



Innovations for the energy system of tomorrow

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Today, our energy supply and our mobility are based almost exclusively on fossil fuels. The consequences of this have already become clear – both on the supply side and on the disposal side. We know that the limited natural resources available will not allow

supply to continue at current levels. While we use fossil resources, population growth and the worldwide pursuit of prosperity will continue to increase demand and aggravate the problem. The state of our predicament is being clearly reflected in cur-

rent price trends, and potential conflicts are already starting to emerge. At the “disposal side”, the burning of fossil fuels is not less problematic, as emissions have negative effects on our environment and our climate. The most prominent example is the



greenhouse effect, but the dangers to health caused by air pollution are a major threat as well. Global warming also leads to shortages of drinking water and productive land; here too, population growth is aggravating the problems.

But new technologies cannot be developed and introduced overnight, and yet more time passes before their effects become apparent. We have to act now if we are to secure humanity a future worth living. In the field of energy, the priorities are to reduce demand, to use energy more sparingly and convert it more efficiently, and to make the progressive switch to renewable energy sources. Those countries that are quick to take up the challenge of future-proofing their energy supply and transport needs will have the edge over others and will be able to export their pioneering technologies.

DLR is better equipped than any other German research centre to develop solutions for these challenges. Its research activities are primarily focused on issues of sustainable mobility (aviation and ground transport) and a sustainable energy supply.

The principal lines of DLR's energy research are high-efficiency, low-pollution gas turbines, solar thermal power stations, fuel cells, heat storage and systems analysis for the energy economy. Its activities in aviation and other modes of transport are likewise targeted at reducing the use of fossil fuels and are closely geared to the energy research topics. For instance, the continued development of gas turbines serves power stations as well as aircraft propulsion. Fuel cells have applications in stationary energy supply, in cars and airplanes. And systems analysis addresses not just individual technologies but the entire system of energy and mobility. In the space field, satellite navigation delivers efficient road traffic control,

and weather forecasting helps power-station management by predicting conditions for wind and solar energy installations.

The professional competences represented at DLR are geared to these specific tasks and at the same time have a wide range of applications. Thermodynamics, for example, is an essential discipline for gas turbine design, the further development of solar thermal power generation, the development of innovative engine concepts and the optimisation of fuel cells. Expert knowledge of fluid mechanics ensures optimal design of aircraft and other vehicles – but also of compressors for gas turbines. Competences on alternative fuel sources can be used both in transport and in stationary energy supply.

DLR's activities in energy research are exceptionally well integrated both inside the institution and with external partners. Based on the needs, the expertise of DLR researchers is complemented by their partners at universities and other research institutions to offer system competence for specific tasks. Numerous projects for industry and in partnership with industry evidence our ability to develop innovative practical solutions. The task of shaping a sustainable future for our transportation and energy needs is of enormous and urgent importance. DLR is making contributions that matter for the energy system of tomorrow. There is much to be done – and we are ready to do it.

This special Energy issue provides insight into the work currently being undertaken by DLR scientists and engineers.