

## **Nuclear power station in Israel**

Summary and recommendations of the Energy Forum at the Samuel Neaman  
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### **Abstract**

The subject of erecting a nuclear power station (NPS) has been on the agenda of the energy sector in Israel since the 1970s. As part of the decision to diversify the country's "fuel bin", following the energy crisis in the aftermath of the Yom Kippur War and the oil embargo that was imposed on Israel and its allies, the possibility of building a NPS was considered. In contrast to the shift in electricity production from oil to coal, which was natural (though not easy) to implement, the shift to nuclear production is much more complicated. The sensitivity of the subject has to do with Israel's political situation, the fear of terror attacks and the fact that Israel did not sign the nuclear Non-Proliferation Treaty (NPT) -- all of which make it difficult to reach a decision to build a nuclear power station in Israel. A NPS team operates at the Israel Electrical Company since the 1970s, whose function is to follow the nuclear and technological developments in the global nuclear power industry and adapt them to Israel. A suitable site was selected (in the Shivta region in western Negev). Beyond that - no decision has been made yet to establish such a power station.

Electricity from nuclear reactors is produced in the world already since the aftermath of World War II. Currently, 440 reactors are operating in 30 countries, producing a total of approximately 380 GWe, and about 60 reactors are under construction in 14 countries. In 2010, nuclear reactors produced 2,630 billion kWh, which account for 14% of the electricity produced globally. First generation reactors (from the 1960s) have been replaced by second generation reactors, which constitute about 90% of the reactors operating commercially today. At present, third generation reactors are being built and installed, comprising substantial improvements in comparison with second generation reactors, especially in terms of safety, based on the lessons learned from the nuclear accidents that had occurred. Towards 2030, the fourth-

generation reactors – which are now only in their development stage, based on a number of technological concepts with far-reaching improvements in efficiency, safety, reduced waste and minimizing the danger of use for military purposes - are expected to become operable.

As a result of two serious nuclear accidents, Three-Mile Island (1979) and Chernobyl (1986) – nuclear energy acquired a bad image in the public's opinion, leading to significant reduction in construction of new nuclear power stations, up to a complete halt in certain countries. The accident in Fukushima, Japan, in March 2011, worsened that image, although an analysis of events underscores the robustness of this technology. The subject of public acceptability, along with other aspects of the technology, was discussed in this Forum.

The importance of energy independence and security in energy supply led to the realization that regular and reliable power supply is an existential imperative and a central component in the life of a modern country, for manufacturing and industry, and even for the basic food sector. In the State of Israel today, the power economy is based on 40% natural gas and 60% coal. Due to environmental constraints and hindrances in the development of electric power sector, it is possible that we will become more and more dependent on gas. The use of coal for the production of electricity provides security in supply, perhaps more than any other source, but involves considerable environmental pollution. Israel's gas reserves, considering future consumption, will suffice, according to different scenarios, until 2050 or 2060 (provided that the country will not embark on exporting gas). Renewable energy sources– solar and wind - considering the limited areas that can be assigned to them, will suffice at the most to produce 75 TWh per year, at a cost three to five times higher than any other source of energy. Based on that data, beginning in 2050, other energy sources must be planned besides gas and renewable energies, even without taking into account the importance of diversifying energy sources. Nuclear energy is an available source that is based on recognized technology and is pollution-free. The data presented in the Forum on the environmental consequences of nuclear vs. coal show a clear benefit to nuclear energy.

There are several basic problems to be overcome as part of the preparation for the establishment of a nuclear power station in Israel. The main problems causing delay for many years involve regulation and public acceptability. The discovery of gas reservoirs near the coast of Israel gives extra time of a few decades to address these issues. Until then, more experience will be gained with more technologically advanced and safe reactors.

## **Recommendations**

1. It is important to continue and monitor the development of nuclear technology and its possible consequences on establishing a nuclear power station in Israel: Perhaps fourth generation reactors? A large number of small reactors with inherent safety that could be dispersed all over the country, thus dealing also with the problem of power distribution?
2. It is important to continue and follow relevant developments at the political level, such as the agreement signed with India, who has not joined the nuclear Non- Proliferation Treaty (NPT).
3. Despite the time window that was opened due to the recent gas discoveries, which allow postponing the decision on building a nuclear power station for several years, the regulation problem should be addressed as soon as possible, due to the long time period required to deal with it. This is the only way to make sure that when the opportunity presents itself – we will be ready to seize it. To do so, the environmental impact should be studied, and consequent controls should be devised.
4. Great efforts should be devoted to the education of the public and to transparency towards the public about the benefits and problems involved in the nuclear technology. The public wants to know what risks are involved in the operation of a nuclear power station. What happens to the waste? It is important to bring the issue to public discussion right now, and emphasize science as opposed to myth.

5. Professional personnel in the nuclear field should be trained, since such manpower is lacking in Israel today.