Hydrogen as an energy source

Experts discuss CCS

Twelve winners in “Climate Protection and Class Kitty” competition

Standards: From low-energy house to green building
German Geothermal Conference 2009 in Bochum

The German Geothermal Conference will take place in Bochum from 17 to 19 November. The conference will be organised by the association Geothermische Vereinigung e.V. - Bundesverband Geothermie, in cooperation with the GeothermieZentrum Bochum and the geothermal office of EnergyAgency.NRW (Geothermie.NRW). The event will be supported by the two-day specialist exhibition GEOEnergia2009 on 18 and 19 November. In addition, the 5th Bochum Geothermal Day will take place on 17 November within the framework of the German Geothermal Conference 2009. Further information on the conference can be found at www.geothermie.de or www.energieagentur.nrw.de/geothermie

Conference on storage of renewable energies

The World Council for Renewable Energy and Eurosolar will be holding a conference on 24 and 25 November in the North Rhine-Westphalia representation facilities in Berlin, among others in cooperation with EnergyAgency.NRW. The conference will be on the subject of storage of renewable energy and will last for two days. The conference programme and registration forms are available at www.eurosolar.org.
Dr. h.c. Fritz Pleitgen
Management Board Chairman of RUHR.2010 GmbH in Essen

Water - the coal of the future

As early as the 1870s, Jules Verne already wrote that water would be the energy of the future, and would secure our energy supplies. So it was not a scientist but a man of letters who was the spiritual father of the hydrogen-based fuel cell. Thanks to research, the future has already been born - what was considered science fiction in Verne’s time, is now becoming reality.

As a journalist, I reported on scientific innovations, but never actually worked in an editorial office specifically concerned with science and technology. Unfortunately, this means that my understanding of the chemical processes which take place in fuel cells is incomplete. In fact, I probably know more about outer space than I do about anodes, cathodes and ions zipping through membranes. But I do understand the results: electrical current and heat are produced during the reaction - and these can be used for powering motor vehicles or heating homes. And the really clever thing is that the only waste product is water!

In 2010 the Ruhr Region will be European Cultural Capital, and the watchword of RUHR.2010 will be sustainability. This does not refer only to the wide variety of culture in the region and formation of a new Ruhr metropolis from 53 towns and cities. We must think beyond coal: if coal was the fuel for industrial society, renewable energy sources stand for an environmentally-friendly future in the knowledge society. Therefore an important part of RUHR.2010 will be the 18th World Hydrogen Energy Conference, where 1,500 guests are expected in May 2010. The fact that Essen was selected as the location for the World Hydrogen Energy Conference demonstrates that future energy “made in the Ruhr metropolis” has won attention and respect at the highest international level. And the fuel cell is firmly anchored in the Ruhr metropolis. A considerable amount of research is being carried out at the Duisburg-Essen University at the Centre for Fuel Cell Technology. The infrastructure company Vestische Straßenbahn AG started operation of two fuel cell buses in May, and in Gladbeck there is company which specialises in production of fuel cell systems for buses. And the locations where electricity and heat are won from mine gas, read like a list of the former coal mines themselves. Because of the solar industry, Gelsenkirchen is changing from the city of a thousand furnaces to the city of a thousand suns. Visions and goals create energy - and not only in the worlds of art, culture and creativity!
The previous decade brought rapid technological development as regards fuel cells. In North Rhine-Westphalia this progress was made possible above all through the Fuel Cell and Hydrogen Competence Network, which will celebrate its tenth anniversary in 2010. Established by the NRW Economic Affairs Ministry with an initial membership of 50, the network has since become a cluster with more than 350 players from many nations working on further development of the fuel cell and its introduction to the market.

“A modern society like ours depends on having energy supplies which are secure and cost-effective and which also protect resources and the environment. Hydrogen and fuel cell technology can play a major part in this, because it is efficient and therefore environmentally friendly, while supporting security of supply and value creation in our own region; in other words, all the plant and individual components for hydrogen and fuel cell technology can be developed and produced in local companies and research institutes”, confirmed NRW Economic Affairs Minister Christa Thoben. The fuel cell also has the potential to become a winner for export “Made in NRW”. The focus of activities within the network has always changed to fit with current questions in the area of fuel cell technology. At the beginning the most important thing was to bring the players in NRW together and to intensify knowledge transfer from research into industry”, says Dr. Andreas Ziolek, director of the Network at EnergyAgency.NRW.

Since the establishment of the competence network, around 90 projects - mostly cooperations - have been initiated. The NRW state government has also supported the projects with funding worth around 92 million euro. The first projects were concerned with initial applications of the new technology - such as stationary energy supply systems which were tested in smaller-scale field trials. Failures at the beginning caused by numerous system breakdowns were overcome after the competence network drew the attention of companies in NRW to the problems. The result was that a series of projects started with the aim of developing suitably modified system components such as fans, power inverters and regulation devices. Since then, North Rhine-Westphalia has enjoyed even more prominence as a location.
Hydrogen as an energy source

With the erection of the building for the “Test, Application and Assembly Center” (TAZ) and extension of scientific activities with new fields of interest, the second development stage at the Centre for Fuel Cell Technology (ZBT) at Duisburg-Essen University is now complete. Generous funding from the state of North Rhine-Westphalia and the EU Objective 2 Programme has been provided to support the facility. Now sufficient space — amounting to 1,150 m² floor area — are available in the TAZ for trialling and development of manufacturing methods, system examinations and analysis laboratories.

The new fields of electrical chemistry and layer technology, hydrogen technology, microsystems, manufacturing technology and also quality assurance and testing have been successfully added to the existing departments, which are concerned with gas process technology and fuel cell and systems technology. The portfolio of the development service provider ZBT has therefore now been adapted to fit the needs of the industrial partners more closely.

For high-quality fuel cell components which are in demand by both domestic and foreign fuel cell manufacturers.

The fact that development of applications became more important as companies gained increased know-how in the area of fuel cells was on the one hand a logical consequence as far as the market was concerned, and also constituted a further milestone in the history of fuel cell development. The applications mainly concerned products such as fuel cell forklift trucks, midi buses, cargo bikes and uninterruptible power supplies. Some of these were developed within the framework of the HyChain project. This was a project on the international level funded by the European Union in which four regions from France, Spain and Italy worked together with the state of North Rhine-Westphalia. The results of the cooperation were presented to a wider public for the first time during the Football World Cup in Germany in 2006 and were able to prove their worth on a practical level.

Numerous fuel cell applications are now ready for the market. The current challenge is to prove the suitability of fuel cells for everyday use when subject to the requirements of a wide variety of applications. The National Hydrogen and Fuel Cell Innovation Programme (NIP) of the federal government is concerned with this, among other things, and for the first time appreciable numbers of fuel cells are being used in a practical context within the framework of large-scale demonstration projects. In addition to technical questions, it is planned to subject aspects like infrastructure creation, safety technology, certification etc. to critical examination. The German government has provided around 500 million euro of funding for this purpose. In addition, developers hope that higher volumes will bring cost reductions as regards systems and components. As Dr. Andreas Ziolek says: “Based on the results achieved so far, we will prepare the next step for widespread use and mass production of fuel cells. In order to enter the mass production stage, in addition to the necessary technical advances it is above all important to achieve further cost reductions through introduction of suitable manufacturing and assembly methods, accompanied by corresponding standardisation and quality assurance.” Among others, the Test, Application and Assembly Centre (TAZ) at the Centre for Fuel Cell Technology (ZBT) in Duisburg (see box) has accepted this challenge.

Efforts in the area of research/development and introduction of fuel cells to the market in North Rhine-Westphalia will again be considerably increased by means of the major “NRW Hydrogen Hyway” project agreed in 2008 under the umbrella of the NRW energy and climate protection strategy. The government of NRW has

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ZBT SUPPORTS FUEL CELL TECHNOLOGY

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As a result of the second development phase, the ZBT now employs an interdisciplinary team of more than 90 qualified staff, some with many years of experience in the research domain. Internet: www.zbt-duisburg.de
agreed to provide around a further 60 million euro for development and demonstration projects and also for measures relating to infrastructure. The intention is to develop and intensify existing activities between 2009 and 2011. The starting point for fuel cell applications is hydrogen as a by-product of industrial processes. For example, a study by the Wuppertal Institute, concludes that the volume of hydrogen produced would be sufficient to fuel 300,000 passenger cars or 6,000 buses on an annual basis. The following initial projects have already begun:

- development of an 18-meter-long fuel cell-battery hybrid bus as a joint project between Germany and Holland which is to be used in the Regionalverkehr Köln (RVK) local transport system.

The work on fuels cells carried out in North Rhine-Westphalia will find expression from 16 to 21 May 2010, when the “18th World Hydrogen Energy Conference 2010” will take place in Essen under the auspices of the International Association for Hydrogen Energy (IAHE). This is the major forum for global coordination of fuel cell research and will be organised by EnergyAgency. NRW on behalf of the state of North Rhine-Westphalia. “The fact that the World Hydrogen Energy Conference is taking place in Essen in the year when the Ruhr Region will be European Capital of Culture is a clear indication that the solution of existing problems with energy supply is also a challenge on the cultural and social levels. The process of transformation from an industrial to a knowledge society, which is clearly demonstrated by the changes taking place in the Ruhr Region, seldom finds clearer expression than in the way societies win their energy”, says Dr. Frank-Michael Baumann, CEO of EnergyAgency.NRW, describing the connection between the two events.

The International Hydrogen Conference takes place every two years in different continents - the last one in 2008 in Brisbane, Australia. the WHEC2010 will among others be supported by the German Fuel Cell and Hydrogen Association (DWV), the Forschungszentrum Jülich research center and the trade fair body Messe Essen.

At the top of the agenda of WHEC2010 is the positioning of hydrogen as a fuel more clearly on the route towards a sustainable, climate-friendly energy economy. Clear strategies for introduction of hydrogen technology in the participating countries will be created. Around 1,500 guests from Germany and abroad will take part in the conference and discuss various themes - from research, technical development and introduction to the market up to and including political perspectives and strategic analyses.

The programme of events also includes an exhibition and an extensive framework programme directed towards the interested public, with excursions to hydrogen and fuel cell projects in NRW. In order to introduce young scientists to the energy supplies of the future, informative and qualification events for pupils, teachers and students are also on offer. Internet: www.whec2010.com
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RW Economic Affairs Minister Christa Thoben congratulated the five groups of winners of the North Rhine-Westphalian competition for school pupils - "Fuel Cell Box" 2008/2009 on the subject of hydrogen and fuel cell technology - at the logistics centre of the company Hoppecke Batterien GmbH & Co. KG in Bad Wünnenberg-Haaren. The theme of the competition was the planning and creation of a functioning, highly-efficient fuel cell forklift truck. First prize was won by the team from the Inda Gymnasium in Aachen. Joint second place went to the groups from the Aloisiuskolleg in Bonn-Bad Godesberg and the Ingeborg-Drewitz Gesamtschule (comprehensive school) in Gladbeck, who both gained the same number of points. All the members of the three teams received professional fuel-cell-powered model vehicles from Minister Thoben. The members of Städtisches Gymnasium (grammar school) Bergkamen, in fourth place, each received an iPod, and the team members from the Albert-Einstein-Gymnasium (grammar school) in Duisburg (in fifth position) each received a trolley.

"The Fuel Cell Box competition is an important instrument in order to interest young people in technical education and study in the area of energy technology", said Minister Thoben. “This is vital both for the future employment prospects of the young people themselves and the development of the economy as a whole, as there is a current shortfall of 20,000 engineers in NRW. This will have negative consequences for North Rhine-Westphalia as an industrial and technological hub in the foreseeable future if we do not take action now.” A new “Fuel Cell Box” competition is therefore also planned for the coming school year.

The competition was again organised by EnergyAgency.NRW and h-tec GmbH

Further projects are under preparation. EnergyAgency.NRW co-operates closely with the federal authorities with regard to these projects; for example, a hydrogen fuel station in Hürth for fuelling of the bus of Regionalverkehr Köln GmbH, is to receive funding from the NIP. However, those concerned with the project in NRW are still not satisfied with the results achieved so far. True to the idea that standing still really means going backwards, development is continuing. Progress in hydrogen storage technology, in fuel cell stacks and their components, will further expand the range of applications for this technology and lead to a significant reduction in costs. In some areas, such as that of uninterruptible power supply (UPS) or storage technology, it is already competitive, as demonstrated by orders for several thousand UPS installations for Indian Telecom and the use of more than one hundred fuel cell forklift trucks in American warehousing companies. Programmes such as NRW Hydrogen Hyway and the NIP provide considerable impetus for the development and demonstration of fuel cell technology in Germany.

Further information: www.brennstoffzelle.nrw.de, Dr. Andreas Ziolek, EnergyAgency.NRW, Tel. +49 (0)211/866420 and 9th Annual Meeting of the Fuel Cell Competence Network, 10 December 2009, Düsseldorf
Carbon Capture and Storage (CCS), separation of the greenhouse gas CO₂ out of power plant waste gases and its subsequent storage, is under discussion in the world of power sector experts. Prof. Manfred Fischedick from the Wuppertal Institute for Climate, Environment and Energy gave an interview on the technical feasibility, cost-effectiveness and environmental friendliness of this new technology.

In your opinion, what are the chances for CCS?
It is not possible to offer a final answer to this question from today’s point of view. For example, the costs of the technology cannot yet be estimated with sufficient accuracy. The development of the costs of other climate protection options and their uses is a further factor which will influence the possibility of CCS becoming a competitive alternative at the national level. As far as the costs for renewable energies are concerned, we know that we still have considerable scope to lower prices, while in the case of energy saving we know that it is already extremely cost effective today, but that existing potentials are often not used because of various obstacles. The question of acceptance within society for implementation of CCS on a national level will also be extremely important. The pressure to make use of CCS as an option for climate protection is a great deal higher on the global level. This will open up opportunities for value creation for those at the forefront of the technology.

There are numerous projects all over the world in which CO₂ is captured and stored. When will CCS be ready for widespread use?
Despite the experience gained with some commercial installations and numerous demonstration plants, it cannot be said that CCS technology is ready for the market today, in particular as regards large-scale industrial applications. Based on what we know today, I would not expect the technology to be ready in this respect before the year 2020 and perhaps only in 2025. It takes time to gather experience, and development cycles and learning processes cannot be speeded up at will. When the first demonstration plant enters operation, probably in 2014, it is necessarily the case that up to a further decade will be required until the technology can be used on a larger scale and “off the peg”. In addition to technical questions, experience will also have to be gathered as regards the legal aspects, and questions of infrastructure will also have to be solved.

What challenges have to be met in the area of transport?
The largest sources of CO₂ and the potential storage locations often do not lie within the same regions. Large distances will have to be covered, and therefore considerable challenges will arise as regards infrastructure. In view of the volumes to be transported - in the case of a fully-developed power plant in the range of several million tonnes per year - there is really no alternative to transportation via pipeline. Against this background, careful planning of the pipeline routes - for example the avoidance of laying in hollows – and participation of the general public at an early stage are the most important aspects. Further challenges have to be met if cross-border infrastructures, e.g. in collaboration with the Netherlands, have to be developed. This could become relevant in view of the regional distribution of the storage locations.

Is there sufficient storage capacity for the CO₂ which is produced?
At present, estimates exist for the potential storage capacity in Germany. According to these, there is sufficient capacity to accept the CO₂ produced at the large individual sources - for example power plants - over between 30 and 70 years. The Federal Institute for Geosciences and Natural Resources is currently in the process of developing a storage register for Germany, which will help us to gain more information. However, this cannot in itself replace detailed consideration of individual cases. Experience to date with detailed analyses of selected locations indicates that the actual useable potential could be less than current estimates.

What role is played by CCS in climate protection?
The challenge is enormous. If the guidelines of the Intergovernmental Panel on Climate Change are to be followed, greenhouse gas emissions must be reduced by more than 50 per cent by 2050 in relation to 1990, and must be reduced in the industrial countries by between 80 and 95 per cent. This appears necessary in order not to allow temperature increase of more than 2°C in comparison with pre-industrial levels. For coal-based countries and regions, CCS can make a contribution to achievement of these targets if the technology can be further developed and used so as to be viable from the point of view of economics and the environment and also as regards society as a whole. However, by far the most important climate protection options, both nationally and internationally, are the development of renewable energies and exploitation of energy-saving potentials. These should be given absolute priority. The measures taken in these areas will decide if ambitious climate protection targets can actually be achieved.

How important will acceptance on the part of the general population be for the future of CCS?
Acceptance within society is central to implementation of CCS technology. Nowadays, attempts to implement projects against the will of the general population lead to considerable additional costs and time delays, and in some cases even to their complete abandonment. In the case of CCS technology, it is not a question of implementing one individual project, but of construction of several plants and development of a completely new transportation and storage infrastructure. This means that far more people will be affected than is the case with a single power plant today. In my view, public discussion of the chances and limitations of CCS technology is needed, and neutral, trustworthy players must be found to act as moderators.
Science and politics discuss CCS technology

Capture and underground storage of carbon dioxide from coal-fired power plants (Carbon Capture and Storage, CCS) is, in the words of the North Rhine-Westphalian Economic Affairs Minister Christa Thoben, “an important chance for industry which we don’t want to miss. Electricity generation from coal is essential in the medium term. However, we can only achieve acceptance for coal-fired power plants on the part of the general public if we make every effort to drastically reduce carbon dioxide emissions the world over. CCS technology can be an important step along this road.” Such were the Minister’s words on the occasion of the “Climate protection through carbon dioxide storage” conference, organised by the Ministry of Economic Affairs, Energy Agency NRW and the Wuppertal Institute for Climate, Environment and Energy. Politicians, internationally-recognised scientists and engineers from all over the world discussed the technology before an audience more than 200 strong.

Two pilot plants are currently planned in Germany: the Swedish energy company Vattenfall is undertaking a project in the east of Germany, while RWE Power AG intends to build a 450-MW power plant with CCS technology in Hürth near Cologne. The CO₂ produced there is to be captured by up to 90 per cent, transported to Schleswig-Holstein through a pipeline 500 kilometres in length and then pressed into suitable underground rock formations.

According to plans of the European Commission in Brussels, there should be a series of plants with CCS technology throughout Europe by 2020. A corresponding EU directive was published in the Official EU Journal on 5 June. The directive has to be transposed into national law, and corresponding legislation has been drafted by the German government and is currently under discussion by the different parliamentary parties.

The Bundesrat (upper chamber) already agreed in principle to the legislation on 15 May. The EU will provide funding of 1.25 billion euro for research and development, of which 250 million are intended for the two German projects.

“What we now urgently need is comprehensive, factual and ongoing explanation to the public regarding the chances this technology offers with regard to climate protection. However, the risks must not be ignored. The state government has already made very active contributions here, and we are ready to face the discussions openly, fairly and without prejudice. In fact, the state government already established a widely-based dialogue with companies, industrial federations and trade unions several weeks ago with regard to the future of CCS. I am sure that in the north of Germany also such an initiative can lead to success. Our experience is that the public appreciate it if they are provided with information and transparency in a sensitive manner early on,” continued Minister Thoben. Energy Agency NRW has published a brochure on the subject of carbon dioxide capture and storage (“Kohlendioxidabtrennung und -speicherung. Fakten zu CCS”) and an Internet portal in connection with the event. The brochure can be requested by phoning 01803/190000.

Further information:
www.energieagentur.nrw.de/ccs-tagung
New research on PCC

Experts expect many benefits from the use of post-combustion carbon capture (PCC) when it comes to the reduction of CO₂ emissions. A new research project is intended to investigate the matter thoroughly. Reduction of CO₂ emissions is a central theme in future electricity generation, above all when coal is used as an energy source. Pre-combustion carbon capture can be used for gasification technologies which, however, cannot be considered to be the state of technology at the present time. Firing with pure oxygen and subsequent capture (Oxy-combustion carbon capture), on the other hand, necessitates considerable intervention in the plant technology.

Design of plant ensures mobility

Only limited experience is currently available in Germany with regard to PCC for use in coal-fired power plants. It is true that projects have been initiated for basic research under ideal conditions which generally utilise synthesised flue gases. However, up to now it could not be guaranteed that the findings are transferable to real conditions in power plants such that reliable and smooth operation results.

A mobile CO₂ scrubber is being built and operated in order to close this gap. Because it is designed in the form of a container, it can be transported to operating sites by truck where it is then subjected to a partial flow of flue gas. This means that equipment is now available which makes it possible to test laboratory-developed scrubbing fluids under real conditions at different coal-fired power plants (both hard and brown coal) in order to establish design parameters for scrubbing on an industrial scale.

The plant will be equipped with two absorbers which can be switched in series or in parallel and which can be in the form of packed columns and/ or a spray washer as required. Conditioning with regard to SO₂, NOₓ, steam content and gas temperature of the partial flue gas flow which is fed to the absorber is performed in a column upstream of the main equipment.

NRW universities in international cooperation

The project, costing a total of around 4.4 billion euro, was applied for by ef.Ruhr and the scientific aspects will be performed by the Chair of Environmental Process Engineering and Plant Design (LUAT) at the University of Duisburg-Essen and also by the Institute of Energy and Environmental Technology (IUTA e.V.), with further participation by the Chair of Environmental Engineering at the University of Dortmund. The basic engineering will be carried out by Australia’s Commonwealth Scientific and Industrial Research Organisation (CSIRO), which already has experience with three installations. This also means that the project will attract attention at the international level. The project will be funded within the framework of the HighTech.NRW-Initiative.

Contact: Prof. Görner (LUAT), E-Mail klaus.goerner@uni-due.de
Model region Rhein-Ruhr

North Rhine-Westphalia will, with its Rhine-Ruhr region, become one of eight model regions for electromobility in Germany - this has been decided by the Federal Ministry of Transport. Out of 130 applicants, North Rhine-Westphalia qualified with the Rhein-Ruhr region and the competence centres Münster and Aachen and will now receive funding from the “Model Regions Electromobility” programme.

The programme, which has received 115 million euro from the second economic stimulus funding package of the Federal Ministry of Transport, Building and Urban Affairs provides targeting funding for trialling and preparation for the market of electrically-powered vehicles until 2011. The aim is to achieve effective integration of passenger cars, local public transport systems, delivery and utility vehicles, and also motorbikes with alternative drive systems. A further intention is to develop a user-friendly and safe infrastructure for electrical charging of the vehicles.

As a complement to the programme of the federal state, North Rhine-Westphalia also started the NRW-EU Objective 2 competition “Elektromobil NRW” within the framework of the first German Electric Vehicle Congress in Bonn on 16 June 2009. This competition has been provided with 60 million euro of funding in order to drive forward research and development in the sector. The intention is that there should be 250,000 electrically-driven and hybrid vehicles on the roads of NRW by 2020. The final date for submission of draft projects is 24 September 2009. (www.ziel2-nrw.de).

The government of NRW sees the great potential for NRW, both for the location itself and for value creation arising from electrification of the drive train. This is a good day for the NRW as an automotive centre, explained Economics Minister Christa Thoben in front of 500 participants at the conference in Bonn. “Because of its high traffic density, our region is practically predestined to perform model trials. All possible applications - whether in the area of passenger cars, in road haulage companies or in local public transport - can be utilised in North Rhine-Westphalia. Not forgetting the excellent conditions pertaining here for a suitable infrastructure”

Numerous concepts of the automotive manufacturers for plug-in hybrids and electrically-powered vehicles with range extenders (using additional diesel motors or fuel cells) extending up to vehicles powered by electricity alone, indicate that the character of mobility will change considerably over the next ten years because of electrification. Travelling with electricity on the one hand reduces dependency on mineral oil and on the other hand has the effect that saving petrol can also save emission of greenhouse gases, if the necessary electricity is won from renewable energies. However, a great deal of research and development is needed until larger market shares are gained in the road traffic sector. Keywords here are safety, weight and range of the necessary batteries.

Therefore, at the end of last year, the federal government established a national development programme for electromobility, in which the federal states are explicitly called upon to develop model regions for electromobility. In its successful application, North Rhine-Westphalia drew attention among other things to its strengths in the automotive and automotive supply sectors, in the energy economy, in logistics and in the chemical and plastics industries, and also to its wide-ranging research activities concerned with vehicle development, battery research and development and system integration of battery, vehicle and battery charging infrastructure. Further information: www.energieagentur.nrw.de

NRW – ready for fuels of the future

It is possible to achieve alternatives to petrol and diesel in the medium term. This is the result of a study on the introduction of synthetic fuels in NRW using the example of GTL (gas-to-liquid), which was commissioned by the Economics Ministry and presented during the Conference Forum “Clean Moves” at the Hanover Trade Fair. According to the study, North Rhine-Westphalia is, with its strong automotive supply industry and recognised diesel research facilities, well placed to participate in introduction to the market of GTL, also on an international scale. In 2010 there will already be sufficient production capacity to cover requirements for niche applications in North Rhine-Westphalia.

The synthetic GTL fuel, manufactured on the basis of natural gas, promises a reduction in local hazardous airborne emissions (particles and nitrogen oxides), without the need to undertake complicated modifications to vehicles or the diesel engine. Therefore GTL is particularly suitable for use in centres of population and along the environmental zones which have now been established.

Further information and downloads at www.kraftstoffe-der-zukunft.de
The new solar dimension

The most modern test centre for solar modules in the world was opened in June by the TÜV Rheinland Group in Cologne. This independent inspection service provider has invested around four million euro in the new building and in state-of-the-art technical equipment for checking the safety, quality and energy efficiency of photovoltaic modules and solar collectors. Around 70 per cent of all manufacturers of solar modules in the world have their products tested in the TÜV Rheinland laboratories in order to gain international market approvals. More than 40 experts will work in the test centre. The new test centre is, at 1,800 square metres, three times as big as the previous centre, which was no longer able to fulfil the requirements of a rapidly growing market for the use of solar energy.

The experts from TÜV Rheinland not only test the modules, but also develop new test methods, participate in research and development projects for the use of solar energy and support development of solar power plants for clients all over the world. For example, a lifetime durability test which was co-developed in Cologne is now the international standard. In the test, sunlight and hailstones and also continuous rain are simulated and also - in special climate chambers - high air humidity and temperature deviations between minus 40 and plus 85 degrees celsius. This is because the local climate in particular has a strong influence on the durability and efficiency of the modules, which are intended to maintain their performance capacity, even after twenty years.

The TÜV Rheinland Group started technical testing of solar components on a laboratory scale as early as 1995 and has now achieved the position of market leader with the support of the state of North Rhine-Westphalia. The NRW Innovation Ministry funded several research projects, for example, in which the corresponding test systems and processes were developed.

Further information: www.tuev.com

“The opening of the new cargo centre at Cologne-Bonn airport is an important signal in these times of economic difficulty. The investment of around 25 million euro demonstrates to haulage and freight companies that we care about their needs”, said State Secretary Dr. Jens Baganz from the Ministry of Economic Affairs in Düsseldorf during the inauguration of the new Cologne-Bonn Cargo Center (CBCC) at the airport of the same name, which is the second most important freight airport in Germany.

“Modern systems, improved process sequences and better regional access ensure efficient productivity, from which in particular medium-sized haulage firms are intended to profit”, explains Dr. Baganz. The varied advantages of the airport location as an international hub for the entire region was emphasised by all the speakers at the event. The central
First wind turbine with hybrid tower

The first wind turbine in the world with an Advanced Tower Systems (ATS) hybrid tower has been feeding power into the electricity supply network since May 2009. The lower part of the tower, located at the wind power test site near Grevenbroich, consists of narrow prefabricated concrete components, while the upper part consists of conventional steel elements. The turbine reaches a total height of 180 metres, with a hub height of 180 metres. The turbine was erected and is operated by the ATS Project Grevenbroich GmbH.

The ATS not only makes considerable hub heights possible, with consequently higher energy yields. A further ground-breaking feature is the fact that the overall costs are relatively low and the tower is extremely easy to transport. The response of the sector as a whole has been correspondingly positive. “The ATS concept has aroused considerable interest with project developers and turbine manufacturers, and also investors at international wind power exhibitions such as EweC in Marseilles and Windpower in Chicago”, explains ATS Sales Manager Johannes Bietz. It is intended that the tower will be used in a series of wind energy projects by the end of 2010. More than 20 further ATS installations are at the planning stage.

The system can deliver 20 per cent more energy than turbines with the widely-encountered hub height of 100 metres. The higher costs for erection of the tower have therefore been covered within around four years. A further advantage is that maintenance costs are extremely low. Over the long term, this results as a whole in considerably lower power generation costs than with the systems which are now usually found on the market. This is particularly significant with regard to inland locations where wind speeds are low. The elements of the hybrid tower are designed in such a way that no special measures are needed for transport, and also so that more inaccessible locations (for example in the forest) are easy to reach. Info: www.ats.eu

Sunroof for Cologne-Bonn Airport

Last year, the Ministry of Economic Affairs started the photovoltaics and solar energy campaign “Photovoltaics NRW – Solar Power for North Rhine-Westphalia” together with EnergyAgency.NRW and companies from the region. Half the funding for the campaign is provided each by the Ministry and by the participating companies. Intensive publicity and targeted marketing activities are available to the partners within the framework of the campaign. Practical help is also available for interested customers. The objective is in particular to create more transparency regarding the photovoltaics market in North Rhine-Westphalia. EnergyAgency.NRW is responsible for coordination. Information: www.energiebau.de and www.photovoltaik.nrw.de
New pellet production in Titz

A further wood-pellet production facility has started operation, this time in Titz-Ameln, Düren County. The operator is Westpellets, a partner in EnergyAgency.NRW’s “Wood Pellets Campaign”. The pelletizing plant here will have an annual production rate of around 10,000 tonnes, consisting of high-quality “DIN plus” pellets for end users throughout the region. The new facility is located at the Ameln energy park, which is also the site of a modern biogas plant. These two installations operate in technical and organizational tandem, with participation by farmers from the surrounding region. Josef Nüsser, the mayor of Titz, praised the farmers’ “bright idea” in turning to energy generation as an alternative, following the closure of the local sugar refinery. The farmers supply maize, the raw material needed for fermentation. The vegetable residues remaining in the biogas plant after fermentation have a high mineral content and are subsequently used as fertilizers. “There’s no waste - everything gets used”, commented Klaus Dering, managing director of the Farmers’ Maschinenring Rheinland West e.V. machinery cooperative, at the inauguration. The biogas produced is used on site for power generation, and the electricity, around 1.2 megawatt, is fed into the local power supplier’s grid. The heat yielded in power generation is utilized in the adjacent pelletizing plant. Here, sawdust purchased from sawmills in the hilly Eifel region is dried using this process heat and then compressed to form wood pellets.

Further information:
Isabel Dör, EnergyAgency.NRW, Tel. +49 (0)211/4566-602.

The market for solar-thermal power plants is developing rapidly. Facilities offering several hundred MW total output are currently in operation or under construction in Spain. Work is going on at a feverish pace to exploit the enormous potential for solar-thermal power generation in the Mediterranean region and, in particular, the USA. Manufacturers and purchasers of solar-thermal plants can now use the test facilities and commercial-scale systems of the new Test and Qualification Center for Concentrating Solar Technology, or QUARZ, for short, operated by the DLR in Cologne, to test the quality of key components, such as mirrors and absorber tubes.

Concentrated sunlight
In solar thermal power plants, solar radiation is concentrated (or “collimated”) and converted to heat by the absorber. This then drives a conventional steam turbine, a gas-turbine or a Stirling engine. The curved mirrors reflect the incident sunlight on to a focal point or so-called “caustic curve”. In the case of the parabolic-trough power plants which currently dominate the market, these mirrors are arranged in the form of long troughs, which focus the sunlight on to vacuum absorber tubes. The thermal oil flowing through the tubes is heated to 400 degrees celsius.

Product quality, and the durability of components which remain in use for decades, are factors of great importance for manufacturers, operators and project backers, since even tiny deviations from the target can cause significant loss of yield. Where the performance of components is only inadequately known, on the other hand, risk surcharges will force up the price of the solar electricity. The new Test and Qualification Center will enable the DLR to provide power-plant operators and manufacturers with improved support in such questions in the future.

The heart of QUARZ: The mirror and absorber lab
The mirrors used need not only to have extremely good reflective characteristics, and to retain them permanently, the geometrical accuracy of the preshaped glass mirrors generally used is also precisely measured in the laboratory. The absorber tubes are also tested. A range of different test facilities is used to determine, on the one hand, absorption of sunlight, and thermal radiation, on the other hand, without destruction of the glass tube which encases the absorber tube.

This test procedure has been developed on the basis of the many years of experience gained in research by DLR in Germany and at the Plataforma Solar de Almería, in Spain.

Further information: Dr. Björn Schiricke, Tel. +49 (0)2203/601-4507, e-mail Bjoern.Schiricke@dlr.de, www.dlr.de
Energy-saving market in ten cities

Whether electrical propulsion, thermal insulation, solar-power systems, energy-saving building systems, the energy-efficient old building, the economical domestic appliance, or low-consumption vehicles - this market featured tips on economical use of energy for (almost) all areas of life. The NRW state government’s “North Rhine-Westphalia Saves Energy” energy-efficiency offensive went on the road in May, offering a market place for energy-savers. The Roadshow was coordinated by EnergyAgency.NRW, featuring the ADAC German automobile association and the KfW banking group as its prime exhibitors.

“The Roadshow idea proved highly successful, and has borne fruit”, enthused economics and energy minister Christa Thoben at the end. “NRW Saves Energy” recruited a large number of new energy activists, she added.

Some 20,000 visitors took up the economics ministry’s offer on a total of eighteen days in ten cities. “We have successful cooperation with a range of different partners from industry and politics to thank for the success of the Roadshow. A masterpiece of organization and logistics!” commented ADAC president Peter Meyer. The Roadshow progressed right across the state, from Düsseldorf to Mülheim, Wuppertal, Bonn, Duisburg, Essen, Bielefeld, Münster and Dortmund, to end in Cologne. As Dr. Stefan Breuer, director of the KfW banking group noted: “You first have to dig deep into your pocket for thermal insulation, new windows or a new heating system. The KfW group provides low-interest loans, and grants in some cases, to promote construction and modernization projects, in order that average earners and young families can afford these investments”.

“The Roadshow meets the needs of the population. The same applies to private households as to commercial enterprises: energy-efficiency too frequently fails due to lack of information on the technical possibilities and the financial benefits”, summarizes Prof. Dr. Norbert Hüttenhölscher, the director of EnergyAgency.NRW. Not only was the thirst for information stilled, but the hunger for knowledge as well. The Burggymnasium, of Essen, achieved the best score in the schools E=Quiz² competition, receiving the prize of 3,000 euro.
Lore-Lorentz School on passive-house course

It doesn't just look out-of-the-ordinary, it is out-of-the-ordinary! The red facade of Düsseldorf's Lore-Lorentz School, projecting like the bow of a ship into Schlossallee, conceals a seductive energy concept - the first passive-house standard school in the state capital. Construction of this new occupational college cost 5.3 million euro - an investment which is scheduled to be recovered via reduced heating costs.

The building convives beholders with its exceptionally good thermal insulation and a mechanical ventilation system which transfers thermal energy from outgoing air via a heat exchanger to the incoming fresh air. The school building has the unusually low heat requirement for heating of only around 15 kWh/m² annually.

The thermal energy required is supplied by a heat pump, which utilizes geothermal heat obtained via geothermal probes, and provides it for heating purposes. The heat is fed into the building via a supplementary heating register in the ventilation system, on the one hand, and, on the other hand, via a concrete-core conditioning system. The great advantage: circulation of water makes it possible to balance temperatures between the cooler, north-facing and the potentially warmer south-facing rooms. The basement's foundation slab is located on a 20 centimetre thick insulating layer, consisting of extruded polystyrene or foam-glass tiles, depending on anticipated load. The exterior walls of the basement, in contact with the surrounding soil, are also insulated with extruded polystyrene tiles.

A 30 centimetre thick compacted bed of foam-glass ballast produced from recycled glass was installed below the building's floor slab and also continues through the foundation strip zone, completely insulating the building from below. An insulating layer 12 cm thick on average and consisting of WLG 025 polyurethane rigid-foam tiles was installed additionally in the floor structure of the ground floor, in order to assure achievement of the insulation rating for the floor slab.

All exterior facades have been insulated using WLG 035 Building Material Class A mineral wool. Measurements in accordance with DIN EN 13829 verified N₅₀ = 0.12 l/h for the building’s air-tightness, thus bettering the permissible value by a five-fold. EnergyAgency.NRW provided advisory services for this project.

Museum extra efficient

Hagen’s new Emil Schumacher Museum has plenty to be proud of - not only in the form of the canvases by the Hagen-born artist it exhibits. With an energy demand of only 40 kWh/(m²a), the building itself is practically an (energy) masterpiece. The necessary energy concept, which had already been implemented in Cologne’s “Kolumba” diocesan museum, was supplied by the Gerhard Kahler engineering consultancy.

“Museums, generally, present extreme energy challenges, with their high ceilings, special lighting requirements and, frequently, complicated air-humidity control arrangements”, commented Dipl.-Ing. Matthias Kabus, of EnergyAgency.NRW. The “building-in-building” principle made it possible to master this challenge in Hagen. A white concrete cube which houses the exhibit rooms is enclosed in a glass housing, thus climatically isolating the cube.

Heating (in winter) and cooling (in summer) are accomplished by means of a concrete-core activation system (use of the concrete core as a heat store), which is supplied by two heat pumps. These utilize the energy obtained from eighty-one piles, each of which extends down 99 metres into the ground. The heat pumps each provide heating/refrigeration capacity of 80,000 kWh/a for the building. In addition, the air is preconditioned by means of geothermal heat-exchangers, the energy product of the geothermal duct being around 10,000 kWh/a. The “cream” on the “energy cake” is a consistently south-facing photovoltaic installation on the roof of the museum. The City of Hagen anticipates annual energy of approx. 30,000 kWh, covering the high power consumption for lighting, a typical feature of museums.

The decisive factor for the City of Hagen was that the energy concept meets both the functional and environmental requirements equally effectively and innovatively, as well as keeping energy costs low. Total investment for this building was 18.5 million euro, with energy equipment accounting for some 3.5 million euro.

EnergyAgency.NRW awarded the museum building the accolade of “Project of the Month” for August on its website (www.energieagentur.nrw.de).
Remscheid’s Ernst-Moritz-Arndt grammar school reduced its power consumption by no less than 30 per cent between 2005 and 2009, receiving an award from NRW’s Energy Minister, Christa Thoben, in the “Climate Protection and Class Kitty” competition. In all, twelve schools were awarded prizes in the Big Tipi in Dortmund, for their achievements in energy-efficiency and the use of renewable energy.

“Up-to-date use of energy is becoming ever more important, as is demonstrated by the fact that energy-efficiency and renewable energy topics have now become standard elements in lessons at many schools in NRW. School pupils - and, no less important, teachers and school caretakers - have long become vital partners in climate protection, and thus contribute to our state’s urgently needed know-how for the jobs of the future”, enthused Minister Thoben.

This “Climate Protection and Class Kitty” competition was the fourth organized by EnergyAgency.NRW on behalf of the ministry. “NRW’s schools have proven their inventiveness in saving electricity and heat” commented Prof. Norbert Hüttenhölscher, the director of EnergyAgency. NRW, on these results. “In addition, school pupils bring the public and the entire school environment on board with their commitment to energy-efficiency and climate protection”.

“The Barbara school catches the sun”. The transition from the title of their song, which they performed at the awards ceremony in Dortmund’s “Big Tipi” Fredenbaum events venue, to a firm resolve to protect the climate, was but a short step for Mettingen’s Barbara school. Their commitment was rewarded with the first prize among the special-needs schools. The school not only has a solar installation for preparation of hot water and a solar power system on its roof, it also focuses on and illustrates the subject by means of its solar kitchen and a range of solar models. “In the field of “Energy and climate”, every school can take action, and actively shape lessons, irrespective of the pupils’ ages. In our experience, it is the special-needs and primary schools that exhibit particularly great creativity and motivation, on the part both of pupils and teachers”, commented the Minister.

A total of some fifty schools from all over NRW participated in the competition with their climate protection activities from 2006 to 2009.

Two winners from each of six categories were chosen to receive cash prizes.

The winning schools

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<tr>
<th>Grammar schools:</th>
<th>Vocational colleges:</th>
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<tr>
<td>1. Ernst-Moritz-Arndt-Gymnasium, Remscheid</td>
<td>1. Berufskolleg Neuss Weingartenstraße, Neuss</td>
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<tr>
<td>2. Gymnasium Lechenich, Erftstadt</td>
<td>2. Rudolf-Rempel-Berufskolleg, Bielefeld</td>
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<th>Special-needs schools:</th>
<th>Primary schools:</th>
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<tr>
<td>1. Barbara-Schule, Mettingen</td>
<td>1. Barbaraschule, Pulheim</td>
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<tr>
<td>2. Erich-Kästner-Schule, Oelde</td>
<td>2. Herzogschule, Leverkusen</td>
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<th>Comprehensive schools:</th>
<th>Secondary modern schools:</th>
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<tr>
<td>1. Ingeborg-Drewitz-Gesamtschule, Gladbeck</td>
<td>1. Emilie-Heyermann-Realschule, Bonn</td>
</tr>
<tr>
<td>2. Gesamtschule Scharnhorst, Dortmund</td>
<td>2. Osterrath-Realschule, Rheida-Wiedenbrück</td>
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Motivated schools

In all, twelve awards for creative ideas and activities in all aspects of energy-efficiency and renewable energy.
First passive-house swimming baths

Lünen’s baths authority now intends, with assistance from the state and the German Environmental Foundation (DBU) to construct Germany’s first indoor swimming baths using passive-house technology. The new pool is in future to use 50 per cent less energy than a conventional baths. Improved thermal installation of the building shell, triple glazing and heat generation from solar energy will permit annual energy-cost savings of up to 193,000 euro.

“Nothing is as useful as a completed example. This project is unique throughout Germany, and will, we hope, inspire many imitators. It is an ideal example for illustrating in an informative manner the benefits of energy-efficiency and the use of renewable energy”, commented NRW’s Economic Affairs Minister, Christ Thoben, when the plans were unveiled.

The state is supporting the passive-house design of the baths, the use of renewable energies, in the form of a photovoltaics installation with an output of 105 kWp, and a solar-thermal system of 50 m², with a total of some 430,000 euro. These funds originate from the “progres.nrw”, the state’s promotion program for rational use of energy, regenerable energy and energy-saving. Total costs of the project are 11.5 million euro, of which more than two million euro are for extra costs for corresponding energy-saving technologies. The DBU is to subsidize an evaluation, the extra planning costs and a post-completion monitoring program.

Further information: www.progres.nrw.de

Energy management

Energy management is a tried and proven instrument in industrial and commercial premises for the improvement of energy-efficiency and reduction of CO₂ emissions. Management of energy utilization is becoming increasingly important for commercial enterprises, against the background of continuously rising energy prices and ever tougher competition.

In order to fully exploit efficiency potentials in industry, the energy-efficiency of production processes and cross-sectional technologies, in particular, must be improved, energy input reduced by means of optimization of material flows, energy-efficient product innovations and services utilized, and behaviour-based savings potentials exploited. These potentials have, at many locations, not been fully utilized up to now, however. The neglect of efficiency potentials within industrial enterprises is the consequence of a complex of economic, organizational, informal, behaviour and communications deficiencies. An energy management system determines and documents the existing energy-cost-savings potentials, with verification by an energy assessor.

In Switzerland, the introduction of energy management systems is now well advanced, thanks to political incentive models. In Germany, the federal government adopted in Meseberg in 2007 orientation points for an integrated energy and climate program, an essential element taking the form of the introduction of energy management systems being linked to tax concessions for manufacturing companies.

In addition, since 1 August 2009 the new DIN EN 16001:2008 standard has defined the requirements for an energy management system which will enable companies to continuously improve their energy performance, on the basis of a systematic concept, while taking into account legal organizational requirements.

November conference

To illustrate these diverse aspects of methodical energy management with close orientation to practice, Energy-Agency.NRW, in cooperation with the Technische Akademie Wuppertal, has organized a conference to take place on 3 November 2009 in the Historic Town Hall, Wuppertal, and focusing on successfully implemented energy management systems, technical questions, and the legal and planning-policy boundary conditions.

Three companies reporting on their “bitter-sweet” experience during implementation will conclude the event.

Visit www.energieagentur.nrw.de, or mail anmeldung@taw.de, for the agenda and registration.

Further information: www.progres.nrw.de
Hubertus Gilsbach, energy utility

Even if it’s not apparent at first glance: Hubertus Gilsbach, from Schmallenberg, is a North Rhine-Westphalian energy utility. This forestry manager operates a wood-chip-fired heat-generation plant, a watermill, and a wood-gas unit-type combined heat+power generation (CHP) plant. Rather than pinstripes, Gilsbach much prefers dark oil stains on his overalls, from morning till night. He has already found no less than fifteen customers in Schmallenberg for his power and heat, including an old people’s home, a restaurant, an open-air swimming pool and a hotel.

It all started four years ago, with a 50 kW wood-fired boiler, which met not only Gilsbach’s own needs, but also supplied his neighbour with heat during the winter. This boiler is now used only in emergencies, and Gilsbach has since then invested more than 400,000 euro in his projects.

Energy supply is an entrepreneurial idea. Gilsbach’s self-constructed 25 kW wood-gas CHP plant achieves 7,500 hours of operation each year, producing some 60,000 kWh of electricity. Loath to waste even one kilowatt-hour, he uses the waste-heat from the CHP plant to dry the wood-chips. “Wood gasification is a complex technology, making the availability and revenue from this installation even more admirable”, notes Bernd Geschermann, of EnergyAgency.NRW. After deduction of internal consumption, Gilsbach earns around 1,300 euro each month by feeding energy into the grid from his wood-gas CHP plant. He also sells heat to nearby residents. What is more, his watermill generates 50,000 kWh of power annually.

Gilsbach made the transition from a do-it-yourselfer working in his basement to a professional just on one year ago, with the commissioning of his wood-chip heat plant. A neighbour provides the building for the wood-chip installation free-of-charge. Its two boilers, each with an output of 150 kW, last winter supplied the local St. Georg old people’s and care home with heat from regenerative sources for 72 euro cent per kWh. “This has cut the old people’s home’s energy costs by a third”, adds Gilsbach. The 65-bed home has an annual heat requirement of some 360,000 kWh. Further information: e-mail geschermann@energieagentur.nrw.de.

Efficient building competition

In these times of rising energy prices and urgent climate protection, energy-efficiency has become a central quality criterion for residential buildings. Simultaneously, urban living is experiencing a renaissance. The task thus arises of combining energy-efficient construction and good architecture, and fitting both into our “organically” developed townscapes. Against this background, the German Energy Agency (dena) has organized a high-value-prize competition, with “energetic” support from EnergyAgency.NRW, as its regional partner. Oliver Schwinn (of Dorff Schwinn und Partner, Bonn), Dietmar Riecks (banz + riecks architekten, Bochum) and Dirk Mobers (EnergyAgency.NRW) were members of the NRW jury.

The extensive energy modification of a 1920s detached house in Cologne’s inner-city zone convinced both the regional and the national-level jury. The key factors were sensitive handling of the historical building fabric, and the complexity of the interior design. Also noteworthy are the solar installation and the central ventilation system, incorporating heat recovery, in the existing building. This overall concept made it possible to reduce the house’s primary-energy demand from over 200 to just 57 kWh/m²a, i.e., 40 per cent below the current requirements of the Energy Saving Regulation for new buildings. As Dirk Mobers noted: “This house is a great illustration that, with good planning, the character of a building can be preserved, even after highly efficient energy modernization. In addition, the low-interest loans provided by the Kreditanstalt für Wiederaufbau bank mean that these modifications can be accomplished perfectly cost-efficiently”.

Convinced the jury: The house in Cologne’s Sielsdorferstrasse
Climate-neutral - but how?

It all started with aviation - Atmosfair demonstrated how the CO₂ emissions from flights can be ecologically balanced out at a mouse-click, and with only low financial input. The market for climate neutrality is now growing, with a consequent increase in the frequency of the question of quality standards and verifiability. What should companies, municipalities and consumers who wish to neutralize their CO₂ emissions do? The correct procedure is decisive in success for companies who wish to exploit neutralization for their environmental commitment, in particular.

Avoid, reduce, neutralize

The term “climate neutrality” is used to describe the reduction and neutralization of greenhouse-gas emissions. The first option should always be avoidance, or at least reduction, of the emission of greenhouse gases by companies. Unavoidable emissions are neutralized via the financial support of climate-protection projects which reduce or eliminate emissions elsewhere. “Avoid, reduce, neutralize” is EnergyAgency.NRW’s slogan in promoting climate neutrality. The road to this target must be clear and comprehensible, in order to assure effective presentation to the outside world.

A company or municipality should firstly decide which sectors, products or processes are to be made climate-neutral. These may, for example, be business trips, events, products, services, or facility locations.

Quantifying emissions

Fuel and power consumption, and the passenger-kilometres travelled using public transport are determined in order to calculate emissions. The consumptions recorded are then assigned emission factors. Greenhouse gases other than CO₂ are also included if they play a significant role in the company. The enterprise itself is also responsible for deciding the extent to which emissions from upstream and downstream processes, such as the transportation, utilization and disposal of products, are included in this calculation.

The avoidance of emissions within a company is more effective and more credible than any retrospective redress. For this reason, all economically justifiable potentials for energy-savings should firstly be exhausted. Rational augmentations include conversion to eco electricity, heat generation using renewable raw materials, and the use of alternative fuels.

Certificate-based neutralization

Compensation for the remaining emissions is then generally effected via the purchase of CO₂ certificates. This service is generally furnished by specialized service-providers, but enterprises can also perform it themselves. They are then confronted with various certificate types: the ERU (emission reduction unit) and CER (certified emission reduction) originate from recognized climate-protection projects which operate in accordance with the official rules of the Kyoto Protocol. Certificates from the voluntary market, which is less strictly regulated, but therefore also less easily understood, are referred to as VER (verified emission reduction) certificates. The strictest climate-protection certificate requirements are set by the so-called Gold Standard.

Irrespective of their origin, all certificates must be bindingly recorded in the respective certificate register after purchase. The vendor thus prevents their being used for other purposes. This precise documentation also assures companies and municipalities of security in publicizing their climate commitment.

EnergyAgency.NRW provides interested parties with initial advisory services on climate protection, contact: Stefan Leuchten, e-mail: leuchten@energieagentur.nrw.de, www.energieagentur.nrw.de

Stimulus package II: 2.4 billion euro for municipalities in NRW

The second economic stimulus package provides NRW municipalities with some 2.4 billion euro of subsidies for additional investments aimed at improving their educational infrastructure and special sectors of their overall infrastructure. Particular importance attaches in this context to the energy-modernization of existing buildings (including schools, for example). These measures make an important contribution to climate protection and to the conservation of resources, enhance user convenience, and relieve the burden on municipal finances by cutting heating and operating costs.

Information on how municipalities can energy-modernize their properties is available from a new EnergyAgency. NRW Internet portal, which has been set up on behalf of the NRW Economic Affairs Ministry. In addition to extensive basic information on modern energy technologies, renewable energy sources and typical energy-modernization provisions for specific building types, www.energieagentur.nrw.de/kommunale-sanierung also includes a detailed list of FAQs on the current boundary legal conditions. This Internet site also discusses the potentials for energy-orientated improvement, presents Best Practice examples, and supplies information on other programs offering financial support.
Energy standards: from low-energy house to green building

A whole series of names for energy-saving building and modernization have grown up in Germany since the 1990s; a few have become established as standards.

The low-energy house
A building standard, the heat requirement of which for heating is 25 per cent below the requirements of the 3rd Ordinance on Thermal Insulation (1995), is generally designated a low-energy building. The low-energy building became a “standard” in 2002, with the publication of the energy saving regulations EnEV. The term is in some cases also still used today in the relevant literature for building standards that go beyond the minimum legal requirements (e.g. the “Existing low-energy building” model project). The first low-energy buildings were constructed in Germany in the early 1990s.

Passive houses
A “passive house” is a building in which a comfortable interior climate can be achieved with no active heating or air-conditioning system. Typical characteristics of such buildings are, in particular, optimum passive utilization of solar energy, avoiding overheating in summer, a highly compact building design with optimized thermal insulation, extremely high-quality glazing, and a ventilation concept based on the incorporation of heat recovery. Its extremely low heat requirement for heating, of max. 15 kWh/m²a, also enable the passive house to achieve excellent primary-energy ratings.

KfW 40/60 now
Energy-efficient building 55/70/100
These standards are named after the KfW bank’s promotional standards and are oriented around annual primary-energy needs for hot water and heating. The heated-area factor in this context is the gross internal floor area (i.e., 1.2 to 1.35 times the living floor area) as stated in EnEV. Subsidies for the KfW60/40 building have now been superseded by new promotion programs.

The Energy-efficient Building 100 is now the standard for new buildings. Energy-efficient buildings 70 and 55 are 30 and 45 per cent better, respectively. This new line of promotion is also intermeshed with a new “Energy-efficient Building” quality seal which can be awarded both to new and to modernized existing buildings.

Zero-energy and energy-surplus buildings
In these buildings, the energy needs for heating, cooling, ventilation and lighting are completely balanced out by gains in regenerative energy. To achieve a CO₂-neutral annual balance, energy requirement is reduced to a minimum by means of optimized thermal insulation and efficient technology, and the remaining energy needed is obtained by regenerable means. In the case of energy-surplus buildings, a surplus (using a photovoltaic system, for example) is actually achieved and can then, for instance, be used by the residents (for residential purposes, operation of electric vehicles, etc.). The basic energy-surplus building conception is comparable to that of passive and zero-energy buildings.

Green buildings
In so-called “green buildings”, the requirements for sustainable construction go beyond energy-optimization of the buildings. The aim is that the entire life-cycle of a building should be as efficient, environmentally friendly and resource-conserving as possible. Minimization of consumption of energy and other resources should therefore extend not only to the utilization phase, but also to planning, construction and subsequent demolition. Also emphasized are the greatest possible inclusion of health aspects for users, and optimum integration into the social and cultural environment.

National and international building certification standards
The German Sustainable Building Council quality seal introduces to Germany a certificate for sustainable building. The seal is based on a rating system made up of a total of six sustainable construction factors, taking account of ecological, economic, social, cultural and functional aspects, as well as the technology, processes and location of a building. Each factor is subdivided into a number of criteria (total: 60), with measurable targets assigned to every criterion. Between 0 and 10 points can be awarded, for example, for energy requirements or for efficient use of site land. An overall score is then derived from the various weighted criteria and the individual factors. The DGNB’s activities have up to now concentrated on new office and commercial buildings.

The subject of “green buildings” was taken up relatively late in Germany, whereas other states developed their first standards for energy-efficient buildings during the 1990s.
Münster’s first solar estate has now opened in the city’s Gievenbeck district, signaling the inauguration in late June of the “Fifty solar estates in NRW” project’s twenty-seventh completed estate. Following the award of “Solar estate at the planning stage” status to the project in 2007, architect and initiator Jörg Petzold himself founded a new company to implement the project. He has already moved into the 3E-Projekte GmbH office in the new building, where he can now promote the advantages of a passive house to persons interested in building, on the basis of his own completed project.

The passive-house standard reduces annual demand for heat for heating by 80 per cent compared to the legal standard (EnEV). This highly thermally insulated building features underfloor heating, and is equipped with individual ventilation systems for each apartment. The building also has a photovoltaics system and a solarthermal installation. As an addition, geothermal heat is obtained from the soil via a brine-water heat pump with six wells reaching down to a depth of 90 metres. In summer, surplus heat is returned to the soil from the solar collectors for the purpose of regeneration.

This combination of an extremely good building shell incorporating energy-efficient technologies and regenerative energy cuts costs for heating and hot water in the twenty owner-occupied apartments to around seven euros per apartment per month.

Further information: www.50-solarsiedlungen.de

Quality assurance in PV modules

Comparable and substantiated information on the efficiency, service-life and quality of photovoltaics (PV) components and systems are of great importance for both customers and manufacturers. The development of reliable measuring and testing methods for innovative PV module technologies, and the standardization of procedures already in use, are therefore the central focus of the European “A science base on PV performance for increased market transparency and customer confidence – PERFORMANCE” project. TÜV Rheinland is successfully cooperating with twenty-seven partners from thirteen countries on this project, which is receiving support from the EU under the 6th Framework Program for Research and Technological Development. The ultimate target is a uniform PV quality standard.

An example of this research work is provided by inter-institutional surveys performed in the context of a sub-project led by TÜV Rheinland for characterization of the performance of PV modules. For this purpose, seven test institutions successively measured the performance of several modules using various technologies. The striking differences in the measured data obtained by the various project partners in the case, in particular, of the thin-film modules tested, clearly illustrate the need for further standardization of measuring procedures and instruments. Improvements are currently being implemented in the context of PERFORMANCE and will then be reevaluated.

This project illustrates that NRW’s enterprises and research partners can successfully participate and receive support in EU programs. ETN, the project backer, provides initial advisory services, in order to improve the success rate of R&D partners from NRW. This is intended to evaluate initial concepts concerning potential subsidies, and to throw a little light on the EU’s support and subsidies “jungle”. Information is also supplied on current EU support provisions in an ETN newsletter. Project: www.pv-performance.org, Dr. Werner Herrmann, e-mail werner.herrmann@de.tuv.com / EU support advice: www.fz-juelich.de/etn/, Dr. Stefan Ambros, e-mail s.ambros@fz-juelich.de

Seven euro a month for heating and hot water

Münster’s first solar estate has now opened in the city’s Gievenbeck district, signaling the inauguration in late June of the “Fifty solar estates in NRW” project’s twenty-seventh completed estate.
**Photovoltaic art at Cologne's Ludwig Museum**

Art and renewable energy: these are two fields not normally associated with each other. American video artist Jonathan Horowitz has achieved the synthesis, however. Cologne’s Ludwig Museum recently unveiled his “Apocalypto Now” exhibition, which focuses on climate change and is the product of a strategic recycling process. Its special feature: the installation is climate-neutral, thanks to a photovoltaics installation provided by the city’s Energiebau Solarstromsysteme solar power systems supplier.

Solar modules mounted on the museum patio, with a view of Cologne Cathedral, generate clean, no-emissions solar power. This is converted to AC current and then fed immediately to the power supply for the video projection. A panel at the entrance to the installation shows the energy output produced and power consumption in real time. Virtually all the materials used originate from previous exhibitions - the walls of the video booth, for example, come from the “Gerhard Richter: Abstract works” exhibition, and the roof structure is also supported by steel elements which have already borne the weight of another installation.

Further information: www.energiebau.de and www.photovoltaik.nrw.de

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**GADORE Center USA opened**

**NRW presence at Windpower 2009 in Chicago.**

The Windpower, with 23,000 visitors and nearly 1,300 exhibitors, is the world’s largest wind energy fair - and therefore a fitting location for the unveiling of the new “GADORE Center USA” pool office. GADORE stands for “German-American Dialog on Renewable Energy”, and the office is sited in Philadelphia, in the state of Pennsylvania. Its function is to assist German companies who wish to evaluate their market opportunities in the field of renewable energy in the USA, or who are already planning to open a branch there.

Dr. Jens Baganz, State Secretary at the NRW Economic Affairs Ministry, and Donald Furman, president of the American Wind Energy Association (AWEA), jointly opened the outpost with the Governor of Pennsylvania, Edward Rendell. “North Rhine-Westphalia, with its world-leading component producers for the wind-energy industry views North America as an important export market. The inauguration of the GADORE Center USA will help small and medium-sized enterprises to penetrate this, currently the world’s largest wind-energy system market”, commented State Secretary Baganz.

There has, up to now, been a lack for most medium-sized structured companies in the renewable-energy field of a central service and coordination organization to provide optimum access to the US market. The services provided by the GADORE Center USA include rental of rooms, arrangement of contacts within the renewable energy industry, preparation for trade fairs, and the interlinking of consultants, service-providers, banks and investors. “Pennsylvania is even now the home of a number of the world’s largest renewable energy corporations. This partnership between NRW and the GADORE Center USA will make it possible to consolidate and expand this status, particularly in the field of wind energy”, added Governor Rendell.

2,800 MW of newly installed output in the first quarter of 2009 illustrate the significance of the US market. By way of comparison: Germany installed new capacity of just 1665 MW in the whole of 2008. The wind-energy industry in the USA has been enjoying a boom for a number of years now.
Recycling-industry energy concept
The recycling industry is one of Germany’s largest industrial consumers of energy, with a total primary-energy consumption throughout the industry of more than 1,500 GWh each year. It is therefore no surprise that a special energy concept for this sector has now been drawn up in the context of the state government’s “NRW saves energy” energy-efficiency campaign. “Specific-industry energy concepts are based on recognition of the fact that the companies in any one industry generally have identical energy weaknesses. Energy concepts for an entire industry are therefore suitable as aids to orientation and navigation instruments in order to detect and eliminate weaknesses individually in each company”, explains Prof. Dr. Norbert Hüttenhölscher, Executive Director of EnergyAgency.NRW.

Bocholt and Saerbeck NRW climate localities
Environment Minister Eckhard Uhlenberg named the two municipalities of Bocholt and Saerbeck as the winners of the “Climate Plus Campaign – NRW Climate Municipalities of the Future” competition. They will, in future, bear the “NRW Climate Municipality” title. Both municipalities convinced the jury of their concept for implementing climate protection and adapting to the consequences of climate change in rural regions. “Both Bocholt and Saerbeck convinced us with an integrated concept outstandingly tailored to their local situation”, commented Uhlenberg. Bocholt, the first winner, receives 2.2 million euro for implementation of its planned climate protection and climate adaptation provisions, while Saerbeck, in second place, will get 1.1 million euro. The jury, consisting of representatives from the chamber of architects and chamber of commerce, the consumers’ centre and EnergyAgency.NRW, had no doubts concerning the practical orientation and implementability of the winning concepts, and voted unanimously for Bocholt and Saerbeck.

Discover bioenergy
The new www.biomasse.nrw.de homepage is now on-line, providing not only news, background information and specimen projects, but also the opportunity of registering in the on-line industry atlas, enabling interested companies to become members of the Bioenergy Cluster free-of-charge and to discuss the latest developments in the industry and their own project ideas with specialists from NRW. In parallel, the topic brochure, “Bioenergy - a multitalent among renewable energy sources!” has been revised, updated and re-issued. It can be ordered conveniently from the homepage.

Wood pellets to read and draw
Wood-pellet heating systems are enjoying a real boom throughout Germany, just on 100,000 pellet heating systems have now been installed, with 10,000 in NRW alone. In order to inform not only parents, but also children, concerning future-safe heating using these high-power pellets, EnergyAgency.NRW’s wood-pellets campaign and the “More Time for Children” association from Frankfurt have developed a drawing book for three- to six-year-olds. In the book, the appealing “egghead”, Peter Pellet, explains to children how wood-pellet heating systems function and outlines how this fuel is produced. The booklet “Zauberahaft warm mit Holzpellets” (“Magically Warm with Wood Pellets”) costs 1.50 euro and can be ordered from www.aktion-holzpellets.de or from the “Mehr Zeit für Kinder” association at www.mzfk.de.

Ruhrdax 09 – Industry meets officials
The fourth Ruhrdax, a platform aimed at bringing together companies and non-commercial initiatives, is to be held at the Oberhausen Technology Centre on September 30, 2009. The participating enterprises will be offering non-cash aid, from the energy equipping/renovation of rooms, via know-how transfer, up to and including commercial support. Information: Centrum für bürgerschaftliches Engagement, Dr. Jörg Ernst, Wallstr. 7, 45468 Mülheim, Tel. +49 (0)208/97068, e-mail joerg.ernst@cbe-mh.de.

Automated algae production unveiled
NRW’s innovation minister, Prof. Dr. Andreas Pinkwart, focused his praise at the 3rd Federal Algae meeting in Cologne in June on the interaction of the energy industry with the biological utilization of flue-gas CO2 and waste-heat from cooling towers. The Jülich Research Centre has in this context presented new developments for automated algae production, which have been implemented in a joint project with power generator RWE at Niederaussem, near Bergheim. Voluminous production systems can also be equipped with these innovations.

www.energieagentur.nrw.de