innovation & energy

Holistic climate protection

E-world 2008:
Partner country Switzerland  P. 08

Effects of the European Energy Award®  P. 14

The German Armed Forces:
8.3 per cent energy savings  P. 18
Focus

04__ Bali: timetable agreed
04__ Path set for climate protection
05__ International climatic protection from NRW – JIM
06__ The search for environmentally safe mobility
06__ Solar housing in Erkelenz: Climate protection in action
07__ Protection of the climate as an economic engine

Innovation

08__ Forum on modern power plant technology
08__ Swiss energy
09__ Energy highlights from NRW
10__ Aachen: Top-class energy research
11__ „Germany core country in wind-power technology”
12__ Quo vadis, fuel cell?
12__ Accompanying the automobile from the very start
13__ Efficient use of biomass

Application

14__ Effects of the European Energy Award® in Bonn
15__ Heating with scrap wood helps environment
15__ Two wood-fuelled heating systems for teaching
16__ Saving energy with lighting control systems
17__ Contracting for the street lighting in Dormagen
17__ Shining examples
18__ German Armed Forces: 8.3% energy savings
20__ School pupils as architects of climate protection
20__ People in Rheinberg are energy-aware

Magazine

21__ Less is more. Solar modules are becoming thinner
22__ Energy region Rhein-Sieg
22__ Cooler and more pleasant thanks to photovoltaics
23__ Stricter EnEV in 2009
23__ New fork lift trucks
23__ Success with EU programmes

Innovative energy technologies in Hanover

In focus

The Hanover Trade Fair is one of the world’s most important platforms for technical innovations. The German energy state of North Rhine-Westphalia will be showcasing itself at this renowned exhibition in Energy Hall 13 (Stand E10) from April 21 to 25, 2008. On 400 m² of exhibition space, the state, in the form of the Energy Agency NRW and twenty other enterprises and research institutions, will be showing the latest product and service developments in the fields of “Fuel Cells and Hydrogen”, “Power Plant Technology”, “Photovoltaics” and “Geothermics”. In addition, experts at the foreign trade info-point will be providing information on opportunities for German companies on markets abroad. The partner country in 2008 is Japan. For the first time, the International Lead Fair for Power Plant Design, Construction, Operation and Maintenance is also to be held in Hanover. A new feature of the Hanover Trade Fair: it is to focus on high-technology, examining both economic and ecological trends for effective enhancement of efficiencies, reduction of CO₂ and sustainable protection of the climate. The World Energy Dialogue on „Future Power-Generating Plants and Grids“, on April 22 and 23, 2008, will also be devoted to this topic. An elite international team of prominent representatives from the energy and other industries, politics, the technical challenges, potentials and perspectives. More information: www.hannovermesse.de
Dear Readers,

Last year witnessed a number of appeals to world society, each with an identical message: the time has come to act on protection of the climate. Last February, the United Nations climate-change body (the „Intergovernmental Panel on Climate Change“, or IPCC) drew a balance from a long-enduring debate: it is now no longer possible, with any scientific plausibility, to doubt that the CO₂ emissions of the industrialized societies of the world are endangering the climate, and therefore the very basis of human life. To limit global warming to 2 °C, and thus prevent the occurrence of uncontrollable consequences, emissions of all greenhouse gases, which are currently still growing, must start to fall again by 2020 at the latest and must be cut to less than half their present level by 2050; the task then will be to divorce economic growth and affluence from carbon emissions almost completely by the end of the century.

In October, an urgent appeal to begin tackling this enormous task was made to the world’s political, economic and social decision-makers at the Nobel prize-winners’ symposium in Potsdam, Germany, entitled „Global Sustainability – A Nobel Cause“. Nothing less than the reinvention of industrial society is needed, to make it possible to satisfy the hunger for energy of a world population of nearly nine billion people and stabilize the climate. A short time later, the IPCC and former US Vice-President Al Gore were awarded the Nobel Peace Prize for their commitment to the protection of the climate. Despite the persistent calls to stir, the politicians of the world seem still to be rubbing the sleep out of their eyes. At the United Nations‘ climate conference, the community of states managed only at the last minute to continue negotiating at all on an effective follow-up to the Kyoto Protocol. Great efforts are now needed to achieve adherence to the time-schedule for the successful conclusion of these talks. For those awake and aware, the time we are going through offers outstanding opportunities. The protection of the climate is not only a topic for international conferences, but also a development of which all of society and all spheres of life must be made aware. With its energy and climate program, the Federal Government has provided incentives for companies to invest in new technologies for the utilization of renewable energy sources and for increased energy-efficiency. Those who take up a position of sustainable energy management today will, tomorrow, possess a lead from which future generations will also benefit. Not to wake up to this would be a grave mistake.
Bali: timetable agreed

Talks on the targeted timetable for reductions in greenhouse gases from 2012 onward developed into a round of negotiation poker at the World Climate Conference in Bali, despite the fact that there was no intention to agree any specific reduction targets, but, instead, only procedures and a time-horizon.

Ultimately, a schedule, the so-called roadmap, for further negotiations on greenhouse-gas reductions from 2012 was approved. The target now is to make, by 2009, an international climate treaty as the successor to the Kyoto Protocol, which will expire in 2012. In addition, important agreements were also achieved in Bali on the inclusion of forests in global climate protection, and, on the transfer of climate-friendly technology from the industrialized states to the developing countries.

Independently of the official negotiations, a large range of side-events demonstrated that trading in emissions rights is becoming globally established, beyond the boundaries of the EU. Australia, New Zealand, Japan, Canada, Norway and certain US states, for example, are working on trading systems which, similarly to the European model, will be intended to limit and put a price on emissions of greenhouse gases. Interest in the Joint Implementation Model (JIM.NRW) project presented in Bali by the EnergyAgency.NRW was correspondingly great. JIM.NRW is based on the mechanisms of emissions-trading and shows how the complex international rules can be specifically implemented in cooperation with medium-sized companies and municipalities in the region.

Path set for climate protection

Germany’s Federal Government intends by 2020 to reduce the country’s CO₂ emissions by 40 per cent compared to 1990. The Integrated Energy and Climate Programme – IEKP recently approved for this purpose contains thirty specific individual provisions which are to promote energy-efficiency and the use of renewable energies. Important for investors: the conditions for financial support are to be improved in a number of sectors in the next few months. This applies both to energy plants and to the field of building modernization. The most important items at a glance:

Expansion of renewable energies in the field of power.
Renewable energy-sources’ share in power generation is to be increased from its around 13 per cent at present to 25 to 30 per cent by 2020. Improved conditions for utilization of hydroelectric and geothermal power, offshore wind energy, and for the repowering of existing wind farms are planned in the framework of the amendment to the Renewable Energies Act. Offshore wind installations can expect higher, and photovoltaics systems lower, sales prices for electricity.

Doubling of cogenerated power, to 25 per cent.
In the course of amendment of the Power-Heat Cogeneration Act - KWKG, the Federal Government intends to invest up to 750 million euro annually in promotion of cogeneration plants from 2007 to 2013. Unlike the current terms of this Act, operators who supply power to a manufacturing company from generating facilities intended originally to supply their own needs will also be able to benefit. In addition, the expansion of local and long-distance transmitted-heat networks (“community heating”) is also to be promoted, with the state providing up to 20 per cent of investment costs.

Increase in renewable energy’s share of heat supplies to 14 per cent by 2020.
To this end, the Federal Government has resolved upon the introduction of an Renewable Energy Heat Act. The Heat Act will oblige builders and their clients to meet part of new buildings’ heat requirements with renewable energies, and will apply to buildings completed from 2009 onward. Heat generated from biomass, geothermics, solar thermics, and also environmental heat and, by way of substitution, cogeneration and energy-saving provisions, may be used.

Expansion of the CO₂ building-modernization program.
The expanded building-modernization program aims at realizing the energy-savings potentials that are latent in the urban structure. Grant-support for replacement of storage-heater systems is planned for this purpose. District-dependent supply of heat and refrigeration, and the use of renewable energy, are to be supported.

Promotional program for climate protection and energy-efficiency.
The Federal Ministry of Economics and the Kreditanstalt für Wiederaufbau (Reconstruction Bank – KfW) are setting up a special fund in order to systematically raise the energy-efficiency of small and medium-sized enterprises. The essential components are “Grants for energy consulting” (initial and detailed consultation) and “Investment loans for energy-saving provisions”. The consultation-promotion program will provide grants for professional, independent energy consulting within commercial enterprises. Further information: www.kfw.de.

This package will probably come into effect during the first quarter of 2008. Up-to-date information: www.energieagentur.nrw.de (Topic portal: Promotion programs)
The European Union brought with it ambitious targets to the negotiations aimed at a follow-up convention to succeed the Kyoto Protocol. Climate-protection provisions which are being implemented “on our own doorstep” and combine reduction of emissions with positive impulses for industry proved to be of great assistance in the international poker game centered around CO₂ savings. In “JIM.NRW”, the Joint Implementation Model NRW project, the EnergyAgency.NRW provides just such a project. JIM.NRW is based on international trading in CO₂ certificates and provides incentives for climate-protection programs in medium-sized companies and municipalities in NRW. The project started in December, 2007, and is scheduled to end in early 2013.

Worthwhile new systems
JIM.NRW is aimed at plant operators in NRW who manage to achieve significant CO₂ reductions for their heating or steam boiler installations. This may be accomplished via installation of a new and more efficient boiler that cuts energy consumption significantly, or operates using a lower-emissions fuel. Industrial facilities, office buildings and larger residential complexes can be included. The participants feed their CO₂ reductions into the project and thus earn tradable emissions rights.

Project sponsor is the EnergyAgency.NRW, which is conducting JIM.NRW on behalf of the Ministry of Economic Affairs and Energy of North Rhine-Westphalia. JIM.NRW concentrates a large number of smaller efficiency modifications into a single pool, and thus makes them economically attractive for marketing. The EnergyAgency.NRW converts the CO₂ savings achieved into tradable certificates, and sells them on the market. The proceeds are then distributed proportionally to the project participants. The EnergyAgency.NRW is, in addition, responsible for monitoring, i.e., verification of the CO₂ savings achieved, and integrates international partners into the project.

Who can take part in JIM.NRW?
- Heating and steam-boiler plants in NRW with a combustion-system output of less than 20 MW
- New facilities that replace obsolete plant
- System renewals in the 2007 to 2012 period
- The operators may be industrial enterprises, local and regional authorities, clinics, contractors, churches or clubs and associations.

Who is not eligible to take part in JIM.NRW?
- Plants already subject to emissions trading
- Facilities with thermal combustion-system outputs of greater than 20 MW
- Installations not in operating condition or are due to close in the near future
- Systems which are subject to obligatory replacement on the basis of legal requirements (e.g. the Federal German Pollution Control Ordinance)
- Installations, for the renewal of which funding from other promotional programs, or from KfW loans, has already been granted
- New facilities that do not replace existing older ones
- New facilities which also generate power

A typical project
A municipality is modernizing heating generation in one of its large administrative complexes and converts from fuel oil to natural gas. The old steam boiler is replaced with a modern low-temperature boiler with an output of 1.5 MW, annual gas consumption is around 2,500,000 kWh. The municipality thus achieves CO₂ savings of some 265 tonnes per year. It submits its consumption figures to the Energy Agency NRW once each quarter-year, for the purpose of verification of the emissions savings. In this way, the municipality can earn around 4,500 euro per annum from participation in JIM.NRW. In the course of the total project period, some 20,000 euro flow into the municipal coffers from the sale of certificates. Total estimated CO₂ savings are around 1,300 tonnes. Further information: EnergyAgency.NRW; Helwig Falk; falk@energieagentur.nrw.de; www.energieagentur.nrw.de (Topic portal: Emissions trading)
Solar housing in Erkelenz: Climate protection in action

The NRW energy and economics ministry is actively supporting progressive and future-viable developments in the construction sector with its “50 Solar Housing Estates in NRW” project. A solar residential estate featuring twenty-two passive houses combining energy-efficient construction and the utilization of renewable energy has now been completed in northern Erkelenz. “The first solar housing estate constructed to passive-house specifications establishes new criteria in climate protection and will contribute to the continued market penetration of this innovative construction standard”, enthused Economic Affairs Minister Christa Thoben at the official inauguration of the estate. So-called “passive houses” are extremely well insulated and function with the minimum input of heating energy. The small residual heat requirement is met from a ventilation system, with the result that it is possible to dispense with a conventional heating system and also that there is always fresh air throughout the house.

Sommer-Passivhaus GmbH, an Erkelenz company, has been constructing passive houses with great success for many years. Precisely now, in the colder part of the year, residents therefore enjoy not only bright and sunny living rooms, but also extremely low running costs. On the Erkelenz solar housing estate, the buildings have also been additionally combined with solar-thermal collectors for generation of hot water. After the official inauguration of the solar estate and the unveiling of the “Solarpoint” (information panel on the estate) jointly with Mayor Peter Jansen and CEO Adolf W. Sommer, the minister signed her name in the Golden Visitors’ Book of the City of Erkelenz. In the context of the “50 Solar Housing Estates in NRW” pilot project, the state is promoting the construction and improvement of residential estates distinguished by energy-efficient buildings and active and passive utilization of solar energy. The estate in Erkelenz is one of twenty-one solar housing estates completed up to now in North Rhine-Westphalia, and already providing accommodation for 4,500 residents. A further fifteen projects are currently under construction. The “50 Solar Housing Estates in NRW” project is coordinated and supported by the EnergyAgency.NRW. Further information: www.50-solarsiedlungen.de and www.energieagentur.nrw.de

The search for environmentally safe mobility

Concepts for mobility that will not harm the climate are right at the top of the energy-policy agenda. Around the globe, traffic, particularly in the field of transport, is increasing greatly, on the one hand, while, conversely, emissions of greenhouse gases must fall dramatically in the next two decades. Innovations in a large number of sectors will be necessary to achieve this target; this is true of the broad range of fuels (natural gas/biogas, liquid/synthetic biofuels, hydrogen) and in the field of propulsion systems (hybrid and electrical vehicles, fuel cells). Densely populated regions such as the Netherlands and North Rhine-Westphalia face a particularly challenging task, due to their high levels of transit traffic. This was the reason the international Connecting Clean Mobility conference, held in Arnhem, provided an excellent forum for the identification of trans-border projects.

More than three hundred participants attended this two-day event, which was arranged by the Dutch province of Gelderland and organized in detail by SenterNovem, of the Netherlands, and Germany’s EnergyAgency.NRW. Jacqueline Cramer, the Dutch Minister for Housing, Planning and the Environment, announced to the audience that the Netherlands, too, are now to place increasing emphasis on natural gas as a vehicle fuel. A network of 250 natural-gas filling stations is to be set up within five years, complementing the existing system of LPG filling stations. In addition, significant efforts are to be made to reduce greenhouse-gas emissions via the use of alternative fuels, and of bio-fuels, in particular. The addition of 20 per cent biofuel to conventional motor fuels is planned as the target for 2020.

Dr. Volkhard Riechmann, Head of Section in the Ministry of Economic Affairs and Energy of the State of NRW, reported on possible German-Dutch joint projects, including, for example, the “Window-to-the-World” project proposed by NRW and Shell, for the introduction of synthetic gas-to-liquid fuels in major commercial and public-service vehicle fleets (including municipal buses, for example). A further project involves tests with fleets of test cars fuelled with higher levels of bio-ethanol (15, 20 or 85 per cent or more).

The prime emphasis of the conference was on interchange of experience and on the initiation of joint projects. The topics discussed included scheduled bus-fleet projects on routes extending over the joint
Climate protection is achievable. Two important strategies for it are the use of renewable energy sources and the improvement of energy-efficiency. Industry in Germany is capable of making a highly competent contribution in both sectors, and thus of benefiting not only the environment, but also the economy. “Environmental technology is a significant economic factor in Germany,” affirms federal environment minister Sigma Gabriel in the Umwelttechnologie-Atlas für Deutschland (Environmental Technology Atlas for Germany). This volume, recently published by the Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety) demonstrates that climate protection does not retard industry but is, on the contrary, a sphere of business with high demand that is, in addition, an effective economic engine.

This is of special significance for North Rhine-Westphalia, Germany’s Energy State No. 1. Our state supplies no less than 30 per cent of Germany’s power, and 240,000 persons are employed in the energy industry. The state is also well positioned in the field of renewable energy sources, as is documented by the latest study published by the International Economic Platform for Renewable Energies – IWR) under the title “The renewable energy industry in NRW 2006”, with statistics showing that 3,100 companies in NRW are active in the fields of planning, construction, fabrication, production and servicing of regenerative plant technology, involving a total of some 18,500 jobs. And with a rising trend: the figure in 2005 was only 16,500.

Three examples
Resol, of Hattingen, is a good example of a company which has been backing renewable energy sources successfully for no less than three decades. This firm has produced smart control technology for solar-thermal, heating and air-conditioning systems since 1977. Last year, Resol increased its turnover from 10 to 18 million euro, proving: protection of the environment can also be financially worthwhile. The same also applies to the field of energy-efficiency, where a “double effect” can be exploited – investment to raise energy-efficiency can save that company costs, and thus enhance its competitiveness. Equally important: the development of high-energy-efficiency products is a business with an assured future.

Wilo grasped this dual opportunity. The company launched a highly efficient pump, which was awarded the top rating (“very good”) by Stiftung Warentest, the German consumer magazine. Wilo also took action to increase energy-efficiency within the company, however, and invested in the necessary production technology, raising six-fold the capacity of its main location in Dortmund. And Bielefeld enterprise Schüco has also taken decisive steps in the field of energy. Its range, for example, includes window systems that incorporate high insulating properties, along with photovoltaics and solar-thermal products. Last year, Schüco achieved a turnover of some 1.6 billion euro, an increase of 16.5 per cent over the preceding year. These three NRW success stories alone illustrate that energy-efficiency technology is a growth industry.

Further information:
Switzerland is rightly referred to both as the watermill and the power hub of Europe. Around 60 per cent of the country’s electricity comes from hydro-electric power, an important sector of the Swiss energy industry. Electricity statistics also demonstrate that cross-border power trading plays a major role for Switzerland, in both economic and power-supply terms: electricity imports in 2006 amounted to 48.8 billion kilowatt-hours (kWh), electricity exports 46.1 billion kWh. Total domestic generation, from hydroelectric and nuclear power stations, was some 62.1 billion kWh.

The energy forecasts published by the Federal Department of Energy predict an increase in demand for electricity by around 20 per cent in Switzerland by 2035, and a shortfall of some 17 billion kWh if more intensive action is not taken. This deficit is equivalent to twice the annual production rate of a Swiss nuclear power plant. This trend, combined with the as yet unexploited potential in the fields of efficiency and renewable energy sources, has resulted in the Swiss government resolving in 2007 on a realignment of its energy policy. This new direction is based on four strategic approaches: 1. Greater energy efficiency, 2. Promotion of renewable energy sources, 3. Systematic construction and expansion of large power plants, and 4. Intensification of external energy policy, particularly in the field of cooperation with the EU. This reorientation of energy policy is to be accompanied by offenses in research, and in basic and further training. A CO₂ charge is to be levied on fuels, and generation of electricity from renewable energy sources more intensively promoted, as from 2008. The cost-based system of pricing for electricity supplied, which is also in successful use in Germany, has been selected to achieve the latter aim. Important political changes have either already been implemented or are scheduled for the near future. The state will not be able to turn the energy sector around on its own, however – it needs, in addition, young and motivated specialists, researchers with innovative ideas and concepts, and bold enterprises and investors. The “E-world energy & water” provides an excellent opportunity of showcasing and interchanging innovation, knowledge and experience internationally. Switzerland is honoured to have been invited as a guest country to Europe’s largest and most important energy fair. The vitality and innovative spirit of the Swiss energy landscape is reflected in the number and diversity of the exhibitors on our joint stand: The Federal Technical University of Zurich, with Pac Car II, the world-record holding hydrogen-powered vehicle, the Paul Scherrer Institute, CTU-Conzepte Technik Umwelt AG, Kompogas AG, Switzerland’s “Powertage 2008” fair, and our two energy cantons, Aargau and Solothurn, will all be presenting their research projects and products. Switzerland’s attractiveness for business start-ups and relocations, and for cooperative research activities, is amply demonstrated by the presence of innovative and internationally active companies such as ABB, Alstom and OC Oerlikon at the various “E-world” events in Essen in February. Further information: www.energie-schweiz.ch
Energy highlights from NRW

The EnergyAgency.NRW at the „E-world“ 2008

The energy region of North Rhine-Westphalia, and thus also the EnergyAgency.NRW, will be presenting a broad and diverse range of topics at the “E-world energy & water” from February 19 to 21, 2008: from photovoltaics for power generation, and motoring using biogenic fuels, sustainable utilization of bioenergy, up to and including modern fuel-cell and hydrogen applications, energy-efficient solar construction, effective energy-efficiency projects and innovative power-generation systems. Around twenty companies and scientific institutions will be exhibiting a cross-section of North Rhine-Westphalia’s energy landscape on the state’s 450 m² joint stand in Hall 3, Stand 3 166. In addition, foreign-trade experts will be providing information on the opportunities for German companies in Norway, the Netherlands and Switzerland from the integrated Info-Point. In Hall 2, furthermore, the EnergyAgency.NRW’s mobile energy consulting centre will provide information on the state’s “NRW Saves Energy” efficiency offensive.

The 12th Expert Conference on Future Energies is the first in this year’s “E-world” series of events, and will take place from 10 to 17:00 h on February 19. On the agenda, following an opening speech by NRW Minister of Economic Affairs, Christa Thoben, will be specialist addresses on the latest developments in energy technologies and on Switzerland’s energy industry. These will be followed, in the afternoon, by four specialist forums on the topics of photovoltaics, energy-efficient and solar construction, innovative developments in nuclear technology, and bio-mass and biogenic fuels. Finally, the NRW Evening on February 19 (from 18:00 h) on the State’s joint stand, is an invitation to “network” and relax.

The agenda for the two-day Expert Conference on Power Plant Technology will open on the afternoon of February 19 with a platform discussion. State Secretary for Economics Dr. Jens Baganz and member of the E.ON board Dr. Johannes Teyssen will answer questions by ZDF (a German national TV channel) environment editor Volker Angres on the theme of “How clean can coal get?” The debate will be joined by Klaus von Trotha, Chairman of the Climate Information Centre, Dr. Stephan Singer, Head of the European office of the WWF, and Dr. Manfred Fischedick, Vice-President of the Wuppertal Institute for Climate, Environment and Energy.

During the morning of the second day of the conference, experts will examine a range of concepts in the field of innovative high-efficiency power plant technology aimed at reducing greenhouse-gas emissions. The afternoon session will look at aspects of CO₂ sequestration and storage. This specialist conference is organized by ConEnergy and the NRW Power Plant Technology Competence Network of the EnergyAgency.NRW: Agenda: www.kraftwerkstechnik.nrw.de

The focus in a round of discussions on February 21, featuring State Secretary Dr. Baganz, inter alia, will be on the new “JIM.NRW” emissions-trading project. Further information: www.e-world-2008.com

The Further Training Day will also initiate the closing phase of the NRW schools’ “Fuel Cell Box” competition focused on fuel cell technology. This event, which is organized under the patronage of NRW Minister of Economic Affairs Christa Thoben by the EnergyAgency.NRW and h-tec GmbH, is intended to acquaint schoolchildren more closely with the future technologies of hydrogen and fuel-cells. More than four hundred pupils, organized into around 140 groups from one hundred schools, have entered the competition and passed the qualifying heats. The best twenty groups will now be admitted to the final phase and will receive for this purpose the “Fuel Cell Box” in the context of the h2congress, i.e., a kit, using which they are to develop a fuel-cell-powered model vehicle, complete with hydrogen infrastructure.

The papers presented on the second day of the congress will report on the production, distribution and storage of hydrogen, and on the use of fuel-cells in the various sectors of potential application.

February 22 will feature an excursion to the Centre for Fuel-Cell Technology - ZBT in Duisburg, and to Coateama Coating Machinery, Dormagen. Further information: Dr. Thomas Kattenstein, e-mail: kattenstein@energieagentur.nrw.de, www.h2congress.de and www.fuelcellbox.nrw.de
Aachen: Top-class energy research

NRW is notable as a strong location for energy research. Teaching and research in the field of energy take place, with differing emphases, at practically every university in the state. Pole position in this area is RWTH Aachen University, which directs its attention to an extremely broad range of energy-relevant topics. From recovery of primary energy-sources, via energy conversion, up to and including distribution, storage and utilization of energy, some five hundred scientists and technicians are active in the field of energy research.

And the RWTH recently had the opportunity to affirm its leading position on the German scientific landscape – the Aachen higher-education institution was named an Elite University in the second round of the Excellence Initiative. Also approved, in addition to two Excellence Clusters and the graduate college from the first round, was the “Tailor-made fuels from biomass” excellence cluster. Under the leadership of Prof. Dr.-Ing. Stefan Pischinger, Chair of Internal-Combustion Engines, this cluster devotes its attentions to the decisive question of availability of resources. The target for this interdisciplinary team is the development of the best possible combination of fuel components and their production processes, founded on renewable raw materials and new combustion processes. This work is being conducted on the basis of close networking of the disciplines of chemistry, process-engineering and combustion engineering. The multi-disciplinary approach of this excellence cluster is also clearly illustrated by the recently inaugurated Fuel Design Competence Centre. This focuses the work of scientists from the faculties of both the natural sciences and mechanical engineering. There are also close links to the participating partner institutions, i.e., the Aachen Fraunhofer Institute for Molecular Biotechnology and Applied Ecology, and the Max-Planck Institute for Coal Research, in Mülheim an der Ruhr. The RWTH is also involved in cooperation with renowned partners in other fields. The Jülich-Aachen Research Alliance (JARA), for example, was founded in August with the Jülich Research Centre, earned itself an outstanding international reputation in the past five years, for the development of a high-temperature process, in the form of the pebble-bed reactor.

The RWTH is now set to consolidate and expand its internationally acknowledged status in energy research with the new E.ON Energy Research Centre. Headed by Prof. Dr. ir. Rik W. De Doncker, the centre cooperates on a supra-disciplinary basis with five other institutions in the field of energy technology and the energy industry, researching, inter alia, into solutions for the integration of renewable energy sources into energy supplies, and the more efficient utilization of energy. The RWTH’s expertise in this field, the excellence of which is recognized even at international level, won it this 40 million euro investment against tough international competition from other potential locations. “The RWTH possesses capabilities unequalled at any other technical university in Germany for development of new products and production processes on the basis of cooperation with industry”, emphasizes NRW innovation minister, Prof. Dr. Andreas Pinkwart. Further information:: Sabine Michelatsch, e-mail michelatsch@ energieagentur.NRW.de

Clustered research: “Tailor-made fuels from biomass”
“Germany core country in wind-power technology”

Interview with Monika Krämer, director of windtest

Frau Krämer, what’s going on at your test centre?

Of our eight locations for large wind-turbines, five are currently occupied by machines from a range of different manufacturers. The sixth location is already assigned for installation of a new prototype in the course of 2008. We’re intending to combine the two vacant slots into one – wind turbines are getting bigger and bigger, and their rotor blades longer and longer. Five years ago, blade lengths of around 35 meters represented the average, but that figure has now increased to 40 or even 45 meters, or more. The problem for us is that the distances between our sites are no longer sufficient, so we are grouping the two free locations into one. We’re expecting that a Siemens wind-energy generator with a special hybrid tower will be set up there during 2008.

Some of the other sites will also become vacant as from 2009, and we’ll also be merging at least some of those.

What measurements are performed at the test centre?

We draft profitability appraisals and complete location assessments, and we also measure loads acting on the turbines, performance curves, electrical characteristics and the noise emissions from the machines, among other things. We don’t only work at our test centre, however – we also inspect prototypes that have been set up at other locations. Trips abroad have also become more frequent since 2004 – more and more German manufacturers are installing prototypes in other countries, including North America, for instance – the market there is growing very rapidly. And European manufacturers have now granted licenses to companies in Asia, who install prototypes to test them for conformity with local conditions and requirements. They then commission us to perform on-site measurements.

So your staff travel a good deal?

Absolutely! But we’re not in-country all the time that measurements are being made, only at the start, to coordinate the project and set up our equipment. After that, we can monitor our measuring systems from here in Grevenbroich. It’s true, all the same, that we spend a lot of time and money travelling, so we’re seriously considering establishing local branches. We intend to begin with an office in France, where we have a lot of work. And our team is still growing – we’re expecting to have as many as thirty-five staff by 2015.

Have you ever considered moving abroad completely?

No, this industry’s know-how is based in Germany, so it’s also good for us to be based here. It gives the company the right image, and it’s also important in terms of our cooperation with universities and other companies in the industry. Germany, alongside Denmark, is the core-country for wind-energy technology, so we’re not going to be moving lock, stock and barrel to somewhere else.

Further information: www.windtest-nrw.de
Quo vadis, fuel cell?

“NRW occupies one of the leading positions internationally in fuel-cell and hydrogen research. Precisely in this sector, we can show that our innovation state of NRW has what it takes to be a pacemaker and a shaper of the future”, affirmed NRW innovation minister Prof. Andreas Pinkwart at the seventh annual meeting of the EnergyAgency.NRW’s NRW Fuel Cell and Hydrogen Competence Network. Around 250 participants attended, and listened attentively to the status report on fuel cells, now an annual fixture at this event.

The meeting outlined the current development status and the prospects for fuel-cell systems. The general tenor of the congress was, that fuel cells will, indubitably, play an important role in future energy supplies and that they are, in a number of applications, already close to – or actually undergoing – their market launch. Numerous examples are provided by applications in so-called “sensitive” infrastructures (assurance of power supplies), warehousing technology (indoor mobile handling equipment) and mini-vehicles in local transport systems. It is, for instance, not a matter of chance that the Federal Government, in its national “Hydrogen and fuel-cell” innovation program, and the EU, in the form of its “New Energy World” program, has initiated longer-term projects aimed at promoting the market launch of this technology, coordinating the existing need for development, and thus strengthening domestic industry’s international competitiveness in this key technology.

Also remarkable is the high level of commitment shown by industry, in terms both of financing, and also of management and planning of the programs involved. Both of these factors are good indications of the future economic significance of hydrogen and fuel-cell technology.

“NRW has long been pursuing the development of fuel-cell systems for so-called ‘early markets’ and is therefore right at the front for the market launch of this technology”, states Dr. Andreas Ziolek of the EnergyAgency.NRW. Private enterprise and the research institutions are tightly integrated into these activities. Examples originating from NRW of such applications include the Cargobike, the Midi-bus, uninterruptible power supply (UPS) systems and warehouse handling vehicles with fuel-cell propulsion systems. The market launch of these innovations, the associated creation of greater demand, the drafting of approval rules, and the

Accompanying the automobile from the

The Institut für Kraftfahrwesen Aachen (Institute for Automotive Engineering - ika) has also been researching alternative propulsion systems for more than one hundred years. The foundation stone for the institute, a department of the RWTH (ika) was laid in 1902, with the setting-up of the “Automotive Engineering” department. The ika now employs around two hundred persons, including seventy engineers and ninety academic assistants from the student body. Grouped into six divisions – Suspension, Bodywork, Propulsion, Electronics, Acoustics and Traffic, activities cover conception, simulation, design, prototyping and testing.

The ika has been studying hybrid technology for more than thirty years. Its first hybrid vehicle was a VW Bus with parallel hybrid propulsion, constructed in 1973. Various hybrid vehicles, buses and cars, have since been built at the institute. The ika is currently developing a hybrid vehicle that will take account of present-day road-traffic conditions and topographical information in its operating strategy.

A further topical project in the field of the enhancement of the efficiency of cars is currently being conducted on behalf of the Federal Environmental Agency. This involves study of the potential for further reduction of CO₂ emissions from a VW Golf 1.4l TSI. The technology optimizes the propulsion system with a combination of downsizing, direct fuel injection and double supercharging. The provisions deployed include both reduction of rolling, wind and internal resistances and power-train losses and optimized-consumption engine management. In addition to technologies such as low rolling-resistance tyres, a gear-change prompt and an automatic engine start-stop system, which are already in use in various series-production vehicles, notable features of the ika demonstrator include the combination of a powerful supercharged 1.4l gasoline engine from the VW range with a gearbox transmission ratio more typical of diesel vehicles, the use of a coolant heat-store, and the substitution of a video system for the exterior rear-view
setting-up of the first hydrogen infrastructures, will smooth the transition into the more “price-sensitive” mass markets, such as the automotive sector. NRW intends to adhere consistently to this route. The present-day status of technology “Made in NRW” also permits the opening up of completely new applications. Projects in the automotive technology field, and in domestic energy supplies, are imminent, as are concepts for the creation of a hydrogen infrastructure carefully tailored to demand. Here, too, NRW benefits from its excellent boundary conditions. In 2010, the state will present its achievements in this field up to that date to experts from around the globe at the 18th World Hydrogen Conference in Essen.

very start

mirrors. A reduction in CO₂ of 24 per cent has been measured with this package of modifications, on the basis of CO₂ emissions of 173 g/km in the New European Driving Cycle (NEDC), the standardized emissions- and consumption-testing cycle. CO₂ pollution from the optimized TSI experimental car is thus lower than that from a standard diesel vehicle (TDI, 156 g/km CO₂) of the same power rating.

The project for isolation of consumption- and consumption-estimating technologies in a test vehicle has demonstrated that not only alternative fuels and the motorist’s driving behaviour, but also vehicle technology itself, offer great potentials for reduction of CO₂ emissions. As a participant in the Fuels and Propulsion Systems Network, the ika also took part in the Connecting Clean Mobility event, at Arnhem, in the Netherlands (see Page 6).

Contact: Dipl.-Ing. Markus Espig, Institut für Kraftfahrwesen, RWTH Aachen, Tel.: 0241/8025640, e-mail espig@ika.rwth-aachen.de, www.ika.rwth-aachen.de

Efficient use of biomass

The Fraunhofer Institute for Environmental, Safety and Energy Technology UMSICHT is developing applied, industry-orientated process-engineering in the fields of environmental, materials, process and energy systems. A leitmotif: the materials-route and energy-route utilization of regenerable raw materials in bio-refineries. In coordination with the “BIO-raffiniert” (BIO-refined) conference – the Future Fuels and Propulsion Systems Network was a co-organizer – it was announced that a total of 1.36 million euro has been made available for expansion of the scope of the lead topic from Innovation Ministry (90 per cent) and Fraunhofer-Gesellschaft (10 per cent) funds. The conference gave us the opportunity of putting a number of questions to Dr.-Ing. Görge Deerberg, Deputy Head of the Institute and Head of the Process Engineering department.

Dr. Deerberg, what is meant by a “bio-refinery”? A bio-refinery is a production system with the special feature of producing on a decentralized basis but nonetheless in a complex. It’s an integrative overall concept for biochemical and thermochemical conversion of renewable raw materials to chemicals, materials and fuels. The target is to use biomass as completely as possible. Bio-refineries are also notable for short lines of communication in their logistics, and their location close to other plants, such as biodiesel, bio-ethanol and bio-gas facilities. In our “BIO-refined” event, we are offering a forum for scientific discourse right through the added-value chain. Our intention is to generate publicity and awareness of “white” biotechnology and the bio-refinery, and set up important partnerships, virtually from the farm to industry.

And what are the main emphases of your work at the moment? We are focusing on three main elements: in the field of biodiesel, we are developing improved catalysts that will enable us to manufacture further products for alternative markets, such as plastics and cosmetics. We are also looking for more profitable routes for commercial use of crude glycerine, which occurs in the production of biodiesel. And we are pursuing various concepts for recovery of ethanol and methane from lignocellulosis. Other important elements are conditioning and catalytic conversion of synthesis gases from biomass gasification. We are also researching into biotechnological conversion to starch- and sugar-based products from renewable raw materials, such as succinic acid, for example, one of the most important platform chemicals.

How do you assess the industrial-policy significance of the bio-refinery for NRW? Because of its broad spread, the bio-refinery concept necessitates the most diverse range of technologies. These will be used around the world, opening up great opportunities for NRW. Development and demonstration platforms are particularly important, in order to maintain and expand NRW’s technological lead. We have, with partners from industry and the various ministries, begun setting up a bio-refinery demonstration centre at which central elements in the innovation process, such as technological and product development, and also basic and further training, can be developed.

Further information: www.umsicht.fraunhofer.de
Effects of the European Energy Award® in Bonn

The city of Bonn is setting an example by showing how the European Energy Award® (eea®) can be used on a local basis as an instrument for climate protection and cost optimisation. Bonn was awarded the eea® in 2005 and is now shortly to receive the eea gold®.

As a Climate Alliance municipality the city of Bonn has been committed to energy efficiency and climate protection for many years, and so it was an obvious decision to take part in the European certification procedure for the eea®. At the beginning of the project, first of all the current situation was analysed and assessed in relation to eight different fields of activity (development planning, regional policy, municipal buildings, supply, disposal of waste materials, mobility, internal organisation and communication). “This analysis was helpful for us so we could recognise what we still have to improve”, says Achim Helbig, Department Head in the Municipal Department for Environmental and Consumer Protection. Building on the analysis, the objectives of the municipality were defined in an energy-related work programme. At least 50 per cent of a possible 408 points had to be achieved in order to obtain certification for the eea®. Bonn was able to achieve 61 per cent of the points and is now attempting to exceed the 75 per cent mark for the eea gold® award.

In order to get to this point, binding measures as regards climate protection have been established for the city: now a improvement guideline for municipal buildings lays down and defines improvement projects. Higher energy efficiency for municipal buildings is achieved, for example, by means of improved heat insulation and optimised energy supply. These measures could help to reduce energy costs by 35 and 40 per cent annually in future. In addition, purchasers of municipal building plots are obliged to erect energy-saving buildings (corresponding to KfW 60).

“The fact that we have been granted the eea® has awakened the development potential of our city. This is a great gain for us”, says Helbig. Projects which had already been planned were given a different priority and have been brought to the fore again by politicians. The eea® has given new impetus to the whole discussion about climate protection.

Representatives of participating cities and towns report that the reporting regarding current status has means that at last this status is documented. And in addition, the many suggestions for possible measures identify new opportunities for reducing energy consumption and costs. From energy-efficient street lighting through optimisation of heating plant or use of waste heat from waste water networks, energy consumption and costs can be minimised in many different ways.

However, it also becomes clear to participants that activities must be sustained over the long term, not only in order to achieve new climate protection objectives, but also in order to be able to maintain a level which has once been achieved. The energy-related work programme and also regular internal “audits” offer continuous controlling here. Participating towns and cities are supported by a qualified adviser, who makes them “fit”, as it were, for certification. An independent external auditor performs the certification process before the official award is granted by representatives of the Ministry of Economic Affairs and Industry.

Further information: www.energieagentur.nrw.de/european-energy-award, Contact: Jochem Pferdehirt/Andrea Fischer, Tel. 0202/24552-59/-55
Heating with scrap wood helps environment

From scrap merchant to modern container service: the recycling firm B. u. J. Hesse in Oberhausen can look back over a long tradition. The company was established in 1899 as a scrap and raw material trader. The employees collected rags, bones, skins, waste paper, scrap and metals in the streets of the town using horse-drawn carts, and these were sorted and processed at the company site.

Today, the company provides its customers with containers with a capacity of up to 30 m³ for disposal of all types of materials. And these include large quantities of scrap wood – B. u. J. Hesse collects around 2,500 tonnes of this material every year. Each week, around 10 tonnes of Category I scrap wood are collected. This is wood in its natural state or wood which has only been mechanically treated and which is only polluted with other substances to a very limited extent, and which is therefore suitable for use as fuel. Now the heating plant at B. u. J. Hesse was due for modernisation, as the heating boiler was quite old and gave rise to excessive exhaust gas losses. During an initial advisory session, the EnergyAgency.NRW recommended use of a heating installation fuelled by wood chippings, as scrap wood was readily available. In fact, use of this fuel offers two advantages: savings in fuel costs and also independence from fossil fuels. As a result of this, B. and J. Hesse did decide in favour of such an environmentally-friendly installation based on the CO₂-neutral energy source wood, despite the much higher initial investment costs.

The wood-fuelled installation was commissioned in October and now also supplies a neighbouring industrial building with heat. The scrap wood available in the company covers the heating requirement 100 per cent, and the costs for making the wood into chippings is around 200 euro per year. As, in the case of the previous heating installation, fuel cost 5,000 euro per year, the savings amount to around 4,800 euro per year. The investment in the new technology, at around 35,000 euro will therefore have paid for itself after a good seven years. A really worthwhile investment – both for the company and for the environment. Further information: Thomas Gentzow, Tel. 0203/306-1264

Two wood-fuelled heating systems for teaching

At the beginning of 2004 there was a “first” in the Ennepo-Ruhr district: the first wood chipping heating system in the area was inaugurated. Since then, an environmentally-friendly installation has been in operation in the school in Hiddinghausen. It replaces two obsolete gas boilers and saves up to 30% of heating costs. As this innovation has really proven its worth, a further wood-fuelled heating system was planned at the Adult Education College in Ennepetal which is already in operation.

The school at Hiddinghausen received a combined installation, and the wood chipping-fuelled boiler offers two-thirds base load utilisation. The buffer storage facility is implemented in the form of the school swimming pool, which ensures that heat is always used, even in transitional seasons. An additional gas boiler ensures that there is sufficient heat at peak loading times. The higher investment costs compared with a purely gas-fired system were covered in part by funding provided by the State of NRW. The Ennepo-Ruhr district itself provided around 200,000 euro. The annual cost savings as regards energy have up to now amounted to around 13,000 euro per year, which means that the installation will have paid for itself after around 15 years. Motivated by the encouraging figures in Hiddinghausen, at the end of 2005 the decision was made also to build a wood chipping heating system at the Adult Education College in Ennepetal. The investment costs: 300,000 euro. Here, too, corresponding savings in heating costs are expected in per centage terms, and so this second municipal wood heating system helps to reduce demands on the municipal budget, as well as making an important contribution to environmental protection – for the saving in CO₂ emissions is expected to be 300 tonnes per year. Further information: Bernd Geschermann, Tel. 0202/24552-14, e-mail geschermann@energieagentur.nrw.de
Saving energy with lighting control systems

Interview with Carsten Krämer, Head of Product Marketing at PEHA

The company PEHA is a manufacturer of electrical equipment and systems with headquarters in Lüdenscheid. The family firm, which was established in 1922, is now being managed by the third generation - Jens Hochköpper. The second Second Executive Manager is Andreas Haugk. In the meantime represented at four locations in the region, the company currently has around 400 employees. We spoke to Carsten Krämer, Head of Product Marketing at PEHA.

What is the product range of PEHA, Mr. Krämer?

We develop and manufacture electrical equipment and systems. Our range covers a wide range of applications - from family homes through functional buildings up to cruise liners - we do almost anything.

You have brought out a brochure entitled “Saving Energy” - is this a particularly important subject as far as you are concerned?

Yes, energy saving is the subject of the future. In view of rising electricity prices and also thinking of climate protection, energy saving is becoming more and more important, and we consciously focus on it. For example, in office buildings, energy used in lighting accounts for a large proportion of the electricity consumption. So it is important to automate lighting in an intelligent way in order to achieve higher energy efficiency. We have made it our aim to use the solutions which are already available in our product range in a targeted way in relation to energy saving.

What solutions does your company have to offer?

A ceiling-mounted presence sensor, for example, makes it quite simple to save energy. Such a device is useful for rooms which are not in permanent use, as it enables the light to be turned on and off depending on the available natural daylight and on whether people are present. This saves energy, as the light is only on when it is needed. The important thing is: we have several types of presence sensors which are all suitable for specific applications. For example, a version is available for teaching rooms. It lights two areas of the room differently, because during the day, the window side requires less light than the rest of the room. We consider such applications to be our particular strength: we achieve the greatest possible energy saving by using exactly the right piece of equipment for the job.

You have developed the PEHA zone control system especially for utility buildings. What are the advantages of this system?

A great deal can be achieved in utility buildings if an intelligent lighting system is used - in fact it is possible to achieve up to 70 per cent energy savings by using the PEHA zone control system. The system is easy to install and offers five pre-programmed light control systems, which are suitable for office and conference rooms, schools, exhibition areas warehouses and production factories respectively. Up to three different light zones can be provided in the room. They are supplied with more or less artificial light depending on the amount of natural daylight. A great deal of energy can be saved with such a lighting system which takes the particular room situation into consideration, and at the same time the comfort of those in the room is improved.

Innovative, because requirement-orientated, lighting systems which function dependent on the amount of daylight present are more intelligent. Pre-programmed light control systems minimise the amount of artificial light which is used and reduce energy costs accordingly.
A bright idea

Contracting for the street lighting in Dormagen

The town of Kempten in Allgäu has shown the way forward and achieved good results by using contracting for street lighting – which has led to considerable energy savings. In Dormagen, a town in the Rhineland of similar size to Kempten, this project was followed with particular interest. In Kempten, the street lighting in the entire town had been modernised by an outside contractor. This facilitated a reduction in CO₂ of 630 tonnes a year, together with a reduction in electricity costs of 35 per cent. During the term of the contract, which was nine years, the cost savings will first be used to pay back the investment costs to the contractor. After nine years the town will benefit. From then on the saving will relieve the burden on the town’s funds.

The technical operations department in Dormagen decided that they could follow suit, and accordingly begin to modify the tender documents for use in their own specific situation. In this, they were supported by the contracting advisory service of the EnergyAgency NRW, which also helped when it came to evaluating the offers themselves. Nine companies applied for the work following a tender process which covered the whole of Germany. One of the conditions was that the project had to be completed within five years.

The company Horlemann, based in Uedem near Kleve, was finally selected to carry out the work. Horlemann submitted a savings forecast of more than 50 per cent. In 2006, the electricity costs for the street lighting in Dormagen amounted to a good 314,000 euro net, which means that the potential savings amount to more than 157,000 euro per year. The estimated reduction in CO₂: around 940 tonnes per year. In order to achieve this, the contractor has to invest just under one million euro. Horlemann has been working on implementation of the project since the end of October 2007, and lamps, bulbs, ballasts and electronic equipment have already been renewed. The modernisation process should be completely finished by April 2008. The Dormagen project is the first contracting project in the area of public street lighting which is intended to create energy and cost savings and where the partner was found by means of a public tender process. It is hoped that now other municipal authorities will be encouraged to follow. Projects like these are good for the environment – and also for town and city budgets.

Further information: Rüdiger Brechler, Tel. 0202/24552-15, e-mail brechler@energie-agentur.nrw.de

Shining examples

Lighting in offices and factories generally accounts for between 30 and 50 per cent of the entire electricity consumption. Considerable savings potentials are waiting in the wings here, and these can be realised by means of energy-aware improvement of lighting systems. And it is precisely here that the companies GKN Walterscheid GmbH, ADVANSA GmbH, along with the municipal council of Alfter and the town of Lohmar, are setting a shining example. And for this they have been distinguished with the GreenLight Partnership of the European GreenLight Programme.

The GreenLight seal of approval was awarded during the “Energy-saving Lighting” workshop which took place in the State Chancellery of NRW in Düsseldorf. The workshop was offered by the EnergyAgency NRW in cooperation with the Berlin Energy Agency, in order to improve the level of information of decision-makers in this area and therefore to encourage wider use of efficient lighting. “Concrete examples in particular encourage companies to follow suit”, says Mechthild Zumbusch, Coordinator of the “Energy-saving lighting” project and the GreenLight programme, when explaining the fact that such awards are extremely effective.

Frank Heimann from ADVANSA GmbH is proud of the GreenLight partnership: “Modernisation of the lighting system in the factory buildings has helped us to make an important contribution to climate protection”, says Claudia Dederichs from the company GKN in Walterscheid: “The modernisation of the factory lighting means that we save around 230 tonnes of CO₂ and 45,500 euro each year – and in the long term the investment pays for itself.” The two representatives of the municipal authorities which received the award – Dr. Bärbel Steinkemper, Mayress of Alfter, and Stefan Hannerthas, Deputy Mayor of Lohmar, are pleased that, with the modernisation of their lighting, they have “discovered a route which is both energy efficient and helps to save costs.” Further information: Heinz-Jürgen Schütz, Tel. 0202/24552-32

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Further information: Rüdiger Brechler, Tel. 0202/24552-15, e-mail brechler@energie-agentur.nrw.de
The German Armed Forces:

“mission E”, the energy efficiency campaign of the Federal Department for Administration of the Armed Forces BAWV and the EnergyAgencyNRW has been running since 1 October 2006. The declared aim of “mission E” was to reduce the energy consumption of the German military by at least 60 million kilowatts within a year by raising the awareness of the 350,000 civil and military members of the armed forces.

Not only one reason
There are many reasons for this enormous drop in consumption. This became clear during an incentive workshop on 4 December 2007 in Bonn, to which the “mission E” campaign team had invited representatives of the Military Region Administrations in order to present the annual result, and also to discuss local activities for reduction of consumption and initiate an exchange of experience between all the branches of the armed forces.

Energy efficiency is possible – “mission E”
For example, the fall in heat consumption can be attributed among others to the ongoing efforts and influence of the around 50 armed forces service centres (formerly the administration bodies at the individual locations) on site, to consistent facilities management and the fact that some facilities have been relinquished, to modernisation of buildings using funds from the 120 million euro programme of the Federal Government and also to optimisation of technical plant and equipment within the facilities themselves.

Target exceeded
Last but not least, “mission E” has also made a contribution to the satisfactory annual financial results of the armed forces. According to reports and calculations from the Military Region Administrations and BAWV, the share of savings attributable to the new energy awareness of members of the armed forces amounts to around 65.3 tkWh, 23,000 tonnes of CO₂ or in monetary terms 5.3 million euro. This means that “the Force” has actually exceeded the ambitious savings targets of “mission E”.

“mission E” is spreading
But it is not only the actual hard figures which are impressive. Two further ministries have expressed interest in activities similar to those which are being implemented within the framework of “mission E” and various different companies are already making use of individual modules of the information campaign which ran throughout the armed forces. In addition, the EnergyAgencyNRW has made up a new service package for energy suppliers based on its activities and experiences in the context of “mission E”, consisting of several offerings from the army campaign along with further modules (see “Energy Efficiency toolbox for energy utilities” on page 24). Further information: Tom Küster, Tel. 0202/24552-23, e-mail kuester@energieagentur.nrw.de

8.3% energy savings

462 million kWh saved
The consumption data for the period 1 October 2006 to 30 September 2007 is now available for all the 1,600 premises of the armed forces – and they exceed all expectations: compared with the same period last year, the German army has reduced its electricity and heat consumption by 8.3 per cent, with seasonal adjustment for the weather. In absolute terms this means that within one year, the armed forces have achieved heat savings equivalent to 403.8 million kilowatt hours (kWh), while in the case of electricity, the savings amount to 58.4 million kWh. This means that the armed forces saved the same amount of energy in one year as is consumed by 29,000 private households on an annual basis, and the same amount of electricity as is consumed by 17,000 households.

400 kg CO₂ less per person
At the same time, the energy costs were reduced by almost 33 million euro and the CO₂ emissions by more than 140,000 tonnes – each individual member of the armed forces has therefore improved his or her individual CO₂ balance sheet by a good 400 kg on average. The total volume of CO₂ which has been saved corresponds to an area of forest of almost 3,400 square kilometres – which according to the National Inventory Report of the Federal Environment Agency corresponds to around 1/22 of the entire forested area of the states in the old Federal Republic.

400 kg CO₂ less per person

Communication – the most vital factor - also for “mission E”
The potentials for saving energy within the area of existing buildings is considerable. Many house owners have already noticed this and are renovating and updating their properties. The following examples of projects which have already been implemented show how it possible to convert an existing older house into a low-energy house. Many modernisations achieve the same standard as is set for new buildings by the Energy Saving Ordinance. However, it is also possible to upgrade a older building in such a way that the standard for new buildings is greatly exceeded.

Avoidance of heat loss from ventilation
The house belonging to the Schröder family from Oberhausen, built in 1952, has reached this innovative standard. In order to achieve this, 20 cm of insulating material was applied to the outside walls, and 32 cm of insulation was used in the roof. The cellar ceiling was insulated and the old windows have been replaced by modern thermal insulation glass. In order to cover the new energy requirement of the house, which is much lower than previously, a wood pellet heating system was installed.

Heat losses resulting from ventilation are particularly significant within an older building which has been upgraded to a highly-efficient level from the energy point of view. If the building shell is insulated and sealed, they account for a significant portion of energy losses. In order to minimise these losses, the Schröder family decided in favour of a controlled ventilation system. A central used air unit was installed in the house, which ensures that moisture which occurs in the house is continuously removed. This improves the air quality in the building and ensures that unnecessary heat losses caused by ventilation are avoided from the beginning.

This upgrading has meant that it was possible to achieve a primary energy requirement for the building of 29 kWh/m² per year, which is equivalent to a reduction of more than 80 per cent. In order to fulfil the standard for new buildings, around 115 kWh/m² and year would be permissible for this house.

“Can we do any more?”
Evonik Wohnen GmbH goes even one step further with regard to ventilation. This company has built a ventilation system with heat recovery into each of its apartment blocks in Düsseldorf – originally built in the 80s – which was due for upgrading, which means that the heat which is used in the apartments is not lost, but can be re-utilised. The facade of the block was provided with insulation 20 cm thick, as was the roof. The ceiling of the unheated cellar was insulated, and triple-pane heat insulating glass was installed. The necessary heat is created by a combined heat and power generation plant. In addition, a 144 square-meter photovoltaic system has been installed on the roof in order to convert the sun’s energy into electricity.

Here, too, it was possible to considerably reduce the primary energy requirement. At 40 kWh/m² per year it is now around 55 per cent lower than before modernisation.

Energy-related building improvement makes sense done like this. No matter if originally built in the 1950s or the 1960s, this building structure is as good as any when it comes to running costs.

The standard which applies to new buildings specifies 90 kWh/m² per year primary energy for this building.

dena and KfW
The model project of the German Energy Agency (dena), which is operating throughout Germany, funds the highly-efficient energy-related upgrading of residential buildings. Projects are financed by means of a low-interest loan of up to 50,000 euro per residential unit through the CO₂ building improvement program of the KfW bank (Reconstruction Bank), and are also released from the obligation to repay 20 per cent of the loan itself.

Owners of single-family homes can apply for the grant up to 31.03.2008. Information is available from Lale Salur, Tel. 0202/24552-71, e-mail salur@energieagentur.nrw.de.
School pupils as architects of climate protection

Within six months, pupils, teachers and caretakers at the Ernst-Moritz-Arndt Grammar School in Remscheid have planned and implemented a combined heat and power generation plant. This involvement originated at the “Future” working group of the school. This group has existed for eight years and has already implemented several projects, like for example two solar heating installations. Currently 13 pupils between the 6th and 11th years belong to the working group. This group is led by teachers Wolfgang Neuroth and Christoph Frielingsdorf. Also taking part is caretaker Klaus Broszkus. He is a trained heating and ventilation fitter and supports the Future Team with expert knowledge and specialist skills.

“We have been thinking about a unit-type co-generation plant for some time now. At the beginning of the year it was clear that it was time for something to happen, reports Broszkus. After this, the working group started to plan the financing for the project. It was possible to reduce the costs of 23,000 euro which were originally calculated to 18,000 euro by means of a discount offered by a manufacturer and also donations of material from local tradesmen. The pupils also collected money donations and organised a sponsored run, which brought in more than 1,000 euro. In the end, the school was left with construction costs of 3,000 euro. it was possible to cover this sum from profits from earlier energy-saving projects.

The unit-type cogeneration plant will be installed in the summer holidays of this year and Caretaker Broszkus has made a particularly active contribution. The plant has been producing electricity and heat for the school since August. It provides 77,900 kWh/a in thermal form and 29,300 kWh/a in electrical form. The town of Remscheid provides the gas which is necessary for operation of the plant and offsets this against the heat and electrical power which are produced. This is forecast to result in a surplus of 2,500 euro per year. An amount which is bound to please the school. And the environment will also benefit from the expected CO₂ savings of 4.2 tonnes per year. Now the Future AG has new plans intends to insulate the loft of the school building.

People in Rheinberg are energy-aware

It mostly not possible to see from the outside if houses are particularly energy-efficient. But this is not true in Rheinberg, where special blue plaques on many houses show that those who live in them are particularly energy-conscious. Within the framework of the “Energy Saver NRW” initiative, the Economic Affairs Ministry identifies houses which have been built or renovated in a particularly energy-efficient way or which make use of renewable energies with a plaque. The EnergieAgency.NRW is organising this initiative together with the District Government of Arnsberg.

More than 400 plaques were awarded in 2007, of which 48 were awarded in Rheinberg. Reason enough for Economic Affairs Minister Christa Thoben to make the award personally in December. Kerstin Eggert and Thomas Frank received the certificate, representing the many inhabitants of Rheinberg who are committed to the concept of energy saving. Three plates adorn their house, which was built in 1963. Following comprehensive upgrading, it not only has a much lower energy requirement than many new houses, but it makes use of heat from the sun and the ground by means of a photovoltaic installation and a heat pump heating system. “Nothing is as effective as a real functioning example when it comes to convincing people. The plaque is a visible sign of the energy efficiency standard of the building and should help to motivate others”, says the Minister.

The fact that more than 10 per cent of all plates went to Rheinberg is a result of the commitment shown by the town administration. Like many other towns, Rheinberg has recognised that buildings offer considerable energy saving potentials. Using these potentials not only makes an important contribution to climate protection and saving of resources, but also provides impetus for the economy and above all benefits local tradesmen. The largest savings potentials lie in improvement of old buildings, where savings of up to 75 per cent are possible. For this reason, “Energy Saver NRW” is part of the Community Campaign Building Improvement NRW “My House Saves”. A total of 17 organisations and associations have collected under this banner in order to offer advice and aid when it comes to building improvement aimed at future energy savings. In addition to answers to questions related to construction and technical aspects, there is also the possibility of financial support, as the KfW bans (Kreditanstalt für Wiederaufbau) offers low-interest loans and subsidies. More than 25,000 apartments and houses in NRW were renovated in 2007 from the energy-saving point of view taking advantage of these offers. Information at www.mein-haus-spart.de or the improvement hotline of the EnergieAgency.
The photovoltaics sector has grown by around 40 per cent annually in the last seven years on a worldwide basis. German companies are world leaders in both research and development and in production of this exciting technology, and firms from NRW have an important share in this. According to the study performed by the IWR, photovoltaic capacity of more than 2,500 MWp was newly-installed in 2006 throughout the world, with around 750 MWp attributable to Germany. This means that Germany was the strongest-growing PV market in Europe. In NRW, photovoltaics was one of the highest-turnover sectors within regenerative plant and system construction in 2006 with sales of more than 1 billion euro. The PV module, at the heart of the photovoltaic system, has to fulfil a great many requirements: it must be of high quality, and it should be reliable and long-lived, and last but not least, the price has to be attractive to consumers.

The sector sees a high level of economic potential for future years in thin-film technology, the aim is produce electricity from sunlight more efficiently and at a more reasonable price. Experts forecast development potential of up to 1 euro/Watt. Already today, companies have started building production factories for new types of thin-film solar panels, or they are already in production or want to considerable expand capacity in coming years. Those who are active in the sector consider that thin-film solar modules could achieve a market share of 20 per cent in a few years time. In 2007/2008 more than 100 MWp of production capacity will be available in Germany alone.

Within the industry, Germany companies are subject to severe international competition. It is therefore crucial that there is both continuous transfer of knowledge from basic research and technology development into industry, and also the possibility of being able to pose complex questions to those responsible for research.

Cost-effective, light and flexible. The thin-film module has several advantages when compared with established silicon wafer technology. Less use of material and energy during manufacture, more favourable behaviour under weak light, less sensitivity to changes in temperature and the possibility of flexible PV applications. These modules adapt to the shape of their carriers, such as ships' hulls or cars, but can also adapt to a wide range of other consumer goods, and therefore generate a large number of new application and design possibilities. It is even possible to mount the modules on awnings, and their light weight also means that they are of interest in association with space travel.

Thin-film techniques were also a main focus of the workshop “Photovoltaic Module Technologies” organised by the EnergyAgency.NRW and TÜV Rheinland in Cologne, which took place at the end of November 2007 for the fourth time. This event has now established itself as the most important photovoltaics sector meeting in NRW and beyond. In his welcome address, NRW Innovation Minister Prof. Dr. Andreas Pinkwart emphasised the importance of photovoltaics as a technology of the future: “Energy research plays a vital role within the strategy of the state government. We need energy sources which are cheaper and kinder to the environment.” More than 300 international representatives of the sector gathered information about new developments in various thin-film technologies and discussed their experiences of various applications. Further items to which particular attention was paid during the event included measuring and field experiences, buildings-integrated photovoltaics, quality assurance and norms and standardisation. Further information: Christiane Schreiber, Tel. 0211/866-4214, e-mail schreiber@energieagentur.nrw.de
A photovoltaic module on the roof is no substitute for proper insulation. However, people who do have a photovoltaic installation on the roof quickly notice that the roof surface heats up much less quickly because of the shade offered by the PV elements. As a result, a room with a PV installation is up to 2 °C cooler in summer than the same room without the PV. A badly-insulated room is even up to 4 °C cooler than the same room without a PV installation.

This was the conclusion of a study which was commissioned by the EnergyAgency.NRW. Within the framework of this study, a typical attic room was dynamically simulated as it would be in summer, both with and without a rear-ventilated PV installation on the roof. As weather data, the test reference year of the German meteorological office applying to Wuppertal for an extreme summer (Tmax 32.9 °C) was used. The room temperatures which are described are felt (operative) temperatures which, in addition to the air temperature, are determined by the heat radiated by the heated room surfaces and the radiated solar heat.

The results of this simulation are of course closely linked with the assumed framework conditions. The higher the proportion of heat flow through the roof, the more significant the thermal effect of the PV installation becomes. As a basis, the adsorption rate of the roof tiles was assumed to be 0.70. The adsorption rate of the PV modules is set at 0.53.

In addition to this adsorption rate, the insulation standard of the building shell is also of basic significance: the lower the insulation standard, the greater the positive thermal effect of the PV installation. In addition, the influence of an attic window facing south which allows the sun to enter the room to a great extent also has a serious effect on the room climate. This means that the maximum perceived temperatures can rise by up to 5 °C if an attic window is also taken into consideration, even if effective internal blinds are present. The perceived temperatures in a room with PV modules which are mounted on the roof and are back-ventilated vary in the course of hot summer’s day between 30 °C (insulated) and 31 °C (uninsulated). In contrast, in the room without the PV modules, the temperatures vary between 32 °C and 35 °C. In addition to the reduction in peak temperatures, it must above all be emphasised that the number of hours in the year with perceived temperatures of above 26 °C can be halved by means of a PV roof – no matter what the standard of insulation. Contact: Joachim Decker, Tel. 0202/24552-69, e-mail decker@energieagentur.nrw.de

Cooler and more pleasant thanks to photovoltaics

The Rhein-Sieg region is one of the regions with the most dynamic economic development in Germany. This is also demonstrated by the high increase in population and households which is forecast for the next 20 years. The role of energy is central to continued strong growth in Rhein-Sieg as an industrial and commercial location.

Against this background, the production potentials in the area of regenerative energies, particularly biomass, solar energy, wind energy and geothermal energy, were determined within the project “Energy Region Rhein-Sieg” and presented on a small geographical scale within a geo-information system. These potentials were then compared with the demand for electrical and thermal energy. From this it can be established to what extent it is possible to become independent as regards energy supply in certain areas through utilisation of local energy sources.

This innovative project was implemented in cooperation with the Austrian research institute iSPACE. Further information: Ralf Beyer, Tel. 02241/133246, e-mail rolf.beyer@rhein-sieg-kreis.de or Cornelia Reuther, Tel. 0211/4566-671, e-mail reuther@energieagentur.nrw.de
Stricter EnEV in 2009

Although the new Energy Saving Ordinance known in Germany as the EnEV, only entered into force on 01.10.2007, first drafts aimed at making the legal regulations regarding thermal insulation in buildings even stricter have already been written. At the same time, the German government is planning to push forward with the development of renewable energies in the heating sector with the help of a renewable energies heat act (in short: EEWärmeG).

Rising energy prices worldwide and the dramatic prognoses of the Intergovernmental Panel on Climate Change (IPCC) on the subject of threatening climate change have yet again underlined the urgency of introducing even more stringent climate protection measures. Against this background, Federal Chancellor Angela Merkel has declared climate protection to be a personal priority.

As the current level of requirement of the EnEV is based on economic studies using price levels of 1997, and because the fact that energy prices have risen to such an extent - which means that climate protection by means of building measures has become much more interesting from an economic point of view, the “Meseberg Agreements” of the German government have among other things specified an accelerated procedure also for introducing more stringent requirements in relation to the EnEV. The limit values for the maximum permissible annual primary energy requirement for heating, hot water provision and ventilation of new buildings are to be lowered by 30 per cent, for example. More stringent requirements as regards heat insulation in buildings are also planned in this connection. With regard to existing buildings, the intention is that night storage systems should be replaced by more environmentally-friendly and low-cost alternatives as fast as possible. In fact, an obligation to replace such systems by at the latest January 1 2020 is under discussion.

As part of the new “climate protection package”, the German government also decided to introduce a Renewable Energies Heat Act (Erneuerbare-Energien-Wärmegeetz). The aim of this act will be to increase the proportion of renewable energies in the area of heating from the current 6 per cent to 14 per cent in 2020. The intention is to achieve this by making use of corresponding installations in new buildings obligatory. According to the plans of the Federal Environment Ministry, owners of buildings should also have the right to choose a particularly environmentally-friendly heating system (e.g. district or remote heating, combined power and heat generation or heat pumps) as an alternative to the obligation to make use of regenerative energies.

Success with EU programmes

The EU energy programmes also offer opportunities for companies in NRW. In particular the programme “Intelligent Energy – Europe (IEE) and the subject of “Energy” within the 7th Framework Research Programme (7. FRP) offer opportunities to make use for one’s own company of the added value offered by internationally linked research and development work and by dissemination projects. EnergyAgency.NRW offers information on these programmes in a new brochure which has been commissioned by the NRW Economic Affairs Ministry. In this new publication, which will be available in March, examples of good practice in companies in NRW who have successfully implemented projects with the help of EU funding will be presented. Those involved will report on their experiences with cooperative work in Europe and will describe the sustainable benefits which the activities have provided for their enterprises. Information regarding the support which is available when seeking and selecting suitable funding and international project partners, and also advice which is available when submitting applications, complete the brochure, which can be ordered by calling 01803/190000 (9 Ct./min. from landlines, calls from mobile networks may cost more). Download at www.energieagentur.nrw.de. Contact: Oliver Weckbrodt, Tel. 0202/24552-20, e-mail weckbrodt@energieagentur.nrw.de

New fork lift trucks

An important milestone was recently reached in the project “Fuel Cell Battery Hybrid for Material Handling”, which was funded by the State of NRW with around 1.8 million euro. In December, technical completion of three vehicles was officially announced: a Type R60 electric fork-lift truck , an FM-X20 warehousing truck and a horizontal EK12 order picker from Still.

Fuel cell systems from the companies Hydrogenics and Nuvera with a capacity of 12 or 5 kW were installed in the trucks. The hydrogen supply module (350 bar) comes from Linde. The tests took place at BASF Glasurit in Münster, one of the future users, as well as at the premises of the lead company in the project, Hoppecke Batterien GmbH & Co. KG from Brilon. Trial operation will begin at the start of 2008, when the hydrogen filling stations have been installed at the sites of both operators. Further information: Frank Koch, Tel. 0211/866-4216, e-mail koch@energieagentur.nrw.de
NRW has a great deal of technical know-how in the area of power plant construction – with regard to both traditional and new technologies. In its newly-published brochure, “Hightech aus der Steckdose” (“Hightech from the Socket”), the NRW Power Plant Technology Competence Network of EnergyAgency.NRW offers an insight into the technology of power generation “Made in NRW” and makes it clear why it is necessary to build new power stations. Further information: thomeczek@energieagentur.nrw.de

New book on passive houses

“Passivhäuser – bewährte Konzepte und Konstruktionen” (“Passive Houses, tried-and-tested concepts and designs”) is the title of a new and comprehensive specialist textbook on the subject of passive houses. The book offers basic information on the way in which passive houses function and deals with the necessary building construction and installations in detail, along with the measures which are necessary for quality assurance of the passive house construction methods. These subjects are related to actual practice through descriptions of successfully completed projects and the experience gained in the course of these. The author is: Dipl.-Ing. Judith Schuck, aided by K. Glaschke, G. Müller, K. Othlein, B. Schnarz; Published by: W. Kohlhammer; 192 S.; ISBN: 978-3-17-018055-0; Price: 38,- euro

New online contracting tool for the property sector

When an investment is to be made in a new central energy and heating system, the most important question is usually: “Shall we use contracting to finance and operate the new system, or shall we build and operate it using our own resources?” Advice is now at hand in the form of a new computer tool from the EnergyAgency.NRW which is available on the Internet. Using this tool, it is possible to calculate in general terms which is the better route to a new and energy-efficient installation. The tool can be found at www.energieagentur.nrw.de (Contracting portal)

Funding programmes of energy supply companies in 2008

The EnergyAgency.NRW will also again be performing a survey amongst all the energy supply companies in North Rhine-Westphalia this year. The willingness of the energy suppliers to increase the use of renewable energies and energy efficiency by means of their own funding programmes continues to be very pronounced. In addition, these programmes can often prove to be an interesting addition to funding provided by the State or the Federal Government - but often the average citizen does not know of the opportunities “his” town has to offer. The results of the survey will be collated in an easy-to-read table and will be available on the Internet as from February at www.energieagentur.nrw.de. Energy supply companies can report updates to their funding programmes to Helwig Falk (falk@energieagentur.nrw.de).

Energy Efficiency Toolbox” for energy supply companies

The EnergyAgency.NRW is offering all energy supply companies a new service package: the “Energy Efficiency Toolbox”. The “Household Electricity Check” – which has already been adopted by more than 100 partners at home and abroad using their own design for their own websites served as a basis when the toolbox was under development. All the components within the “Toolbox” can be adapted to the corporate design of any energy supply company. In addition to the electricity check, the “Energy Efficiency Toolbox” contains the following items, which the energy supply company can use to increase the advice which is given on the subject of energy efficiency: 26 interactive online tips for saving energy, a CO2 calculator and an energy-saving quiz for the Internet, the 36-page brochure “Auszeit!” (“Time Out!”) (for private households and a series of articles on energy savings which can be included in the customer magazine of the particular energy supplier. Further information: www.energieagentur.nrw.de

SHK 2008: Four days with the focus on building improvement

There is hardly a theme which is which subject to such intensive discussion as that of rising energy prices. This is why the EnergyAgency.NRW is presenting the subject of “Energy Efficiency and Renewable Energies in the Construction Sector” at the plumbing, heating and air-conditioning trade fair in Essen (Sanitär, Heizung, Klima - SHK) between 5 and 8 March 2008. At Stand 326 in Hall 2, information will be on offer regarding the use of wood pellets, photovoltaics and heat pumps, and the advisory services and training opportunities available from EnergyAgency.NRW on the subject of energy-saving building improvement will also be presented. A particular focus here will be the joint project for building improvement in NRW “My House Saves” of the NRW Economic Affairs Ministry. Co-ordinated by the EnergyAgency.NRW, 17 institutions, associations and federations have collected together an extensive body of information under one umbrella. Information: www.waermepumpen-marktplatz-nrw.de, www.aktion-holzpellets.de and www.mein-haus-spart.de