

Organisation

The project was commissioned by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. It is conducted by Wuppertal Institute's Research Group I, "Future Energy and Mobility Structures", in cooperation with the research company Adelphi Consult, Berlin. The project benefits from the multidisciplinary approach of the Wuppertal Institute and Adelphi Consult and from the available expertise in a broad range of scientific working fields.

Project duration: 9 months, starting in October 2008.

Contact / Project Team

Dr. Nikolaus Supersberger (project manager)
Dipl. Pol. Dennis Tänzler M.A. (Adelphi Consult)
Kerstin Fritzsche M.A. (Adelphi Consult)
Dipl.-Ing. Dietmar Schüwer (Wuppertal Institute)
Daniel Vallentin M.Sc. (Wuppertal Institute)

For more information please contact

Wuppertal Institute for Climate, Environment and Energy

P. O. Box 10 04 80

D-42004 Wuppertal

Phone: +49 202 2492-255 (-198 Fax)

Email: nikolaus.supersberger@wupperinst.org

<http://www.wupperinst.org/en>



Energy Systems of OPEC Countries in the Middle East and in North Africa

System Analysis of Nuclear Energy, Renewable Energies and Energy Efficiency

Wuppertal Institute for Climate, Environment and Energy
in co-operation with Adelphi Consult

Research Project on behalf of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

Background of the Project

Climate change and energy security are global challenges that require the action of the community of states. In this light energy exporting countries in North Africa and the Persian Gulf region experience further challenges, as are increasing domestic energy demand while keeping energy exports at high levels. The European Union is affected by these domestic developments strongly, as it is importing crude oil and natural gas from these regions.

The EU collaborates with North Africa and the Persian Gulf region on different levels, e. g. in the Euro-Mediterranean Partnership EUROMED (Barcelona Process) and through the cooperation with the GCC.



Various options are discussed as potential solutions to climate change, sustained energy security and increasing demand in energy exporting countries themselves. In this context the project targets advantages of renewable energies and energy efficiency in perspective to nuclear energy within a systemic approach. Currently, nuclear power is experiencing interest in North Africa and at the Persian Gulf on the one hand. Many countries are studying plans on integrating the nuclear option into their energy systems. This is all the more valid for the OPEC members of the regions. On the other hand, the potential roles of renewable energies and energy efficiency are not evolved on such system-wide level, although huge natural potentials in the form of solar radiation and others are available.

Selection of Countries

The **Islamic Republic of Iran**, the **People's Democratic Republic of Algeria**, and the **United Arab Emirates** were selected for the analysis. They represent different members of OPEC in regard to energy and economic aspects (population size, size of fossil fuel reserves, export share of fossil fuels, etc.). Besides these differences there are similarities, e. g. the striving to keep up export levels of fossil fuels to generate income and increasing water demand. All three countries are located in the so-called sunbelt with outstanding opportunities for renewable energy utilisation.

Islamic Republic of Iran: Iran is the second largest crude oil exporter of OPEC and owns the second largest natural gas re-serves after Russia. It is therefore one of the most relevant players on international energy markets. Natural gas potential is very high, and production will be increased strongly in the future.

People's Democratic Republic of Algeria: Algeria and the EU are closely linked, as Algeria exports crude oil and natural gas to various countries of the EU. The country published plans on nuclear power: the first nuclear reactor is supposed to go online in 2017. Renewables are fostered through some regulatory approaches.

United Arab Emirates: The UAE are a member of the Gulf Cooperation Council (GCC). They are perceived in various aspects as front-runners in energy matters. The Masdar project is one example of their will to invest in sustainable energy supply paths. In 2017 the UAE plan to bring the first nuclear power plant to the grid. The GCC conducted a feasibility study on nuclear power.

Focus Questions and Objectives

A variety of **focus questions** constitutes the frame of the project:

- What are motivations for the introduction of nuclear power in the selected countries?
- Which technological options are feasible in terms of renewable energies and energy efficiency (domestically and with medium- to long-term perspectives for exports)?
- Which implications do nuclear power, renewables and energy efficiency have in a system-wide perspective?

Along these questions the project team will analyse relevant aspects of the development of future energy systems in the listed countries. In this regard the focus questions define the general **objectives** of the project:

- Inventory of renewables and energy efficiency options in North Africa and at the Persian Gulf on the basis of the analysed countries (generalisation of results)
- System analytic assessment of renewable energies, energy efficiency and nuclear power: Creation of a detailed matrix for comparison with strong regard to regional conditions
- Support of the discussion process on the role of renewable energies and energy efficiency in North Africa and at the Persian Gulf

