



Office of the State Comptroller
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Ministry of Energy

Research and Development in the Energy Sector

Abstract

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Background

Innovation and technology are a source of economic growth, improving the standard of living and increasing life expectancy. Market failures, including a high level of risk, knowledge spillover between companies and financing difficulties, are causing entrepreneurs' volume of investments in research and development to be suboptimal. These barriers are particularly significant in the Energy sector.

Government authorities responsible for promoting R&D in Israel are the Ministry of Science, the academy, The Chief Scientists in government ministries and the National Authority for Technological Innovation, which is the government's central authority for promoting R&D in industry. Israel is one of the countries with the highest volume of investments in R&D in the western world in terms of GDP; however, in the Energy sector, the volumes of investment in R&D in Israel are among the lowest in the western world.

Key figures

4.4% of the GDP

Israel's national expenditure on civilian R&D¹ in 2016 – the highest among OECD countries. About 86% of R&D is conducted in the business sector

ILS 7 billion

total government support of R&D in 2016

0.6%

ratio of the government's R&D investments in production and utilization of energy² out of all government R&D investments in 2017

70%

of R&D in the energy sector is conducted in academy

ILS 1.7 billion

the Innovation Authority's budget for R&D grants for 2018, about 75% of which is invested in high-tech

ILS 0.6–1.1 billion

potential addition to the GDP as a result of increasing government investments in the energy sector, out of the Authority's budgets, at the volume of ILS 200 million

ILS 43 million

average annual investments in projects by the Chief Scientist in the Ministry of Energy in 2016 to 2018


1.8%

ratio of the sectors of electricity supply, sewage and waste treatment services (which are part of the energy sector) out of the total GDP. Gas discoveries (which are also part of the energy sector) contribute about another 1.4% to the GDP each year






¹ The national expenditure on civilian R&D is after deducting defense R&D.

² According to the Central Bureau of Statistics' definition: R&D intended to improve the manufacturing, storage, transport, distribution and intelligent use of any form of energy. This definition includes only a portion of the energy fields and is also used by the OECD, thereby enabling international comparisons.

Audit actions

 From March to December 2019, the Office of the State Comptroller audited the R&D activity in the energy sector, including the volumes of government support to R&D activity, the activity of the government authorities responsible for promoting R&D in this sector, their characteristics and the effectiveness of their actions. The audit was conducted in the Innovation Authority, in the Chief Scientist's Unit in the Ministry of Energy and in the Israel Electric Corporation Ltd. (IEC). Supplementary audits were conducted in the Ministry of Science and Technology, in the National Council for Civilian Research and Development, in the Government Companies Authority, in the Electricity Authority and in the Authority for Industrial Cooperation and Promotion of Foreign Investments.

Key findings

-  **The recommendations of the Energy Committee in the National Council for Civilian R&D** – as time passes, it has become evident that no material change has occurred in the volumes of R&D activity in the energy sector, inter alia, as a result of a non-implementation of the Energy Committee's recommendations.
-  **The Innovation Authority's focus on investments in high-tech** – about 75% of the Innovation Authority's investments are focused on high-tech industries, even though the high-tech sector has significant sources of funding in the business sector, while other sectors' sources of funding are limited.
-  **Maximizing the Innovation Authority's return on investments** – diversifying the Authority's investments beyond the high-tech sector to more traditional sectors, such as the energy sector, could increase the potential addition to GDP by a minimum of ILS 600 million up to ILS 1.1 billion per annum.
-  **The Israel Electric Corporation's investments in R&D** – the IEC's investments in R&D are low relative to its volume of operations and to the level recorded in electricity utilities in selected countries (0.02% of the IEC's total income). When comparing the IEC's investments to the recorded level of investments by electricity utilities in the comparison, the IEC's annual underinvestment is estimated at about ILS 80 million.
-  **The Israel Electric Corporation's recruitment of professional manpower** – the lack of innovation in the energy sector and in the electricity market in particular impedes the IEC's ability to recruit and retain engineers, which may later adversely affect activities that are vital to Israel's economy. The IEC is taking action to eliminate its manpower problems



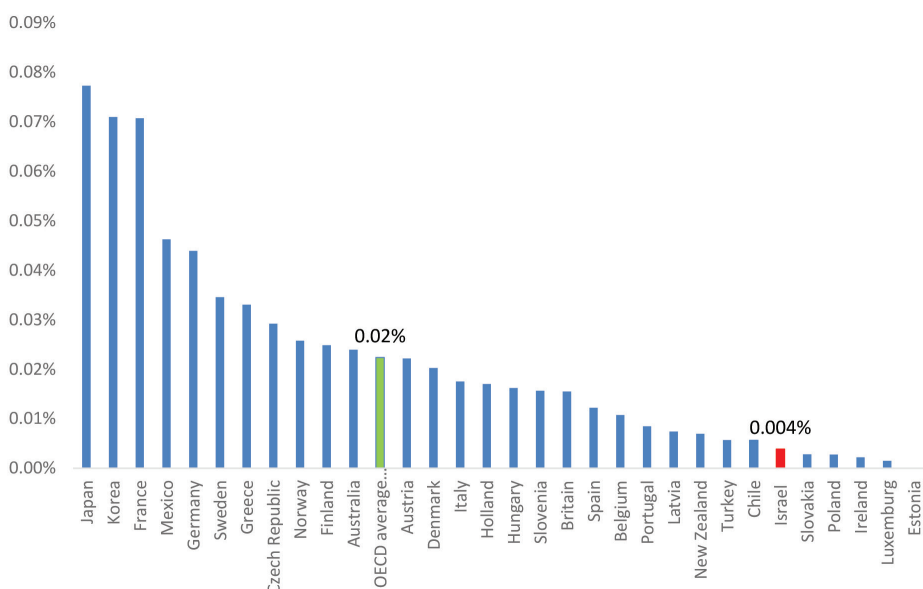
The focus of the investments by the Chief Scientist in the Ministry of Energy – the segmentation of the investments by the chief scientist in the Ministry of Energy indicates investments in segments that the government has sought to promote over the last decade.

Effectiveness of the investments by the chief scientist in the Ministry of Energy – according to the chief scientist's data, its investments are very effective, and this is reflected in the significant increase in investments in energy R&D on the part of the business sector, in the high ratio of ventures that have proceeded to the next lifecycle stage and more.

Key recommendations

- 💡 The Ministry of Science and the Ministry of Energy should examine the Energy Committee's recommendations and their validity considering the years that have passed and should take action to formulate a plan for promoting R&D in the energy sector.
- 💡 It is recommended that the Innovation Authority should reconsider its investment mix, subject to mapping of the needs of the economy's various sectors and identifying market failures requiring government intervention, particularly in the energy sector, in order to ensure that its activities lead to maximizing of the public benefit from its grants, assisting in the advancement of innovation and technology in all sectors of the economy and encouraging growth and increased productivity in the economy.
- 💡 It is recommended that the Authority for Industrial Cooperation and Promotion of Foreign Investments and the Ministry of Energy, should examine possibilities of applying existing reciprocal procurement commitments to also advance R&D activity in general and in the energy sector in particular, whether through direct investments or through knowledge sharing.
- 💡 It is recommended that the IEC should review the R&D potential in the company, analyze its strengths and weaknesses and formulate a plan for strengthening and enhancing the company's R&D activities. It is also recommended that government authorities, in collaboration with the IEC, should examine ways to take advantage of the knowledge amassed in the company and its existing unique infrastructures to enhance innovation and R&D in the electricity market in particular and in the energy sector in general.
- 💡 It is recommended that the Electricity Authority should examine ways to encourage R&D activities in the IEC and remove existing barriers to the IEC's R&D activities, such as the uncertainty involved with regard to reimbursement of R&D costs and the negative incentive to develop technologies that would cause a decrease in the company's revenues.

Government investment in R&D in the energy sector* in terms of the GDP ratio in OECD countries, 2017



According to OECD data.

* Energy is classified according to NABS 2007³ and it includes the following fields: the manufacturing, storage, transport, distribution and use of any type of energy, processes to increase the efficiency of energy generation and distribution, energy conservation, energy savings, sources of renewable energy, nuclear fission and fusion, storage of CO₂, hydrogen cells and fuels and other manufacturing and storage technologies.

Summary

R&D investments in Israel (as a percentage of the GDP) are some of the highest in the world but in energy sector are among the lowest in the world, notwithstanding the sector's criticality. The majority of the R&D activities in Israel is conducted in the high-tech sector and major gaps exist between the volumes of R&D in high-tech and the volume in all other sectors of the economy. The government's R&D policy should handle market failures in R&D, such as the high risk in R&D activities, the funding difficulties and the unique barriers in particular sectors. However, the government's policy is ostensibly neutral and actually, is not leading to any change in the current situation. The government should formulate a policy that will infuse innovation into all sectors of the economy and in the energy sector in particular, and that will contribute to increasing the productivity in these sectors.

3 Nomenclature for the analysis and comparison of scientific programs and budgets used by international bodies conducting comparisons; in this instance, it is the OECD.