

A Nuclear Power Plant in Israel

Summary and recommendations of the
52nd Energy Forum discussion

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Executive Summary

Electricity from nuclear reactors has been produced worldwide since the aftermath of World War II and for commercial purposes since the 1950s. As of the end of 2021, 437 power reactors (electricity reactors) are operating in about 30 countries, with a total output of about 380 gigawatts of electricity, which were responsible for the production of about 10% of all electricity production in the world. So far, more than 19,000 years of experience in operating power reactors have accumulated worldwide. Today, the third and three-and-a-half generation reactors are being built and erected, which are characterized by considerable improvements compared to the second generation, mainly in terms of safety, due to the lessons learned from the nuclear accidents that occurred in the past.

Building a nuclear power plant 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 mix, following the energy crisis of the October 1973 War and the oil embargo imposed on Israel and its allies, the possibility of establishing a nuclear power plant was also considered. The State of Israel's commitment to reducing greenhouse gas emissions, following the ratification of the Paris Agreement in 2016, again raises the idea of integrating nuclear energy into the local fuel mix, but at this stage, only as an idea for consideration, alongside other ideas, such as hydrogen and carbon capture technologies, without setting actual goals.

Despite the environmental benefits and safety improvements, it is still a complex and complicated issue with political implications and significant planning, operational, economic, financial, legal, and public challenges, mainly because it involves a long-term commitment.

To formulate a national position on the issue, an in-depth examination of the various aspects involved in the purchase, construction, and operation of a nuclear power plant in Israel must be performed, taking into account the threshold conditions required to execute a national project of this magnitude. Decisions must be made with a view that includes all the considerations listed below:

1. **Political aspects** - an examination of our region's political and geopolitical conditions and their suitability for managing a multi-year national project must be carried out.

2. **Technical aspects** - an in-depth examination of security, safety, and operational aspects must be carried out while referring to different technologies and location alternatives. Consideration must be given to the issues of nuclear raw material management, protection requirements for the facility, and connection to the electricity grid.
3. **Planning aspects** - a renewed examination of possible locations for a nuclear power plant in Israel must be carried out, including in the maritime territories.
4. **Economic aspects** - the economics of different alternatives for electricity production must be examined with a long-term view while referring to the investments required in the electricity network. In addition, it is recommended to examine possible economic models for financing a project of establishing a nuclear power plant since a very high initial investment is required with a long return on investment.
5. **Legal aspects** - the need for a significant legislative body to handle all issues related to a nuclear power plant must be analyzed, including legislation that supports the creation/establishment of a regulatory body and the definition of its authorities.
6. **Environmental aspects** - the idea of integrating nuclear energy into the fuel mix should be examined concerning other low-carbon alternatives, including dual-use solar energy while considering aspects of decentralization and the requirements of the electricity grid, economic aspects, and aspects of waste treatment throughout and at the end of the project's life.
7. **Public aspects** - the examination of public acceptability of the issue of a nuclear power plant must be continued and expanded while referring to diverse implementation alternatives (decentralization, use of maritime territory, etc.) and while adopting different practices to mobilize support.

In addition, to promote the topic of a nuclear power plant in Israel, it is necessary to invest in research and development and in the training of professional personnel:

- It is recommended to use the existing resources and workforce in Israel to strengthen and expand programs for training professional academic personnel in nuclear engineering. In addition, Israeli researchers from nuclear engineering who are integrated into research and academic institutions abroad as instructors and lecturers should be recruited for limited periods in Israel to share their experiences with new trainees.

- It is recommended to wisely invest the existing research budgets in the Ministry of Energy to promote the establishment of academic knowledge centers that will focus on developing and preserving knowledge in the design, operation, and safety of nuclear power reactors. These centers of knowledge should be integrated as part of the academic activity at the institution, thereby giving students and researchers tools to continue their scientific development in Israel.
- It is recommended to invest in the establishment of advanced experimental systems in reactor engineering, which is expensive by nature, mainly in academic institutions (and not in classified research institutes) so that they can be used by students, trainees, and researchers from Israel and the world, at different levels and without any restrictions.
- The Ministry of Energy and the Atomic Energy Commission in Israel must encourage maximum cooperation of the national research centers with the academy in Israel to open research to international review and publication.