Israel Fuel Choices Initiative

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The National Program for the Development of Alternative fuels in Transportation
The U.S.-Israel Bio-Energy Challenge
Outline

1. Alternative Fuels – Description and Forecast
2. Alternative Fuels Program Overview
3. Promoting activities – Things are happening!!!!
Why we must get off oil

Oil Is a Monopoly in Transportation

Oil Reserves Peaking

Economic Effects

Environmental Problems

The End of the “Cheap Oil Era”

In 1900, the “price” of harvesting 100 barrels of oil was 1 barrel. Today one barrel of oil nets only three to five in return.
NOx Emission – Tel Aviv, Yom Kippur 2012

NOx (ppb) vs Time

Regular Working Day

Beginning of Yom Kippur

Ending of Yom Kippur

FREEDOM TO CHOOSE THE WAY WE MOVE
So what the world has to offer

Ethanol
Methanol
Bio Fuels
Natural Gas - CNG
Electric Cars
Fuel Cells
Forecast of economic viability of Technologies

- HEV
- CNG
- Electric Buses and Trucks
- Methanol
  - Methanol >30%
  - Methanol 15%
- PHEV
- Ethanol
- Biodiesel
- GTL
- Bio Methanol
- DME
- 2nd Generation Biofuels
- Full Electric Vehicles
- Fuel Cells
- Algae fuel
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- Electric Buses and Trucks
- CNG
- HEV

Implementation
Support Pilots & demos
R&D
Reality of Fuels Alternatives

- There are many solutions
- No gold standard
- Some solutions are already economically viable
- Solutions are locally based
- Implementation can start now

Before

- No Choice
- Expensive
- Not Available

Now

- Multiple Choices
- Cheap
- Available Now
Reduce the usage of oil in Israel

Expected Penetration Rate for Alternative Fuels in Israel

- Bio Fuels
- Electric Mobility
- Compressed NG
- Methanol
Fields of Alternative fuels

Energy Agriculture

- Israel is a global leader in agro-technology (limited land and water)

- Advanced Energy Agriculture Projects, based on leading Israeli agro-companies
- Castor bean farming and industrial processes for biofuels.
- Algae farming for as a feedstock for biofuels
- Bio-Fuel production processes and technologies
- R&D is focused on:
  - New varieties of energy plants
  - New machinery for harvest of new crops
  - Procedures for post harvest processes and production of bio-fuels
Natural Gas for Transportation

- Natural gas is the best short term solution for replacing oil in the transportation and as a bridge towards fully sustainable energy solutions.

- NG based transportation in the Israeli market is focused on:
  - Condensed Natural Gas (CNG) solutions for trucks, light duty vehicles, buses and private vehicles
  - Methanol as a gasoline blend, mainly to be used by private vehicles.
  - Gas to liquid technologies, that can turn natural gas into drop-in fuels
Energy Storage Technologies

- Challenge: improved energy storage and integration into mobility platforms
- Israel is home to innovative electrochemistry and energy storage applications & research.
- Applied research and production is focused on:
  - Lithium Batteries
  - Super Capacitors
  - Fuel Cells
  - Hydrogen Storage Systems
  - Metal Air Batteries
  - Battery Management Systems
Our Mission:

To serve as a catalyst for the reduction of global dependence on crude oil by establishing Israel as a center of knowledge and industry in the field of fuel alternatives for transportation.
# Program Structure

## Mission

To serve as a catalyst for the reduction to the world’s dependence on oil

## Goals

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<th>Turning Israel into a center of knowledge &amp; best practices</th>
<th>Raise awareness &amp; Int’l collaboration</th>
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## Objectives

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<th>Developing next generation technologies</th>
<th>Local Test Bed</th>
<th>Support Industry</th>
<th>Raise awareness</th>
<th>Int’l collaboration</th>
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## Government Tools

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<th>Research centers &amp; Industry – Academy projects</th>
<th>Support Pilots</th>
<th>Chief Science +Co-Invest Fund</th>
<th>Seminars &amp; Int’l Prize</th>
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Gov. offices: Science, Energy, IT&L, MOF, Transportation, Environment, MFA, MOD
Turning Israel into a center of knowledge & best practices

- Research
- Reduce Oil Consumption
- Int. Collaboration
- Raise awareness
- Pilots & Demos
focused on:

- Energy Rich Biomass
- Photo (electro) Chemical Conversion
- Biomass Conversion Processes
- Renewable Fuels Production
Israel National Research center for Electrochemical Propulsion (INREP)

The Challenge: improved energy storage & integration into mobility platforms

Research is focused on:

- Hydrogen Storage Systems
- Metal Air Batteries
- Battery Management Systems
- Lithium Batteries
- Super Capacitors
- Fuel Cells
Agro - Energy Research (Vulcani Center)

Challenge: Generate clean, efficient energy from renewable sources.

focused on Seed – to – Harvest processes:

- New varieties of energy plants
- New machinery for harvest of new crops
- Procedures for post harvest processes and production of bio-fuels
- Seed – to – Harvest processes of Jatropha curcas and Castor bean
Systemic Approach for Implementation

- Conduct techno-economical studies
- Different technologies benefit different transportation sectors.
- Mechanism: Inter-ministerial teams that accompany the pilot from writing the protocols through analyzing the results. (Include representatives from the Israel Standard Institution).
- Achieve regulatory support and acquaintance of the regulator with the “new technology”.

Diagram:
- Partners
- Company
- Regulators
- ISI

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Supporting pilots and demos – financially and regulatory

Methanol Projects:

M15

- Field trial in vehicles using a mixture of gasoline containing 15% methanol (existing gasoline-operated vehicles).
- The purpose of this pilot: to provide a full characterization of M15 implications required for its standardization in Israel as a motor fuel.
- The trial includes: laboratory tests of the fuel stability, engine performance on test-bench, road tests and vehicle-generated emissions.
- Collaboration with Ten, BGU, Afeka and European laboratories.

FFV

- Fueling of FFV (Flexible Fuel Vehicles) using methanol rich.
- Validate that these cars do run on high methanol concentrations
**Pilots and Demonstrations – Electric Public Transportation**

Reducing both emissions and noise for the benefit of the citizens.

Advantages of having Electric buses in an urban area are - regular routes, frequent stops, night charging.

**Super-capacitor based Electric Urban Public Transportation (EUPT)**

Buses run on electricity without overhead contact lines.
Pilots and Demonstrations – Tel Aviv – Smart Transportation City

A joint project with the Tel Aviv Municipality

- City Cars (Car sharing A to B model)
- Electric Scooters
- Personal Rapid Transportation

**Personal Rapid Transit** is a mode featuring small automated vehicles operating on a network of specially built guide ways. The first public experiment (based on a NASA technology) of such transportation will be trialed in mid-2014.
Integrating CNG vehicles in the transportation sector

- Potential solution for commercial vehicles. Benefits significantly increase for high mileage vehicle fleets, and/or intercity driving characteristics.
- Economical analysis indicates high market savings for busses.
- The “chicken and egg problem”. Government intervention for both supply and demand side is needed. (Infrastructure, vehicles)
- Safety Issue!!!!!
**Raise awareness.....**

**Seminars and conferences**

To explore the possibilities of partnerships and international cooperation between local industry and leading global enterprises, with the aim of implementing novel technologies in the field.

- Electric Buses and Natural Gas-Based Transportation
- Energy Storage and EV conference
- Agro Energy Nexus Summit - Agro-Energy Projects Global Conference
- Academic seminars and conferences
- Israel Transportation Conference

**Un-conferences - EcoMotion**

Building an inter-disciplinary community

**Prime Minister’s Prize**

An international prize awarded for global innovation or a major scientific or technological breakthrough.

*Raising the world’s awareness of alternative fuels. Building global coalition of partners to speed up innovation.*
Government Resolution

Create a global impact – first show the world we can do it here!!!!!!

Reduce the share of oil in Israel's transportation sector by 30% by 2020 and by 60% by 2025, while supporting green growth and becoming a show case to the world.
Global Challenge
Local Research and Innovation
International Collaboration

Thank you