrial partner Ed. Züblin AG. The pilot plant in Stuttgart represents a high-performance solution for temperatures of up to 400°C for commercial use. While concrete storage systems are very promising in association with parabolic collectors, sand storage is very suitable for use in solar towers. In addition to development of storage systems for solar thermal power plants, the DLR has also developed systems for use in the process industry, together with industrial partners. In processes where the heat requirement varies at different times, energy storage systems improve the use of waste heat, which can be utilised as an additional energy source for cooling or electricity generation.

Further information: Sabine Michelatsch, e-mail michelatsch@energieagentur.nrw.de
Almost every skier or hunter has been pleased to warm his or her cold hands in winter with the help of a small gel cushion. These so-called latent heat storage devices are typically filled with sodium acetate, a “pickling salt”. The heat energy which is stored in the melted salt is released when the liquid crystallises. The crystallisation is triggered by the small metal plates inside the cushion.

This same process is used by the Dortmud start-up company LaTherm, which has developed a heat transportation system which is 200,000 times bigger – and for this a 20-foot standard container is filled with around 22 tonnes of sodium acetate. The function of the metal plate is taken over by a patented heat exchanger, which makes it possible to withdraw the heat progressively - only when it is needed.

The energy and environment-related Institut für Energie- und Umwelttechnik e.V. (IUTA) in Duisburg wishes to develop a hydrogen storage device based on sodium alanate with high storage density in cooperation with the Mülheim Max-Planck-Institut für Kohlenforschung, the Essen company TRIMET ALUMINIUM AG and Brökelmann Aluminiumwerk GmbH & Co. KG from Ense. Areas of application are electric bicycles, portable electronics devices and lighting systems.

The aim of the company MCS International from Dinslaken is to develop and manufacture a high-pressure gas storage system with a storage pressure of 700 bar for use in hydrogen-fuelled vehicles. The project is to be carried out together with the Aachen Institute for Plastic Processing, the company Kautex Textron GmbH & Co. KG based in Bonn and Buschjost Norgren GmbH & Co. KG from Bad Oeynhausen.

The development of new types of materials for solid storage of hydrogen for mobile applications is at the centre of the Bayer Technology Services project (Leverkusen). Together with the Leverkusen company Lietec Licht- und Energietechnik GmbH and the Research Centre Jülich, a tank system adapted to the material is to be designed and constructed in parallel.

The NRW Innovation Ministry will fund these projects with a total of four million euro within the framework of “Regional Competitiveness and Employment 2007-2013” (EFRE). Innovation Minister Prof. Dr. Andreas Pinkwart has now asked the winners to submit funding applications.

Contest successfully completed

With the “Innovative Hydrogen Storage” competition, the State of North Rhine-Westphalia wishes to offer new stimulus in the area of hydrogen use, from research up to production. Six project drafts were submitted, and now the independent international jury of experts from research institutes and universities has recommended four projects for further funding:

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For example: Heat on wheels

Almost every skier or hunter has been pleased to warm his or her cold hands in winter with the help of a small gel cushion. These so-called latent heat storage devices are typically filled with sodium acetate, a “pickling salt”. The heat energy which is stored in the melted salt is released when the liquid crystallises. The crystallisation is triggered by the small metal plates inside the cushion.

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Such a heat container stores around 2.5 MWh of heat energy – sufficient to provide a house for one family with heating and hot water for three months. However, LaTherm’s targets are not houses for single families, but medium-sized heat consumers such as for example swimming pools, hospitals, sports halls or hotels, which can be supplied sustainably and economically using the system.

The containers are “charged” at locations where at the moment heat is discharged into the environment via chimneys or cooling towers – at steel works and chemical factories, waste incineration or biogas installations. With the help of a simple heat exchanger, the heat is stored in the con-
Battery research at the WWU Münster

Researchers at the Westphalian Wilhelms University in Münster are participating in the large-scale “electric mobility fleet trials” project. The intention of this country-wide project is to develop innovative electric vehicles. It was initiated by the federal government together with Volkswagen, and is being implemented in cooperation with partners from industry and universities. In total, the project is being funded with a total of 32.5 million euro over four years. The scientists from the Institutes for Physical and Inorganic Chemistry at the WWU are receiving funding of 2.2 million euro and are therefore the largest university partner in the “Electromobility” project.

This is one of the projects in the area of battery research - of which there are now a dozen - which are being worked on successfully at the endowed department of applied material sciences for energy storage and energy conversion. As an expert in the field of lithium-ion technology with an international reputation, Prof. Winter has held the Professorship in the Institute for Physical Chemistry at the WWU since January 2008, which is being supported with a total of 2.5 million euro over five years by the companies Chemetall, Evonik Industries and Volkswagen.

The aim of battery research in the newly-created department is to make the lithium-ion batteries (LIB) “grow up”. LIBs have been known for many years and are used successfully in mobile phones and notebook computers. However, these small cells have to be further developed into large batteries before they are ready for large-scale application in cars or for the storage of regeneratively generated energy. In particular, safety and lifetime have to be improved if these batteries are to be widely used in cars. It is considered that the large batteries will soon be ready for use in vehicles with so-called plug-in hybrid technology, for example. Cars which are equipped with this technology are - in addition to the traditional internal combustion engine - driven by a battery, which can be charged using an electric socket. On the one hand, it is intended that the battery should support the traditional engine during acceleration while on the other hand recovering braking energy, leading to a reduction in fuel consumption. The plug-in hybrid technology also allows “purely electric” driving, for example on short journeys. www.uni-muenster.de

- tainer within the space of a few hours and then taken to the relevant heat consumer. The amount of heat stored is such that less than 10 per cent of the stored primary energy is needed for the transport. This means that more than 90 per cent of primary energy (and CO₂ emissions) can be saved. For property owners this low primary energy factor has the advantage that, for a low investment, Category A can be awarded in the building energy pass.

The industrial partners who supply the heat benefit in that they can make a charge to LaTherm, whereas previously the heat was simply released into the atmosphere and cogeneration plant also receive the corresponding bonus. None of the suppliers previously made further use of their waste heat, as piping-based systems require that the heat is always supplied just at the time when the consumer requires it - and industrial companies as a rule cannot supply this security against failure. The system not only solves the problem by heat storage, but is less expensive that a piping-based system as from a distance of as little as a few hundred metres.

The town of Dortmund has decided to carry out a pilot project with this technology at the swimming pool in Dortmund-Brackel. Here, LaTherm will take over the supply of heat to the swimming pool together with the public utilities as from the start of 2009, with the waste heat being supplied around 9 km away from a waste dump gas plant.

Further information: www.latherm.de
Focus on solar thermal power plant

Solar thermal power plants offer great potential within industrial strategy and are an important element of a future sustainable energy economy. Good reason for the power plant technology competence network NRW of the EnergyAgency NRW to establish a new working group for the subject of “Solar thermal power plants”.

More than 90 experts from the whole of Germany met on the Jülich Solar Campus of the University of Applied Science in Aachen for a workshop, to be present at the birth of the new working group. “There really is no better place for this group than North Rhine-Westphalia. It is one of the locations with one of the highest concentrations of know-how and technology in the world,” explains Margit Thomeczek, Director of the Network. Solar thermal power plants represent a significant technology option within a sustainable energy mix for the future. They concentrate the sun’s radiation, generate heat and convert it into electricity using conventional power plant technology. The heat can also be stored, so that operation is possible during the passage of clouds, and can also be extended into the evening. First installations in the multigigawatt capacity range have already gone onstream in Spain; more than nine Gigawatt-scale plants are already in the process of construction or at the planning stage. The first solar thermal power plant in Germany is due to be commissioned at the beginning of 2009.

The demonstration and trial power plant which is being created in Jülich will be the first tower power plant in the world that produces heat based on open-volumetric receivers of porous ceramics. This technology promises high efficiency ratings, good possibilities of storage for the thermal energy and also robust operation. This concept was developed by the German Aerospace Center and will be developed further at the Solar Institute Jülich of the University of Applied Science in Aachen.

www.kraftwerkstechnik.nrw.de

First ATS hybrid wind turbine

Currently one of the largest wind turbines with a hybrid tower is being built at the wind test installation in Grevenbroich. The lower portion of this innovative tower consists of high, narrow prefabricated concrete parts from the Dutch tower building specialist Advanced Tower Systems (ATS), while the upper portion is constructed of conventional steel elements. The installation in Grevenbroich – the first one in the world with an ATS hybrid tower – has a total height of 180 metres, with a hub height of 133 metres. The company ATS Projekt Grevenbroich GmbH is responsible for erection and operation of the tower, whose equal shareholders are juwi Netzwerk GmbH & Co. KG, Mecal Projects GmbH, Hurks-Tochter HB Bau GmbH and Siemens Project Ventures.

“This innovative tower makes high hub heights possible and therefore provides higher energy yields at comparatively low overall costs, while being easy to transport” says ATS Chief Executive Frans Brughuis. Compared with the widely-used hub height of 100 metres, the ATS system provides an energy yield which is around 20 per cent greater. The higher costs for the erection of the tower will have been covered after around four years. A further advantage is that maintenance costs are low. Over the long-term life of the project, this means much lower electricity generation costs compared with the systems widely in use today. This is particularly important at inland locations with low wind speeds, and therefore offers new development potentials for clean wind energy generation. Internet: www.windtest-nrw.de und www.ats.eu
In a pilot project in Bergheim-Niederaußem, algae are cleaning flue gas and using photosynthesis to create new biomass from it.

The new RWE pilot installation for the production of microalgae at the Bergheim-Niederaußem power plant site was officially opened at the end of 2008 by the RWE management board and the Minister President of North Rhine-Westphalia, Dr. Jürgen Rüttgers.

The waste heat from the cooling towers has been used here for many years in order to heat neighbouring greenhouses belonging to the Bong garden centre, where the so-called “hortitherm” installation is used to grow fresh tomatoes the whole year round.

Now a greenhouse has been cleared in order to build a pilot plant for algae production, whose operation will also be supervised by Bong. A pipeline installed by RWE Power transports scrubbed flue gases from the nearby power plant to the greenhouse, where the algae turn it into new biomass by means of photosynthesis.

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Further information: www.rwe.com or Sabine Michelatsch, e-mail michelatsch@energieagentur.nrw.de

Innovative approaches to garden horticulture and intelligent use of waste heat form the background for integration of algae technology. This is the largest pilot installation of its type in the world.

For the first time, large volumes of algae biomass are being produced, with up to six tonnes per year begin forecast. The next stage will be to develop effective methods of harvesting and processing the algae.

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Efficient generation of electricity and heat is at the centre of the presentation of the North Rhine-Westphalian state government and EnergyAgency.NRW at this year’s “E-world energy & water” to take place between 10 and 12 February at the Messe Essen exhibition center. Around 20 companies and scientific bodies will demonstrate their expertise in the areas of power plant technology, cogeneration, geothermics, biomass and energy storage.

The 13th Expert Congress on Future Energies will be held on 10 February as the first “E-World” congress at the Messe Essen between 10:00 and 17:00. Following the opening speech by NRW Economics Minister Christa Thoben, expert talks on current energy technology developments are on the agenda, with NRW Environment Minister Eckhard Uhlenberg rounding off the plenary session with a lecture on the biomass strategy for North Rhine-Westphalia. Following the plenary session there are five specialist forums on the subject of biomass, geothermics, wind energy research, energy storage and power plant technology.

North Rhine-Westphalia evening on 10 February 2009
The North Rhine-Westphalia evening, with live music starting at 18:00 at the NRW stand in Hall 3, invites guests to an entertaining conclusion to the day.

On the Internet:

“A mobile future?”

“Yes, but ...” this could just about be the answer to the question in the title of the event “Are 120 grammes of CO₂ per kilometre feasible and affordable for the car fleet?”

High-ranking experts from the automotive industry and research institutions in NRW accepted the invitation of the Ruhr Press Conference journalists’ association and EnergyAgency.NRW to the event at the Düsseldorf Meilenwerk and at the end agreed: the mobile world will have to make use of the internal combustion engine for some time to come.

But the experts were also in agreement that the internal combustion engines still offers many opportunities for efficiency optimisation. For example, Dr. Thomas Kell recognised considerable potentials for fuel saving with the Efficient Dynamics concept from BMW. This potential could be found at innumerable points within the vehicle, even in the use of assistance systems for the driver, which show the most efficient way of driving from minute to minute.

As an alternative, it will be possible to achieve large reductions in CO₂ in future with the use of biofuels, which represent the only option for regenerative manufacturing of energy-rich liquid fuel. And the transport sector will be dependent on such liquid fuels for a long time to come. Using the example of the flexi-fuel concept, which provides for both bioethanol and petrol in each mixture, Norbert Krüger explained that technological innovations in the area of biofuels can also be enjoyed at reasonable cost. Karl Mauer for General Motors/Opel and Carsten Reimann for Nissan announced that production vehicles based on biofuel would be available within the next one to two years.

Toyota, however, according to Bernhard Grünewald, favours the “energy mix” in the tank. Plug-in hybrids operate – to put it simply – on electricity and petrol. Experts consider that development of an infrastructure of “electricity stations” will be started in the near future - for example in multi-storey car parks. Nevertheless, particularly in the case of purely battery-driven electric vehicles, limited battery performance is still a constraining factor.

Prof. Martin Winter from the Institute for Battery Research of the WWU Münster: while the chances of lithium-ion technology in NRW for small and medium-scale consumer applications are minimal, they are “good to very good” for the automotive sector. Winter explained the progress of lithium technology and also pointed out its limitations. This is why further basic research is needed at this point. “In order to remain mobile in the future, we need a wide spectrum of solutions. There is no one perfect answer”, explained Dr. Frank Köster, head of the Fuel and Drive Network of EnergyAgency.NRW. He is certain that this is precisely where the opportunities for North Rhine-Westphalia lie. “On the one hand, NRW has significant industries in the domains of suppliers, mechanical and plant engineering and the chemical industry. On the other hand, NRW has large vehicle fleets, road haulage companies, transport companies and parcel delivery services, so that NRW is very suitable for model projects.”

Further information at www.energieagentur.nrw.de/kraftstoffe/
Fuel cells of acid zeolites

The basis for a new type of fuel cell has been created at the Institute for Energy and Environmental Technology in Duisburg. Because of its functional principle and the materials used, this fuel cell has the potential to overcome the major obstacles to fuel cell development which have existed up to now. The new electrochemical cell uses an acid zeolite instead of a polymer electrolyte as the medium for the ion exchanger – along with catalyst systems based on electrochemically-coated metallic substrates.

The development of the fuel cell as an energy source is the subject of research and development activities throughout the world. The main emphasis of current research is on further development of PEM (polymer electrolyte membrane) fuel cell systems. Transport of ions is facilitated by a polymer electrolyte in this type of fuel cell. In addition to its many advantages, the PEM fuel cell has several disadvantages which act as a brake on widespread and successful introduction to the market. These primarily include temperature sensitivity, the fact that the membrane needs to be damp and in particular also the high price.

In a first project, financed by the State of NRW, it has been possible to demonstrate the basic suitability of zeolites as an alternative ion exchange medium in fuel cell applications.

The illustration shows a first laboratory fuel cell which contains a synthetically-manufactured zeolite as the ion exchange medium. This zeolite sample is based on a modified ZSM 5 (a zeolite originally developed by Mobil Oil with channel diameters of around 5 Å), which was adjusted so as to be strongly acidic. The zeolite ballast is surrounded on both sides by a catalyst system based on Pd-dosed full metal catalysts. First trials resulted in almost constant voltages of around 400 mV (for comparison: PEM fuel cells achieve around 800 – 900 mV off-load voltage). These trials, which were performed with very simple means, should now clarify the basic feasibility of the cells.

In order to develop such fuel cells further, various different types of zeolites will be synthesised in future, with the aim of optimising the acidity and the channel and pore geometry in order to achieve high proton conductivity and the best-possible characteristics with regard to water quality management. Currently, the new fuel cell concept is being developed further within the framework of a joint industry research project funded by the Ministry of Economics and Technology (BMWi). The aim of the project, which is to run until 30.09.2010, is to complete a first functional example of a zeolite fuel cell with clearly improved performance figures. But even with the values achieved today, this type of fuel cell would be an interesting alternative because of its simple structure.

Further information: Dr. Frank Koch, Tel. 0211/86642-0, e-mail koch@energie-agentur.nrw.de
Controlled ventilation

“The solar estate of the Wohnstätten- genossenschaft housing association in Siegen combines climate protection and cost-effectiveness in an exemplary fashion. Energy-related renovation work linked with the use of solar energy have led to a clear reduction in energy costs and helped to introduce this innovative building standard to a wider market”, explained Economics Minister Christa Thoben at the official opening of the Siegen solar estate. At the same time, she unveiled a “Solar Point”, an interactive information board for the estate.

“We don’t need to buy energy that we don’t need – and our tenants don’t need to pay for it”, emphasised Hans-Georg Haut, Managing Director of the association, and thanked the many people who were involved in the conversion, and above all the tenants who had supported the work for eighteen months. Energy saving and use of renewable energies were the most important aims of the renovation of the 54 apartments from the 1950s on Wetzlarer Straße. The heating requirement was reduced by around 85 per cent, from 250 kWh/m²a to 39 kWh/m²a. The association now saves a total of 320 tonnes CO₂ per year.

This was achieved by a combination of different measures. In addition to good insulation of the building shell (16-20 cm) and new energy-saving windows, central ventilation with heat recovery was installed. To this were added thermal solar installations to support the heating and hot water systems with a total of 142 m² of collector surface, and a photovoltaics system (around 66 kWp). The ventilation systems make a major contribution to energy saving and also prevent any possible future mould problems. They are still a rare feature within large renovation projects.

Over half of solar estates complete

Now 26 estates have been completed within the framework of the “50 solar estates in NRW” project. Already, around 6,000 people live in these innovative estates. 18 estates are currently under construction, while others are at the planning phase. In the case of homes which have already been completed, 75 per cent are renovation projects, which offer particularly impressive energy saving potentials.

Further information: Andreas Gries, Tel. 0211/86642-17, e-mail gries@energieagentur.nrw.de, www.50-solarsiedlungen.de

The increasing hunger for energy throughout the world is driving the search for new energy sources. Nuclear fusion offers potentials here: it is able to provide the enormous amounts of energy that will be needed in future at the base load level – round the clock and without the need for complex and expensive decentralised storage and distribution technologies.

In the ITER international fusion project, the large-scale use of controlled nuclear fusion for electricity production is undergoing trials. China, the EU, India, Japan, South Korea, Russia and the USA are building a reactor based on nuclear fusion in Cadarache in the South of France. ITER, which means “the path” in Latin, will - after completion - be the first fusion experiment to be able to provide an output of 500 million watt from a new primary energy source which has never been used before. Scientific institutes and companies from NRW, like the Research Center Jülich, are also involved. In Jülich, among other things contactless measuring devices are being developed which measure temperatures, densities and magnetic fields in the fusion plasma. In addition, wall elements are being constructed of tungsten with the aim of developing technologies for stable heat dissipation, which will be tested in the European JET fusion experiment in England. A further project in Jülich is concerned with the development of rapid-action gas valves. These are to be used at ITER in order to terminate a plasma state which is recognised as unstable by means of rapid gas injection. However, there is still a great deal to be done before the development work for ITER is complete. The Jülich TEXTOR fusion experiment and other international fusion installations serve as a testing and development environment. Engineers and technicians are faced with considerable challenges: the transportation of large-scale complex systems to Provence, their installation and subsequent commissioning.

Further information: Prof. Dr. Ulrich Samm, FZ Jülich, e-mail u.samm@fz-juelich.de
Throughout Germany, the country’s chambers of commerce favour the use of regenerative energies and the promotion of corresponding investments within companies – provided the risks for the competitiveness of energy-intensive industries are not forgotten. “We see lack of knowledge, and worries about excessively long amortization periods, as a brake on more widespread adoption of technologies for the utilization of regenerative energy in small and medium-sized companies up to now”, explains Dr. Wolfgang Willmann, of the SIHK, Hagen. The SIHK has organized the “Renewable energies on the offensive! Prospects and risks for small and medium-sized enterprises” series of events with EnergyAgency.NRW in order to eliminate this information deficit and to outline potentials for entry to the energy market. More than two hundred persons took up the chance to obtain information this autumn.

**Geothermal**

For years now, the Heat Pump Marketplace NRW specialist conference has offered architects, engineers and the housing sector information on the use of heat pumps. This year, experts reported to the more than one hundred participants on the properties of this technology: in addition to reducing heating costs, heat pumps make a contribution to protecting the climate. “Heat pumps reduce the CO$_2$ emissions generated in heating of buildings by more than 50 per cent. This is why they are, for the state government, one of the technologies which will help in achieving the targets set by its energy and climate-protection strategy”, comments Dieter Schröder, organizer of the Heat Pump Marketplace NRW.

**Solar**

The Solar Energy workshop, headed by Prof. Dr.-Ing. Detlev Patzwald (FH South Westphalia), examined the topic of solar energy utilization from the viewpoint of users and manufacturers. Experts from EnergyAgency.NRW, Sotec-Solar Arno Kynast, of Plattenberg, and the BINSE Berchum association in Hagen, outlined heat and power generation technologies and cited examples to illustrate the cost-efficient use of solar-energy systems in industry, commerce and private households. In addition, representatives of Westfa Vertriebs- und Verwaltungs GmbH, Hagen, and Günther Spelsberg GmbH & Co. KG, Schalksmühle, demonstrated that industry here has successfully utilized the trend toward solar energy to set up new specializations in production and marketing.

**Hydropower**

In a water-rich region such as South Westphalia, attention inevitably focuses on hydroelectrics. Stefan Prott, the head of EnergyAgency.NRW’s Hydroelectric Power Bureau, chaired the workshop on the use of HP. “Hydroelectric power is a clean and directly utilizable method of generating electricity, but conflicts in its targets with the protection of surface water and the hydroecological contiguity of waterways", stated Joachim Drüke, of the Arnsberg regional government, who perceives only limited potentials for the approval of new HP plants in NRW. It has, nonetheless, proven possible to reactivate closed facilities in individual cases. Prof. Dr.-Ing. Jürgen Jensen, of the University of Siegen, on the other hand, drew attention to ultra-small HP plant technologies. As he commented, modern technology makes it possible to achieve significant output even from low hydraulic heads. The WAGU GmbH (Kassel) planning consultancy presented a concept for the nature-orientated development of the River Lenne. The background of major structural changes and the many and diverse utilizations along this river will probably make it difficult to achieve truly natural conditions in the foreseeable future, however. The workshop concluded with addresses by Nova-Strom GmbH, Hagen, Stadtwerke Fröndenberg GmbH and Lister-Lenne-Kraftwerke, Olpe, all of whom market CO$_2$-free power products in the region via operation of their own HP plants. Further information: www.wasserkraft.nrw.de
The paper industry has its own energy program. This new concept has been drafted, with support from the NRW ministry of economics, in the context of the "NRW saves energy" state energy-efficiency campaign and was unveiled recently at an EnergyAgency.NRW event. "Energy concepts for specific sectors are based on recognition that the companies in an industry generally have identical energy weaknesses. Energy concepts for a complete industry can be used as an aid to orientation and a navigational instrument in isolating and individually eliminating weaknesses in operation", explains Prof. Dr. Norbert Hüttenhölscher, director of EnergyAgency.NRW. There are potentials for savings of an average of between 5 and 10 per cent on energy costs in the paper industry.

The "Paper" energy concept was drafted by the "Paper Industry Workgroup" (Institut für Energie- und Umwelttechnik e.V. IUTA, Duisburg, Department for Technical Thermodynamics of the RWTH Aachen, the PTS Papiertechnische Stiftung, Munich, and EUtuch Energie & Management GmbH, Aachen, in cooperation with the German Paper and Pulp Association, Bonn).

The pulp and paper industry is one of Germany’s five largest industrial energy users. Energy costs have amounted to around 10 per cent of turnover in recent years. As for many other industries, energy is of considerable significance as a cost factor for the paper sector in the context of maintaining competitiveness.

Energy needs cut
For this reason, the paper industry has already attempted to implement potentials for reducing the use of energy. Greater energy-efficiency has now been achieved via technical optimization in power plants, papermaking machinery and by modifying input materials structures. Specific energy needs, i.e., the energy required for production of a tonne of paper, paperboard and cardboard has dropped from some 8,300 kWh/t in 1955 to around 2,700 kWh/t now. Increased use of heat-recovery systems and improved mechanical dewatering in the press line, via new machines (e.g. the shoe press) are among the reasons for this drastic reduction in specific energy consumption.

"Still potential"
"We nonetheless perceive further potential for optimization", continues Hüttenhölscher. Enhancement of boiler efficiencies, for example, is technically feasible and economically worthwhile. And, according to the Paper Industry Workgroup, there is also space for optimization in room and canopy air exchange systems, in energy-saving pulp grinding, and in efficient drive and pump systems. The exploitation of low-temperature waste heat, which otherwise leaves the paper plant unused via the water and waste-air systems is, in particular, still too frequently an unsolved problem in this industry. The reason for this is the low temperature level of the waste-air flows compared to the plant elements that require heat, which means that economic utilization is not possible without uprating the energy level.

Further information
Gerd Marx, EnergyAgency.NRW, e-mail marx@energieagentur.nrw.de, Tel. 0202/24552-35, www.energieagentur.nrw.de or www.nrw-spart-energie.de
Germany’s first climate (super)market opened

The Tengelmann group has opened Germany’s first climate (super) market. The Tengelmann climate market in Mülheim/Ruhr - with its model energy- and CO₂-saving function for the entire industry - was completed in a record time of just eight weeks.

“The first Tengelmann climate market sees us again setting standards in the German groceries sector, demonstrating that a modern supermarket concept can be operated with 50 per cent less energy and no CO₂”, enthuses Karl-Erivan W. Haub, managing director of the Tengelmann group of companies. “This is also a step to achieving our major target of making our contribution, as a group, to implementing the Kyoto Protocol by 2020 and cutting our CO₂ output by 20 per cent”, is his comment on the Mülheim retail group’s ambitious project. This entrepreneur concentrates his commitment under the umbrella of the Tengelmann climate initiative, which includes the use of “green” power, participation in the PCF Pilot Project Germany, the drafting of annual emissions balances and - most recently - Germany’s first Tengelmann climate market.

Tengelmann, working with its own specialists and external experts, has developed an energy-efficiency concept covering a whole range of individual provisions, some of which have already been available for several years, while others were developed specially for this pilot project. “We believe that this combination, which is unique in Germany, will enable us to halve our energy consumption”, affirms Haub. “Tengelmann’s new climate market is a next-generation supermarket, it sets an example for all of Germany! We pulled out all the energy stops and showed everyone that climate and economic action can be harmonized”, continued Prof. Dr. Norbert Hüttenhölscher, director of EnergyAgency.NRW at the unveiling of the project to the press. “Near-surface geothermal heat is used efficiently here, and 45,000 kWh of solar power generated annually using photovoltaics, while waste-heat is returned to the energy circuits, energy saved in cooling, and sophisticated light management practiced - and the customer loses nothing in atmosphere and convenience”. A particular plus: Tengelmann did not build a new “greenfield” project, instead they energy-modernized an existing building to such high standards that, Hüttenhölscher expects, this climate market will probably become an excursion destination.

Geothermics and waste-heat

75 per cent of the market’s heat needs are covered via recovery of cooling-system waste-heat which, up to now, remained unused. The other 25 per cent is supplied by a geothermics system with six geothermal probes. Together, these innovations make the old boiler-plant superfluous, and the climate market independent of gas and oil fuels.

New lighting systems

The lighting is, literally, one of the highlights of this market. Special glazing set into the roof admits daylight into the interior. A newly developed lighting control system regulates the artificial lighting as a function of the natural light available. In addition, only energy-saving illuminants are used - the promotion displays and refrigeration suite, for example, are lit by LEDs. In all, this innovative lighting concept requires 30 per cent less power than a conventional system.

Photovoltaic power

The new climate market features a photovoltaic system of 1,140 m². The photovoltaic elements on the facades and the collector films on the roof generate up to 45,000 kWh of “green” electricity using solar energy. Remaining needs are met 100 per cent from “eco-power” (from HP plants) - as is the case, by the way, in all other Kaiser’s and Tengelmann branches.

Covers on refrigerated equipment

All refrigeration equipment in the climate market is equipped with glass doors or sliding covers, saving up to 50 per cent energy in the frozen-goods sector, and 30 per cent in the refrigerated display sector.

Tengelmann switched to innovative cooling systems in 1996. The climate market uses - for the first time ever - a cooling-plant combination operated on the natural refrigerant, CO₂. This plant requires water-cool-
Open-top pool welcomes heating bill

The lifeguard is the second most important person at the Cabrio-Spassbad baths in Senden, Münsterland - after the caretaker. To avoid drowning in a flood of energy-costs, the new pool at Senden has been equipped with an ultra-modern energy supply system.

Senden corporation expects between 200,000 and 250,000 swimmers yearly at the new baths. The “swimming convertible” sets standards in several ways; the roof, for example - as at the Schalke Arena “football temple” - opens and closes at the push of a button. But the energy supply for the “Cabrio” has been solved at least equally impressively.

It was decided as early as the planning stage to build a baths with CO₂ emissions 20 per cent below those of similar facilities. To achieve this, the “Cabrio” is linked into a heat-sharing system with a multi-purpose hall, a double gymnasium and a changing-room building.

The centrepiece of the heat-sharing system is an 840 kW wood-pellet boiler to cover base load, with two 336 kW gas boilers for peak loads. Together, the baths and the other buildings in the system have a heating demand of exactly 2,614,847 kWh, meaning that this scheme’s heat requirement is around 37 per cent of total consumption in council-owned buildings. The CO₂ savings from the wood-fired boiler are just on 470 t/a of those of a gas-fired system.

Electrochemical disinfection

Totally consistent environmental friendliness: here, no chlorine is used to disinfect the pool water - no less than 1,350 m³ (equivalent to around 10,000 domestic bathtubs). Instead, the water is disinfected electrochemically.

The council also scored useful points in the European Energy Award® with the Cabrio” baths, which opened to swimmers in summer, 2007. For its efforts in municipal climate protection, Senden last November received the Energy Award® Gold in Gelsenkirchen from NRW economics minister Christa Thoben.

Further information: Jochem Pferdehirt, Tel. 0202/24552-59, e-mail pferdehirt@energieagentur.nrw.de, www.energieagentur.nrw.de (topic portal: European Energy Award)
The art of heating churches

Cosy heat in a church pleases the flock, but damages the organ. It’s no simple matter finding the right temperature for everyone. “In a nutshell, churches weren’t built to be heated”, smiles Christian Dahm of EnergyAgency.NRW, advisor to four hundred parishes in NRW, and familiar with the problems of church heating. “Classical churches can be hundreds of years old, and heating has generally been retro-installed. Demands are made on the heating system by users, on the one hand, who want more warmth, and by the building, on the other hand, with its murals, its organ, or its carved altar. Such treasures need a humidity of 55 to 70 per cent - and this will drop as soon as heating starts, sometimes as low as 35 per cent during the winter heating period, causing wood to dry out and warp. Organs protest with off-pitch notes, and dry heating can also cause plaster to crack off from the walls. So you can, in theory, destroy a church with heating”. The average annual energy costs for a parish, with its church, congregation centre, nursery school and rectory amount to 25,000 euro - a lot of money, for churches in which 500 euro is the choir’s budget for sheet music. All the more important, then, to use every potential for savings, but not at the expense of the congregation or of visitors; vital orientation points are:

Heating the hall
Churches are generally used only for a limited time each week, so it is rational to lower temperatures at other times. The savings are around 10 per cent per degree lower average temperature, or some 500 euro/degree for the average church. A new control system may be needed, so that the church is nice and warm again for the next service; this involves costs, but also offers opportunities since, on the one hand, maximum savings potentials can be exploited to the full and, on the other hand, the building can be gently conditioned using temperature and humidity sensors. Control-system costs are amortized within a few years.

Use energy-saving bulbs
Incandescent bulbs are still very frequently encountered in churches - and a hundred bulbs is no rarity for lighting of a church nave. Conversion to energy-saving bulbs, now available in all shapes and colours, can reduce power consumption for lighting by around 7 kW overall. Savings, assuming three services each week, with lighting on for two hours (inc. preparation and follow-up times) add up to around 2,000 kWh/a, or 450 euro/a.

Their historic significance often gives churches a role in the townscape, so many churches are illuminated at night; another potential for worthwhile savings. A small village church, for example, can easily be lit up using four 250 W spotlights. It’s also worth checking whether lower-power lamps - e.g. 150 W - might not be sufficient, and whether illumination time could be shortened; interest in illuminated objects generally drops abruptly after 11 pm. Savings: up to 1,200 kWh/a, or 250 euro/a.

Recirculating heating pumps
Circulation pumps operate out-of-sight, and the fact that, due to their long operating times, they contribute significantly to power consumption, is often forgotten. Such pumps are also often too large.

Immediate action: with multi-stage pumps, select only the smallest output stage and, if this is not sufficient, move up to the next largest. In the long term, these pumps should be replaced with automatically regulated models. Savings, for a three-group nursery school, for example: 200 euro/a.


Practical guideline “Sustainability and the Church”:
“Energy-efficiency in parishes – a guideline for practice”

How can energy consumption in a parish be systematically registered, evaluated and assessed? What consumption is “high”? Is there a conflict between listed-building policy and energy-modernization? EnergyAgency.NRW’s new practical guideline, due for publication in May, 2009, provides background and discussions of these and other questions. Central topics include: Recording and evaluating energy consumption, the Energy Pass for buildings, reduction of heat needs, heat generation, church heating, the organ and church heating, renewable energies, reduction of power needs, lighting optimization and user behaviour.

Publication date: May 2009, oekom Verlag. Price: 18.90 euro. Advance orders and more information: www.energieagentur.nrw.de/kirche. Contact: Oliver Weckbrodt, Tel. 0202/24552-20, e-mail weckbrodt@energieagentur.nrw.de
Energy team boosts energy change

European Energy Award® scores goals in Dortmund.

A steel town in a time of change: 900 exceptionally energy-efficient buildings, exemplary energy standards for new housing and commercial estates. No miracle - just the result of a “dream team”. A highly committed municipal energy team and its tool, the European Energy Award® (eea®), the European management and certification procedure for municipal energy management, in which Dortmund has participated since 2005. Successfully, as is documented by an “explosion” of more than one hundred projects in the field of energy-efficiency, which has since then enriched the program of measures of the eea® - and now Dortmund has received an award for this from NRW’s economics minister, Christa Thoben.

“How did it all start? With the team!”, affirms Jochem Pferdehirt, responsible at EnergyAgency.NRW for the eea® in this state. The eea® started when representatives of municipal energy and water utilities, the municipal property side, the environmental bureau, planning office, economic promotion, municipal treasury and agenda office met. Only in a team like this can climate protection and energy-efficiency be tackled on a supradisciplinary and supradepartmental basis, and totally new impulses be generated for a municipality’s fields of action. The eea® acts here as the spark. “The best thing about eea is that the diverse activities are constructively grouped together in the city administration, and also by external partners, greatly facilitating coordination and communications”, comments Christoph Löchle, of the city of Dortmund’s Agenda Bureau.

An example: the Phoenix-See construction project in the south of Dortmund; the city’s sophisticated specifications will produce a showpiece energy estate here. The Phoenix Lake is currently being created, with a water surface area slightly larger than the famous “Binnenalster” city basin in Hamburg. It will feature around nine hundred residential units, and the site purchasers undertake now to adhere to the KfW 60 standard, which means that not less than one quarter of the energy needed for heat will come from regenerable sources. Every second house is to conform, in fact, to the KfW 40 standard. In the commercially used zone, properties are to be connected to the heat transmission system of a new heat+power cogeneration plant. All this will cut CO₂ emissions by some 50 per cent compared to conventional designs and energy supply - in the heating sector alone.

Another Dortmund highlight is the equipping of the Westfalenhalle with photovoltaics systems to supply a total of around 1.5 megawatt-hours of solar power, sufficient to supply some 450 three-person households, and relieving the environment of some 1,000 t of CO₂ annually. With the modernization of its systems, the Westfalenhalle is also participating in the JIM. NRW emissions trading scheme (see page 19). And a whole range of projects in the PR field has also been initiated, with systematic comprehensive information for citizens on energy-efficiency topping the council’s agenda. Following the award, the second, 2008 to 2011, phase now starts, the target being the eea® Gold award.

The eea® is a program that combines a certification and a Quality Management process. It is a European certificate for municipalities which have already shown their commitment to energy-efficiency and climate protection and now aim to improve even further. Eighty-one municipalities from NRW are participating; thirty-one in the state have received eea® awards up to now, with four towns winning eea® Gold.
EnergyAgency.NRW started the NRW Joint Implementation Model (JIM) project on behalf of the NRW ministry of economics in January, 2008. JIM.NRW is aimed at the region’s operators of heating and steam boilers, and provides low-interest financing for installation of climate-friendly technologies. The project is based on international emissions trading, and is the first of its type in Europe.

**Westfalenhalle Dortmund**

Dortmund’s Westfalenhalle is a “celebrity” participant in the JIM.NRW project. This famous Dortmund venue, working with the DEW21 contractors, has begun renewal of its building services, and of its HVAC systems, in particular. The new four-boiler heating plant supplies 15 MW, sufficient for around 1,000 detached houses, providing heat not only to the auditoria, but also two ice-skating rinks, an indoor arena, a hotel, the congress centre and various admin buildings. The Westfalenhalle’s new fresh-air supply is also sophisticated; under the German venues regulations, ventilation is a mandatory requirement at events open to the public. The Hall 1 ventilation system thus regularly imports fresh air from outside. The consequence, however: greater need for heating - air from the outside is generally colder than the air in the hall. The operator states that system modernization has increased efficiency from 83 to 92 per cent, saving 2,000 megawatt-hours of thermal energy, or 100 tonnes of CO₂ annually. As he comments, “There need not be conflict between environmental considerations and financeable investments”.

**New climate-protection base**

Since autumn 2008, Hachenberg Barracks, Erndtebrück, has met its heating needs using renewable energy. This German Air Force base, home to some 700 servicemen, now uses a wood-fired heating system with some forty outlets and an output of 1.3 MW, replacing two oil/gas-fired boilers, which are now kept only for standby purposes and, at 4.7 MW in all, were significantly larger. A long-term contract assures local supply of forestry and sawmill waste. The operator is the URBANA contracting firm, which has cooperated with the Erndtebrück regional military administration since 1999. URBANA invested the necessary 750,000 euro after steep rises in oil and gas prices in recent years, which made a change to a different fuel highly attractive. The contractors’ calculation included participation in the JIM.NRW model project. Some 80 per cent of the fossil fuels used up to now at Hachenberg Barracks can be replaced by renewable energy. URBANA feeds the CO₂ savings into the JIM.NRW climate-protection project, where they are converted to tradeable CO₂ certificates and sold under the emissions-trading scheme. URBANA is anticipating annual CO₂ savings of some 1,500 t, with benefits of around 90,000 euro across the overall project period (up to 2012), assuming a price of 15 euro per tonne CO₂. JIM.NRW will thus “subsidize” just on 12 per cent of total investment for URBANA.

**100 per cent CO₂ savings**

The town of Kamp-Lintfort illustrates that smaller systems can also be worthwhile in climate-protection. A coal-fired heating system (100 kW) installed in 1986 has up to now heated the children’s day centre in Haerstgen. Coal-firing has a long tradition in a mining town such as Kamp-Lintfort, but produces high CO₂ emissions. “We’re always looking for good practical examples to reduce our CO₂ output”, declares Miriam Kramp, of Kamp-Lintfort council. For this reason, a small, but highly efficient biomass-fired boiler (85 kW) has been purchased; the former coal-bunker now becomes a pellet store. Alongside lower operating costs, a 100 per cent cut in CO₂ has been achieved. Kamp-Lintfort is also a participant in the JIM.NRW project; the town is anticipating 125 t less CO₂ annually; assuming a price of 15 euro per t of CO₂, emissions trading should return around 17,500 euro to the council’s coffers across the project period.

Further information: Verena Müller, Tel. 0202/24552-29
Wood is not just for heating – power can also be generated from it. These two uses are combined in a wood-gasification installation with a downstream cogeneration plant which went into operation in Dortmund last summer. This is a joint project by Dortmunder Energie und Wasserversorgung GmbH (DEW21) and the Dortmund company, Biomass Energetiksysteme.

The installation, located on the DEW21 Zinkhütte site in Dortmund, is a further development of a similar project completed in Arnsberg-Wildshausen, and generates a combustible mixture of gases from forestry waste. The heat generated from the wood under controlled addition of oxygen expels the producer gas, which is used to generate power and heat in the cogeneration (CHP) plant. In theory, the CHP plant’s output is sufficient to supply some 1,000 households with power for a year; in reality, the energy produced is used to supply the DEW21 site and for drying of wood chips.

The commissioning of this system marks a decisive advance in wood-gasification and the use of producer gas from wood in a CHP plant. This technology was long encumbered with the problem of severe tar formation, which gummed up system elements. This has now been overcome - in Dortmund, the producer gas from the system is cleaned on ceramic filters at 550 to 600 degrees, eliminating tar-forming components and other hydrocarbon compounds. After cooling to 30° C, the gas is scrubbed with biodiesel to ensure the elimination of impurities. Biomass states that residual amounts in the gas are below the detection limit of 20 mg per cubic meter. After drying, the gas is ready for use in the CHP plant.

Both companies regard the 3.3 million euro input to this project as an investment in the future - follow-up orders are thought likely if this installation succeeds. Applications for producer-gas-generation plants include swimming pools, school complexes, clinics, office buildings and commercial premises.

Further information: Ulrich Goedecke, Energy Agency.NRW, Tel. 0202/24552-16

Oberhausen announces Germany’s largest city operated photovoltaic system on grid since December 2008.

With some 3,500 m² module area and an output of 466 kWp, the photovoltaics system on the roof of Stadtwerke Oberhausen AG (STOAG) is certainly impressive. STOAG anticipates annual feed to the grid of 424,402 kWh, equivalent to CO₂ savings of around 250 t each year. As Dipl.-Ing. Gerald Orlik, of Energy Agency.NRW explains, “That is approximately the same as the annual energy requirement for 125 detached houses, or around 500,000 washes in a modern washing machine”.

A total of 2120 polycrystalline solar panels has been installed on the building roof, following the integration of aluminium framework into the roof structure by Thürlings Haustechnik GmbH, Tönisvorst; the module supports are mounted on this. This is the second large-scale solar-energy plant installed by Thürlings in Oberhausen - the firm has already completed a 243 kWp system opposite the STOAG site, so that some 0.7 MW of environmentally friendly power is now generated in the Max-Eyth-Strasse.

"Oberhausen, with this solar technology and the cogeneration arrangement in the Lower Rhine waste incineration plant, is making an important contribution to the region’s ecological image", affirms Klaus Wehling, Lord Mayor and chairman of the STOAG supervisory board. Energieversorgung Oberhausen AG provided STOAG with important support during the planning and tendering phases of the project.

Contact:
STOAG, Roland Pramor, Tel. 0208/838-8400, e-mail r.pramor@stoag.de or Gerald Orlik, EnergyAgency.NRW, e-mail orlik@energieagentur.nrw.de, Tel. 0202/24552-33

Oberhausen wood-gasification system shows what’s possible:
Power from wood
Promotional trips to boost NRW energy exports:

Export benefits

Products from NRW have excellent export potentials, whether modern power generation and transmission technology, solar energy and biomass, fuel cells, utilization of mine methane and geothermal potentials, or modern, high-output wind-power systems and components.

To support export-orientated enterprises, trade and institutions (universities, research institutes, associations, etc.) in the energy sector, international business visits, topic-specific trips and international projects will in 2009 again be provided, organized and coordinated by EnergyAgency.NRW, with the aim of assisting market entry, for small and medium-sized companies, in particular, via strategic support from state politicians, NRW-International GmbH and international network partners and, ultimately, of networking companies and institutions in the target regions with those in NRW.

Currently planned for 2009:

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<tr>
<td>04.-07.05.2009</td>
<td>Windpower Chicago, USA</td>
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<td>as part of an “NRW goes to USA” trip</td>
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<td>27.-29.05.2009</td>
<td>Carbon Expo 2009 Barcelona, Spanien</td>
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<td>companies work and services from the domain of climate protection</td>
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<td>certificates will be presented.</td>
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<td>23.09.-01.10.2009</td>
<td>Trip to Latin America relating to the subject of energy / mining</td>
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<td>Latin America” of NRW International GmbH, organised by the IHK Essen</td>
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<td>Stations en route in the energy field include participation in the</td>
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<td>mining fair EXPOSIBRAM, an energy and mining symposium with co-operation exchange in Belo Horizonte (Brazil) and an energy symposium in Santiago de Chile.</td>
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<td>Autumn 2009</td>
<td>Specialist trip including energy symposium and co-operation exchange</td>
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<td>in the field of energy and energy efficiency in Turkey</td>
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<td>Project planning by IHK Cologne and the EnergyAgency.NRW</td>
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<tr>
<td>Spring/Autumn 2009</td>
<td>Specialist trip in the field of fuel cell and hydrogen technologies</td>
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Export Infopoint at national energy fairs

EnergyAgency.NRW’s export activities in 2009 will again include the “E-world energy & water” fair, in Essen, and the Hanover Trade Fair Energy. These fairs have developed into important forums for the international energy sector, and EnergyAgency.NRW will thus again provide the “Infopoint Export” information source and contact forum on its stand. Here, foreign institutions and partners can present information and contacts in the target regions and provide specialized information on the target markets.

Further information: www.energieagentur.nrw/Internationales or Tel. 0211/86642-11 (Stephan Lintker), and from partners and co-organizers at NRW-International GmbH, and the Aachen, Düsseldorf, Essen and Cologne chambers of commerce.

Satified faces all round at the close of the fair Haus & Wohnen in Cologne in autumn, 2008. More than 550 manual-trades firms, consultancies and promotional corporations, associations and manual-trades organizations exhibited their products and services for the household, for construction and for better living. Some 26,000 consumers visited this four-day exhibition in Cologne.

The State of NRW had a presence in Cologne with a joint corporate stand carrying the motto of “Save energy - Safety - Comfortable living”. Twelve manual-trades firms and EnergyAgency.NRW showed their products and services here. On the focus topic of “Save energy”, visitors received advisory services on subjects ranging from the Energy Pass up to specific building projects. Also available to see - and touch - were exhibits such as heat pumps operated together with solar collectors, wood-pellet heating systems and condensing-type gas-heating.

NRW has some 180,000 manual-trades companies. Their around one million employees achieved a turnover of more than 100 billion euro in 2007. Further information and illustrational material for free-of-charge download at www.hausundwohnen-koeln.de.
The Regenerable Energies Heat Act (EE-WärmeG) came into effect on January 1, 2009. To increase renewable energy’s share of overall final-energy consumption for heat (room and process heat, cooling and hot water) to 14 per cent by 2020, the owners of new buildings are obliged since January 1, 2009 to ensure that a certain minimum portion of energy needs is met using renewable energies. Clients can decide whether they use a solar installation for hot water or booster heating, a wood-pellet heating system or a heat pump. Alternatively, the requirements of EEWärmeG can also be fulfilled via local or remote community heating generated from not less than 50 per cent regenerable energy, waste-heat and/or cogeneration, or by means of improved thermal insulation (15 per cent better than EnEV) of the building shell.

In parallel, it is anticipated that the amendment to the Energy-Saving Ordinance (EnEV 2009) will come into effect at the end of 2009. The innovation here is that the new-building limit for primary-energy consumption will also be specified for residential buildings on the basis of a standardized reference building. This will make it easier for buildings with advantageous geometries, orientations and system technology to fulfil the new, more stringent limits. Also new in EnEV 2009 is that energy balancing of residential buildings can now optionally be performed using DIN V 18599. Other changes include an expansion of obligations to retrofitting in the case of systems on owner-occupied detached and semi-detached houses, and regulations on night-storage heaters. Older night-storage heaters installed in multi-occupied residential buildings are now to be replaced after thirty years. All in all, EnEV 2009 implements stricter requirements necessary for climate protection, without sacrificing planning flexibility.

**Tell us your opinion:**
The DIN V 18599 standard for non-residential buildings was enshrined in EnEV as early as 2007. The complexity of the calculation method has attracted criticism, however, and not all consider the EnEV software of good quality. We want your opinion: should the EnEV assessment procedure be simplified? Or would it be rational also to use DIN V 18599 as the basis for verification of the energy-efficiency of residential buildings? What is your experience? Let us know by e-mail to Matthias Strehlke (strehlke@energieagentur.nrw.de).

### Engines for bio-fuels

Deutz AG, of Cologne, recently became the first manufacturer to unveil engines for operation using rapeseed methyl ester (RME) and rapeseed oil bio-fuels. These engines offer significant economic advantages, since no fuel tax is levied on bio-fuels used in agriculture. The engines possess the same reliability and durability as diesel-operated equivalents. Significant elements in operation of the engines using rapeseed oil are the Cologne company’s DCR® Common Rail system and electronic engine management. The latter assures control of the entire combustion process, cuts starting and low-load emissions, and optimizes all parameters, to keep carry-over of fuels into the lubricating oil as low as possible. Another important element is the Fuel Management® system, consisting of a fuel regulation element integrated into the engine control system and a dual-tank system with automatic switchover from diesel to rapeseed oil and vice versa. It also includes a fuel preheat function for the rapeseed-oil circuit, in order to assure fuel flow at low temperatures. The dual-tank system is necessary, since these engines are started using diesel, which is also the fuel in the low-load range, in order to optimize emissions. The German Agricultural Corporation awarded its silver medal to the TCD 2012 and 2013 series at the 2007 Agritechnica, acknowledging an important innovation in propulsion systems.

**Information:**
www.deutz.de
NRW on the Hydrogen HyWay

Before some two hundred participants, NRW Undersecretary of State for Economics Dr. Jens Baganz gave the starting signal for the “NRW Hydrogen HyWay” at the 8th annual meeting of EnergyAgency.NRW’s Competence Network Fuel Cell and Hydrogen NRW. This new pilot project under the umbrella of the state government’s climate strategy groups together a large number of individual projects for the development and demonstration of fuel-cell and hydrogen systems. Over the next few years, the state is to provide more than 50 million euro for this project from state finances and the European Fund for regional development.

The first HyWay project was unveiled at the meeting: this joint NRW-Dutch project focuses on the development of a bus with fuel-cell propulsion. After a development period of around one year, the 18 m long bendy-bus is to start trial operation in Amsterdam and in the Cologne region, with two vehicles in service at each of these locations. The NRW participants are Vossloh Kiepe GmbH, Düsseldorf, and Hoppecke Batterien GmbH & Co. KG, Brilon, with support from the technical Universities of Cologne and Aachen.

WHEC 2010 in Essen

An important milestone on the HyWay will be the 18th World Hydrogen Energy Conference (WHEC), held in Essen in May, 2010. Not only conference guests, but also visitors to Essen, the European Capital of Culture 2010, will then be able to experience this groundbreaking technology in NRW. The annual meeting’s focus was not only on international projects, but also on the activities of EnergyAgency.NRW’s Competence Network Fuel Cell and Hydrogen NRW and its around 350 members. “This network is one of the largest technology platforms of its type in Europe. We maintain intensive cooperation with our partners in Germany and Europe as a whole, and intend to continue contributing as a highly capable partner to the programs run by the federal government and the EU”, notes network head Dr. Andreas Ziolek. More than eighty projects have up to now received subsidies of 82 million euro, from a total volume of more than 133 million, from the NRW economics ministry, in cooperation with the science and technology ministry.

Energycharged presentation

The Hanover Trade Fair is one of the world’s most important platforms for technical innovation, and the world’s largest energy fair. Energy state NRW will again showcase its activities here, from April 20 to 24, 2009 in Energy Hall 13. Under the motto of “Mobile with new energy”, the state, with EnergyAgency.NRW and some twenty other enterprises and research institutions, will be showing the latest products and services in the fields of “Fuels and Propulsion Systems”, “Fuel Cells and Hydrogen” and “Photovoltaics” on a 600 m² display area. Export specialists will also be providing information on potentials for German firms on foreign markets. Korea is the Hanover Trade Fair partner country for 2009.

In addition to the leading new international Wind fair, mobility will be a prime focus in Hanover this year, and will be highlighted by EnergyAgency.NRW and the Competence Network Fuels and Future Propulsion Systems in a series of addresses held in the Clean Moves congress forum to be held on Wednesday, April 22, 2009 from 10:00 to 15:00 h on the topics of alternative-fuel (Clean Fuels) solutions, electromobility concepts, hydrogen and fuel cells. Hall 24 will feature a further main attraction, the E Motive presentation, focusing on alternative propulsion systems and electric vehicles.

Power Plant Technology

The Competence Network Power Plant Technology NRW will also be there in Hanover - the network will have a joint stand with the VGB and FDBR, at the leading Power Plant Technology fair. The Power Plant Technology fair expands Hanover’s commitment to the topic of energy by yet another important segment. The focus will be on technologies for the planning, construction, operation and maintenance of power-generating plants. Competence Network Power Plant Technology NRW partners will be able to present their companies on the joint stand at preferential conditions granted by the Hannover Messe exhibition company. The stand is centrally located in Hall 27, immediately adjacent to the Power Plant Technology User Forum, at which current developments in the power industry will be examined and discussed, with a practical emphasis, on all five days of the fair. The User Forum is being organized by the Competence Network Power Plant Technology, in cooperation with the FDBR, VDMA, VGB, ZVEI and Hannover Messe.

Internet: www.brennstoffzelle-nrw.de and www.whec2010.com
Enter school projects by February 27

Which NRW school is running the best energy-savings projects, or other climate-protection campaigns or websites? Until February 27, schools from North-Rhine Westphalia can enter the “Climate protection and the class kitty” schools competition and submit projects on energy-saving and utilization to Energy-Agency.NRW. All years from all NRW educational institutions - from primary schools to occupational colleges - can enter. The only condition: the project must have been completed in the 2006 to 2008 period. Entry conditions can be found at www.energieagentur.nrw.de/Schulen; contact Andrea Fischer (Tel. 0202/24552-55).

10,000 wood-pellet heating systems now in NRW

Glowing success for EnergyAgency.NRW's wood-pellets campaign: the 10,000th wood-pellet heating system in the state was commissioned in Aachen in mid-January. Reason enough for environment minister Eckhard Uhlenberg to congratulate the owners, the Blatt family, in person. And the lucky household won not only praise, but also their winter fuel stock, in the form of two tonnes of wood pellets, “fresh” from the tanker, a prize donated by Schneifel Pellets, one of the campaign's member companies, from Ormont. The number of pellet-fired systems in NRW has thus multiplied, from its initial 600, since 2003. “This fuel is regenerative, rationally priced, even in the long term, and is locally available. The system hardware is easy to operate and dependable, which is what makes this climate-protecting heating technology so attractive”, commented Heike Wübbeler, of Energy-Agency.NRW. Further information: www.aktion-holzpellets.de or Tel. 0211/4566-692.

In memoriam: Norbert Dahmen

Norbert Dahmen, our source of support over many years, died on December 20, 2008, aged 54, after a short illness. His career with NRW's Ministry of Economic Affairs and Energy extended over twenty-six years. With his exemplary commitment and outstanding technical competence, Norbert Dahmen was instrumental in steering Energy-Agency.NRW to pole position in Europe. He enjoyed the very greatest esteem within the ministry, EnergyAgency.NRW and well beyond. He was, at all times, totally focused on his work, successfully translating the state of NRW's energy policy and strategic targets into reality. A committed fighter for the cause, he nonetheless always remained friendly and approachable. “The sudden death of Norbert Dahmen is a great sadness to all of us. We lose in him both a colleague and a friend, and he leaves behind a great void. All our sympathies go to his wife and daughter”, stated NRW economics and energy minister Christa Thoben.

www.energieagentur.nrw.de