Exploitation of oil shale in Israel

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Abstract

One of the local energy sources of the State of Israel is oil shale - a source of fossil fuel that appears in the form of marl or chalk rocks rich containing organic matter, which is mostly kerogen. Oil shale can be used in direct combustion that produces heat, and the possibility of using it as a substitute for coal was considered. However, due to its relatively low caloric value and high percentage of mineral content, a relatively large amount of residue consisting of mineral materials is created following burning, which must be dealt with. Alternatively, the organic matter can be extracted from the shale using heat (retorting), and then refined to produce distillates such as gasoline, kerosene, and diesel.

Oil shale deposits are known to exist in many sites throughout Israel. About 30 deposits of oil shale are known, in different quantities, depths, and qualities. In the Rotem Plane region, the average thickness of the oil shale layer is about 48 m and there are estimated reserves of 2.5 billion tons with organic matter content of more than 10%. Due to the shallow depth, the shale can be extracted through open mining. For the past twenty years, strip-mined oil shale in direct combustion has been utilized to supply energy in the Ef'e region in the northern Negev for Rotem Amfert plants. Under the shale in the Negev are phosphate deposits, and removing the shale layer burden to produce energy increases the profitability of their exploitation. Experiments were also conducted to exploit shale both through direct combustion and through retorting by the PAMA Company, on a demonstration scale. Another source of oil shale, especially rich in quantity and in kerogen content, is found in the lowlands of Judah, at a depth of several hundred meters. There are plans to produce distillates from it without mining, using the In-Situ method.

Oil shale development in Israel has the potential to contribute significantly to the country's energy economy, to energy independence, and to reducing dependence on imported fuels - primarily oil and refined petroleum products. The following summary describes the different views, as voiced by the forum participants.

1. There is a consensus on the need to check the data on quantities of oil shale in Israel and about their location and quality. There are contradictions between the data held by various parties.
2. Some participants expressed the opinion that an orderly and transparent process has to be developed for obtaining permits for development projects of this type. Those participants think that the current procedure for issuing permits, based on the opinion of the State and accepted by the Ministry of Energy and Water, does not take into account other relevant factors (such as the Planning and Building Law), leading to objections and appeals before the courts (as indeed happens). There is a general problem of regulation in Israel, and much can be learned from the experience of countries such as the United States, where an orderly process exists. However, some participants think that the approval process in its current form is correct, meets the needs, and treats the developer more strictly than other countries, including the United States.
3. All participants believe that any development must be accompanied by careful planning, analysis, and evaluation of potential environmental effects, while taking into account the environmental sensitivity of the area, its proximity to the population, and the land designation stated in the applicable outline plans. Alternatives should be examined as well as the extent to which they fit the master plan for energy. External costs are also very significant. In this context, it is regrettable that representatives from the Ministry of Environmental Protection and the Ministry of Finance were absent from the debate.
4. Some participants think that in order to understand the potential of oil shale exploitation in sites where the deposits are buried under a thick cover layer of rock, as in the lowlands of Judah, a complete pilot test should be conducted. The pilot should provide technical, economic and environmental data for the in-situ production method. The pilot should be subject to a plan as defined in the Planning and Construction Law, including a risk assessment of the pilot itself, before beginning, and with the full involvement of the Ministry of Environmental Protection. Criteria must be set ahead regarding the success/failure of the pilot and the environmental requirements, which will determine whether it has succeeded. On the other hand, there were participants who opposed the very idea of conducting the pilot (see section 7 below).

5. Some of the Forum participants believe that there are actual risks in conducting a pilot and therefore, risk assessment of the pilot in necessary, before starting it. Others think that this is not necessary. Some fear that the risk assessment will take a long time, slow down the progress, and deter investors, and that a solution has to be found that will limit the risk assessment process in time.
6. Some participants think that issues related to production should and can be assessed beforehand, if such production is proven feasible: the required infrastructure (roads and transport, water monitoring points), wastewater treatment facilities for treating the wastewater of the oil industry, sulfur treatment facilities, and more. An estimation of external costs is required (public health, damage to the local economy, water consumption, water pollution, energy consumption, air pollution). In the view of these participants, there is enough information from similar projects in order to make such an assessment before conducting the pilot. Such an evaluation, if it leads to the conclusion that the potential damage is not worth the expected profit, may obviate the pilot implementation. On the other hand, there are participants who think that such an evaluation cannot be performed before the pilot.
7. Some Forum participants were of the opinion that there is no urgency in conducting the experiment in Adullam. Oil shale in the Negev is present and available for extraction and the amount of energy that could be produced from it is sufficient for the energy independence of Israel for many years to come. They advise to wait for the results of In-Situ experiments elsewhere in the world, before trying it here in Israel, due to the potential risks involved in the experiment itself.
8. The issue of the appropriateness of the Oil Law for shale oil extraction with innovative technologies has been raised again. The Law has to be adapted in accordance with the current reality: Action in accordance with the precautionary principle. Most participants in the discussion agreed on this issue.
9. Some participants believe that the production of oil, or some other form of energy, from oil shale should be considered within the overall policy of the Israeli energy market. Although oil shale contains enough oil to last for many years, the production of this oil should be done in light of the definition of the oil needs of Israel, looking ahead several decades. A modern energy sector cannot engage only in the supply of energy and in searching for new sources, but should also find ways to optimize the energy consumption, and the methods of its usage.