Through the Sustainable Energy project, the Czech Republic, its research community and especially its promoters – the Research Centre Rez and the University of West Bohemia – obtain, thanks to the contribution of the European Union, an absolutely unique opportunity to significantly extend their research capacities for energy research and development, and to maintain their position on the market for research work in this field. The financial support provided by the European Union and the government of the Czech Republic to the SUSEN project will not only contribute to the development of the field, which we consider essential for the sustainable economic development of the Czech Republic and competitiveness of European Union states, but also for qualification growth of young perspective personnel as an important condition for technological progress.

In compliance with the objectives of the European regional policy and the priority interest of the Czech Republic in strengthening its competitiveness, the SUSEN project is oriented on knowledge economy. Its objective is to contribute, through research and development activities, to the safe, reliable, and long-term sustainable operation of the existing energy installations, mainly Generation II and III nuclear power plants, and the extension of their lifetime by 20–40 years. Another objective of the project is to support, through the research and development of new technologies, a smooth transition to nuclear power plants with Generation III+ and IV reactors. The significant part of the project is focused on the research and development of top technologies for thermonuclear fusion.

A robust and modern research infrastructure will be built as part of the SUSEN project between 2012 and 2015. This particularly involves the construction of a new diagnostic centre, the reconstruction and completion of five existing facilities on the premises of ÚJV Rež, and the construction of a new Experimental Hall in Plzeň. These projects were prepared and started in the course of 2012, and they are currently under construction with completion in 2014.

Between 2014 and 2015, the newly built and reconstructed facilities will be fitted with top experimental equipment. The most finance-intensive technological equipment will include 8 gamma-type hot cells, 2 alpha-type hot cells, an experimental supercritical water loop, two experimental helium loops, a technological circuit for testing fusion reactor primary wall material samples, equipment for the development of remote handling procedures for maintenance and repairs of liquid lead-lithium alloy systems, equipment for nuclear reactor severe accident simulation, and a cold crucible for testing the high-temperature disposal of radioactive waste. The significant part of the project costs will be spent on top equipment for NDT laboratories, metallographic laboratories, laboratories for mechanical testing, anaerobic laboratories, and other experimental equipment.

The work on the scientific-research part of the project started in 2012. This involves four mutually cooperating research programmes.

- **Programme No. 1 “Technological Experimental Circuits”** is focused on the research and development for Generation IV nuclear reactors and for nuclear fusion, mainly on the research of thermodynamic and hydraulic properties of coolant and its effect on structural materials.

- **Programme No. 2 “Structural and System Diagnostics”** will examine the degradation of properties of structural materials of nuclear reactor components after long-term operational exposure as a decisive input for the evaluation of residual lifetime, reliability and safety of nuclear reactors.
Under programme No. 3 “Nuclear Fuel Cycle”, a research infrastructure will be built for the back end of the NPP fuel cycle, particularly for the development of radioactive waste processing and conditioning technologies, study of conditions in a geological repository for radioactive waste and its impact on structural materials of disposal casks/canisters for high-level radioactive waste and spent nuclear fuel, and for the study of radionuclide migration through rock formations. A unique facility for the research of material structure and substructure during material exploitation in extreme conditions (testing of inactive materials at high temperatures, statically and dynamically loaded in environments simulating operating conditions of nuclear installations) will be constructed under programme

No. 4 “Material Research”. The program follows the needs of other programmes under the SUSEN project and is focused on the support of development of ferritic martensitic steels for application in an environment with temperatures to 650°C (steam turbines and ultrasupercritical parameters and inactive circuits of Generation IV nuclear reactors), austenitic steels and high-level austenitic alloys for components stable in aggressive environments at high temperatures and pressures, and new welding technologies for advanced materials.

The specification of the project defines a total of 21 particular scientific-research project outputs and 51 particular results to be gradually achieved by the end of 2020. By 2015, most scientific-research work under the SUSEN project will be funded from the start-up grant provided under the project by its managing authority; however, the significance of earnings from research under contracts, and national and international grants will gradually increase to enable the Research Centre Rez to solely cover, after 2015, all works needed for the achievement of the established objectives, outputs, and results of the SUSEN project and the operation of built infrastructure from such resources and institutional support to research and development.
In December 2011, the Research Centre Rez, a subsidiary of ÚJV, a. s., became a promoter of the Sustainable Energy (SUSEN) project, financed from the structural funds of the European Union under the “Research and Development for Innovations” programme, which is a part of the support provided by the European Union focused on comparisons of the economic levels in individual regions (objective of the Convergence under the European Regional Development Fund – ERDF). The University of West Bohemia in Plzeň is the project partner. Total project costs amount to CZK 2.45 billion, of which EU subsidies the amount of CZK 2.083 billion while the contribution of the Czech Republic amounts to CZK 0.368 billion. Out of the listed costs, approximately CZK 500 million and CZK 1,500 million are expected to cover the civil part of the technical infrastructure and the technological experimental equipment and instruments, respectively.

Project SUSEN represents

- new experimental opportunities for European nuclear R&D;
- further development of nuclear energy technologies in the Czech Republic;
- research and development support for Generation IV nuclear reactors and fusion technologies;
- development of cutting edge technologies;
- development of power generation research professionals.