



Ministry of National Infrastructures
State of Israel

R&D Policy in Israel

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Outline

- Main R&D efforts
 - Israeli energy market - Facts digest
 - Conclusions
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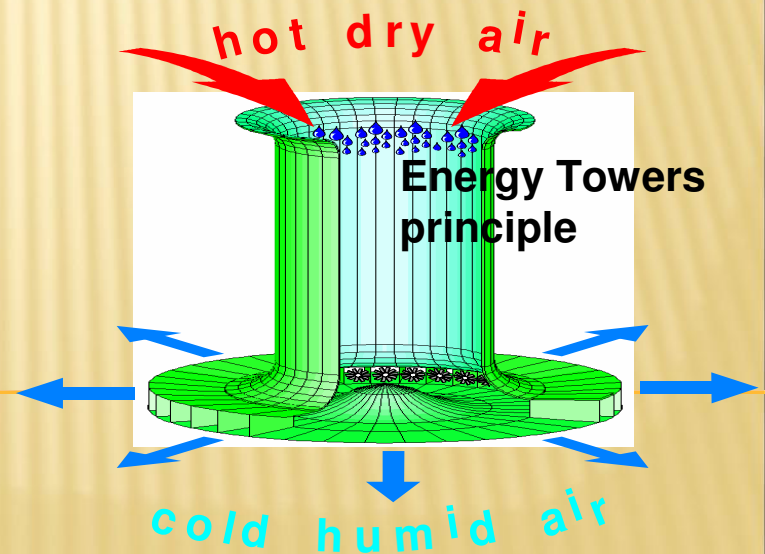
ELEMENTS OF THE NEW ENERGY R&D PROGRAM

- 5 years program / **400 MNIS** in renewable energy & energy efficiency
- Basic Research
 - Ph.D. & Post-doctoral scholarship – 1.5 MNIS/year
 - R&D in the academia managed by MOS – 1.5 MNIS/year
 - R&D in the academia managed by MNI – 7.5 MNIS/year
 - Support for local conferences – 0.5 MNIS/year
- Applied Research
 - Chief Scientist of MOITAD programs
 - TNUFA – 2 MNIS/year
 - MAGNET – 15 MNIS/year
 - Chief Scientist of MNI program SARTERGY – 5 MNIS/year
 - Combined AGRI & MNI programs – 1 MNIS/year



ELEMENTS OF THE NEW ENERGY R&D PROGRAM (2)

- Technological Center for Renewable Energy in the Negev – **11.4MNIS/year**
- **Support industries by the Capital Investment Promotion law**
- **Additional tools:**
 - Use of Reciprocal Purchasing funds
 - Training programs – 1.8MNIS/year
 - Support industries participating in international bids – 0.8MNIS/year
 - International conference & trade exhibition – 1MNIS/year
 - Technology validation center and new Standards development support – 1.5MNIS



ELEMENTS OF THE NEW ENERGY R&D PROGRAM (3)

■ INTERNATIONAL COLLABORATIONS

- EU (FP7) – 2 MNIS/year
- US – 4.5 MNIS/year
- IEA – 1 MNIS/year
- Others – TBD

■ Additional initiatives TBD:

- Regulations
- Taxes
- Planning & land allocation
- Environmental planning



Summary

- The new program will foster the R&D in Israel substantially
- The new measures in promoting energy efficiency by the government & private sector may revolutionize the public attitude to housing regulation and daily energy consumption habits



Solar Energy Government activity

- A decision was made to erect the first solar power stations in Israel:
 - Two 125 MW power plants, based on the **parabolic trough** technology, and, if successful, will be expanded to 500 MW
 - 15 MW PV power plant



US – Israel Collaboration on Renewable Energy

- 7 years program
- M\$20/year ???
- ~ M\$7 for Y2009 ?
- Channels of collaboration:
 - Academia – Academia & Academia – Industry (BSF)
 - Industry – Industry & Industry - Academia consortia (BIRD)
 - Academia/Industry – Any other ... (VC, marketing,...)
(New format ?)
- Fields of activity –
 - Renewable Energy
 - Sustainable energy sources

US – Israel Collaboration on Renewable Energy (2)

■ Program

- Distribute information about projects, R&D infrastructures, etc. - Networking
- Establish personal relations between scientists. Joint conferences, mutual visits,...
- Form R&D consortia based on:
 - Mutual interest
 - Complementarities of know how
 - Sharing infrastructures
 - Synergy in human and economical resources

■ Now – setting the platform for the a.m. program

Facts Digest - Total Primary Energy Supply (TPES) Y2006-7

Source	Quantity [Mtoe] & [TWh]	Electricity Consumption [TWh]	Imported [%]	Estimated Local resources
Coal	9.6 - 110	36.7	100%	None
NG	1.8 - 20.9	9.7	50 %	20-100(?) BCM (18-90 Mtoe)
Crude Oil	9.1 - 105.8		~100%	Almost none
Refining Products	7.5 - 87.2	7.6	<20%	
Oil Shale	0.023 - 0.24	0.04	0%	15 Bt (700 Mtoe)
Biomass		0.003		Wastes: ~6 Mt/year; Algae, Jatropha,... ~1.5Mtoe
Sun	0.7 - 8.1	0.0015		~600 km ² e.g. ~30 GW; ~58 TWh
Wind		0.012		~0.6 GW e.g. ~1.75 TWh
Hydro		0.027		< 20MW (Except Red-Dead Canal)
Geothermal				Negligible (30-70°C at 1km)
Tides				Negligible

Installed electrical power: ~ 11GW (Peak-power demand 10.5GW !)

Facts Digest - Summary Y2006-7

		Israel	France
Population	[million]	7	63
GDP [Y2000]	[B\$]	127.2	1430.1
GDP (PPP)	[B\$]	159.3	1696
Energy production	[Mtoe]	2.1	136.9
Net Import	[Mtoe]	18.3	143.3
TPES	[Mtoe]	19.5	276
Elec. Cons.	[TWh]	46.8	483.3
CO2 Emissions	[Mt]	59.9	388.4

		Israel	France
TPES/Pop	[toe/capita]	2.82	4.4
TPES/GDP	[Mtoe/B\$]	0.15	0.19
TPES/GDP [PPP]	[Mtoe/B\$]	0.12	0.16
Elec.Cons. /Pop	[kWh/capita]	6763	7707
Elec.Cons. /GDP	[TWh/B\$]	0.37	0.34
Elec.Cons. /GDP [PPP]	[TWh/B\$]	0.29	0.28
CO2/TPES	[Mt/Mtoe]	3.07	1.41
CO2/Pop	[t/capita]	8.65	6.19
CO2/GDP	[Mt/B\$]	0.47	0.27
CO2/GDP [PPP]	[Mt/B\$]	0.38	0.23

* IEA - Key World Energy Statistics 2007

Facts Digest - Forecast

- Population estimated growth-rate - ~ 1.8% / year
 - GDP estimated growth-rate - ~ 3.3% / year
 - Estimated increase in energy consumption: ~ 4.4% / year
 - Estimated peak-power demand in 2020: ~ 16.2 GW
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Conclusions

- Renewable energy sources:
 - Sun is the major source. However, the limitation is area availability that may limit the maximal energy production to ~ 58 TWh / year
 - No more than 50% of the TPES can be reached around Y2020 (Our practical aim is 20%). Later, the relative contribution of renewable energy will be reduced
 - Major source of Biofuels can be from abroad, based on Israeli know-how (in agriculture of arid area and oceanography)
 - Energy from biomass can marginally contribute (~1%) to the TPES but important as a part of the end-of-life cycle of products
- Energy conservation & efficiency is essential in order to gain more time for new sources development
- Coal will still be the backbone of the Israeli electrical-energy market for many more years, ensuring the base-load demands.
- Oil from oil-shale extraction and/or direct combustion must be reevaluated as a major local fuel source
- Major reduction in CO₂ emission can only be achieved by using nuclear power

Energy R&D in Israel

- Key R&D area to be explored (Top priority only):
 - Energy saving & efficiency
 - Solar
 - Improved coal technologies
 - Oil shales
 - Novel ideas
 - Nuclear
- But, due to the limited Israeli market most of the R&D projects are oriented to the global needs. Thus, the actual order of the R&D priorities is somehow different from the governmental list.
- The Ministry of National Infrastructures influence on this tendency has reduced due to its diminishing R&D budget
- Many centers of excellence in academia and industry exist, exploring all energy aspects which are internationally attractive.
- The Government promoted some of them for several years in the past. For example:
 - The Sde-Boker solar center
 - LUZ industry (Now Solel)
- Careful selection of R&D projects has lead to remarkable success stories
- → The new Governmental Resolutions of last August on “Renewable energy” and “Energy efficiency” and the coming resolution regarding the “Declaration of the Negev & Arava as national priority areas” will change considerably the situation

MNI's R&D - Policy

- Emphasize local resources
 - Assess the real potential of the local resources (location, quantity, quality)
 - Support absorption and adaptation of new technologies from abroad
 - Encourage cooperation (between research institutions, with industry, with international organizations)
 - “Bottom-up” approach
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Thank You

