

EXECUTIVE SUMMARY

INNOVATION IN ENERGY AGRICULTURE

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About the Koret-Milken Institute Fellows Program

The Koret-Milken Institute Fellows Program accelerates Israel's economic growth through innovative, market-based solutions for long-term economic, social, and environmental issues. The program focuses on connecting government, philanthropic, and business resources that are vital to national growth and development.

Directed by the Milken Institute Israel Center, the Koret-Milken Institute Fellows Program awards annual fellowships to outstanding graduates of Israeli and international institutes of higher education. Fellows serve yearlong internships at the center of the nation's decision-making—the Knesset, government ministries, and other Israeli agencies—and aid policymakers by researching and developing solutions for various economic and social challenges.

In addition, fellows craft their own policy studies aimed at identifying barriers to economic and employment growth in Israel. The fellows' studies, carried out under the guidance of an experienced academic and professional staff, support legislators and regulators who shape the economic reality in Israel. The program offers the ultimate educational exercise, combining real-life work experience with applied research five days a week.

Throughout the year, fellows receive intensive training in economic policy, government processes, and research methods. They acquire tools for writing memorandums, presentations, and policy papers, and they develop management, marketing, and communication skills. The fellows participate in a weekly workshop, where they meet senior economic and government professionals, business leaders, and top academics from Israel and abroad. They also participate in an accredited MBA course that awards three graduate-level academic credits that are transferable to other universities in Israel. The course, which focuses on financial and economic innovations, is taught at the Hebrew University of Jerusalem's School of Business Administration by Professor Glenn Yago, Director of the Milken Institute Israel Center and Director of Capital Studies at the Milken Institute in California.

Fellows Program alumni can be found in senior positions in the public and private sectors. Some serve as advisers to government ministries while others work at private-sector companies or go on to advanced studies at leading universities in Israel, the United States, and Great Britain. Within the program's framework, more than 80 research papers have been published, catalyzing reforms, reducing barriers, bringing about economic growth, and improving the quality of life for Israeli citizens.

The Koret-Milken Institute Fellows Program is nonpolitical and nonpartisan. It is funded by the Koret Foundation, the Milken Institute, and other leading philanthropic organizations and individuals in the United States and Israel.

More about the program: www.kmifellows.org

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Dependence on oil and fuel alternatives

Unlike the electricity industry which has cut its reliance on oil since the 1970s, the global transportation sector remains almost completely dependent on the commodity with fuel demand continuing to rise even in the face of climbing oil prices.

This dependence on oil has strategic, economic and environmental implications, driving an urgent need to develop viable alternatives. This need is especially strong in Israel given a political situation that finds the country isolated from its oil-producing neighbors. **Strategically**, global-oil reserves are finite and largely controlled by OPEC countries, most of which are not friendly to Israel. **Economically**, the price of oil is expected to increase further given the finite quantity of oil in global reserves. This price trend also is supported by OPEC limits on production, political events in the Middle East (which contribute to price volatility) and the cost of environmental effects. **Environmentally**, the use of oil results in CO₂ and other pollutants, specifically in densely populated areas such as city centers.

Bio-fuels are a promising alternative that can help reduce the transportation sector's reliance on oil. The continued increase in oil prices and government policy supporting bio-fuels strengthen the expectation that bio-fuels will play a substantial part in the future of transportation fuels. While demand for bio-fuels rises, supply is short, specifically with respect to advanced bio-fuels, based on next-generation energy plants (non-edible plants). The benefits of second- and third-generation energy plants are high yields for a given area, the use of marginal lands and non-potable water, which make them the preferred option from a sustainable point of view. This forecast constitutes an opportunity for Israeli companies that develop advanced technology, and specifically those developing second- and third-generation energy plants.

Challenging Oil

Alternative fuels are faced with the big challenge of having to compete with oil, the existing effective product, as well as the high levels of standardization and regulation that characterize the auto industry and related infrastructure. Bio-fuels face an additional technological challenge deriving from climate and biological (e.g., insects) effects. Israeli companies in the bio-fuels sector have innovative technologies based on knowledge, experience and proven abilities. However, in order to enter the international markets, Israeli companies must prove their technologies are scalable to a commercial scope. Funding for projects of such a scope is difficult to obtain due to the low level of activity of financing entities in the sector and the high level of risk associated with investing in new technology in a new sector. Furthermore, companies have difficulty dealing with regulatory requirements in Israel and abroad.

This research aims to recommend policy tools to assist companies in performing their first commercial project of innovative technologies in the field of energy agriculture to prove the feasibility of the technologies on a commercial scale.

Israeli companies in the bio-fuels sector require 500 to 5,000 dunams of land to undertake a first commercial project. The costs associated with a 1,000 dunam project are approximately \$100,000 for the agriculture alone (the amount increases dramatically for projects that include irrigation), about \$1 million for the production plant and an additional \$3 million to \$5 million for the oil-extraction factory. Similar projects that already have taken place or are expected to be undertaken in the near future, have been financed only by the companies' equity, without bank loans. The projects are expected to yield revenue within a year or two.

Companies in the field identify regulation (local and foreign), lack of financing (as well as guarantee and security tools), absence of specialized mechanical tools and demand as the major constraints facing them when performing a first commercial project. The constraints (appearing in Figure 1 below) were rated on a scale of 1 to 5 based on the level of their effect, with level 5 indicating the most substantial effect.

FIGURE 1. MAJOR CONSTRAINTS TO COMPLETION OF THE FIRST COMMERCIAL PROJECT



Source: Milken Institute, 2012.

A review of existing governmental programs reveals that none of them specifically addresses the first commercial project. The program for the encouragement of investments in venture-capital backed

companies in the field of alternative fuels for transportation is not aimed at the first commercial project but has the potential of addressing the financing constraint because it is suitable to the relevant phase in the company's activity and the sums required. The program is intended to create a market for private investments in VC-backed companies in the field and involves the government providing a loan of 50% of the amount invested by the private investor (between NIS 750,000 and NIS 12 million per company, per investor and up to NIS 30 million for a number of investors). The loan would be repaid from royalties. Finalization of the program has been delayed, leading companies that would like to enjoy its benefits to hold back plans to raise capital.

This study recommends that the government support the development of a bio-fuels cluster in Israel to create a platform for cooperation that will promote technological development and help attract financing entities to the bio-fuels field in Israel. It also recommends that the government assist companies in regulatory and financial matters to develop the bio-fuels cluster and create long-term certainty for entrepreneurs and investors, thereby allowing the construction of large projects in the country.

Regulatory recommendations:

- Broaden the scope of the government's one-stop-center to assist companies in the demonstration phase to also include assistance for their first commercial project and also to consider extending assistance to the companies' projects abroad.
- International activity to set unified criteria of regulation and standardization. It is advisable that relevant government entities (the Standards Institution, the Ministry of Agriculture) actively promote cooperation with their foreign counterparts to simplify the companies' activities abroad.
- Create a regulatory framework for the companies' activities during the research and demonstration phases, including the use of government agricultural land and laboratories, and facilitating leasing of agricultural land and water quotas. It is advisable to allow companies to use government-agricultural land and to establish a national laboratory to provide services to companies in the field of bio-fuels. Such a venture can be funded from the budget allocated to the agriculture sector under the recommendations of the inter-ministerial committee for leveraging Israel's comparative advantage in the field of agricultural know-how and technology. It also is recommended that specific areas be defined as R&D land, the use of which will include water quotas, and that the Water Authority be allowed to allocate water quotas to companies that operate in the bio-fuels sector. Additional facilitation concerning R&D land may be considered, such as permitting regional councils to exempt R&D land from municipal-land tax.
- Review of the single status of a company as either industrial or agricultural. Agro-technological companies should be defined as both agricultural and industrial to allow them to receive the

benefits associated with both definitions such as water quota for one and rights concerning the establishment of factories for the other.

Financing recommendations:

- Complete and implement the program for the encouragement of investments in VC-backed companies in the field of alternative fuels for transportation as soon as possible. The program seems very promising and has the potential of assisting companies in the phase of proving the feasibility of their technology on a commercial scale. Delays in starting the program are leading companies who want to participate from securing investments now.
- Adoption of a government-support model for project-finance projects. It is recommended that the government assist such projects by providing guarantees, specifically with respect to the initial phases of the project, until the end of the first year following construction. The structure of the guarantees can be under a designated fund.
- Encouragement of demand for the produce of the energy plants (grains or oil) by setting a subsidy for bio-diesel (second generation and up) grown and produced in Israel. It is recommended to adopt a model whereby the subsidy gradually decreases over a set period of time and to differentiate between second-generation technologies (field crops) and third-generation technologies (algae) because longer development time is required for the latter. Such a subsidy is expected to develop the local market and provide certainty, which would encourage the establishment of larger projects in the field.
- Increase the funding provided in the context of the demonstration-projects program. In addition to the grant provided by the program, it is advisable to allow companies to receive a loan that would be repaid from royalties, similar to the repayment method under the R&D law.

Government support to assist companies in regulatory and financial matters will develop the bio-fuels cluster and create long-term certainty for entrepreneurs and investors, thereby allowing the construction of large projects in Israel. The establishment of a local market will create a working model of development, production and distribution of advanced bio-fuels that will demonstrate the benefits of developing the bio-fuels industry around the world. Establishing the bio-fuels field in Israel is expected to allow the technologies to prove their feasibility on a commercial scale and to constitute an important stage in developing alternative-fuels technologies with the potential of creating a global supply of competitively priced bio-fuels in the future. This, in turn, will contribute to reaching the goal of reducing the global transportation sector's dependence on oil.

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