

Israel Nanotechnology Initiative: An Overview

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January 20, 2004

Definitions

Nanoscience

Preparation, characterization, manipulation, and control of single or small groups of atoms or molecules to construct new materials (on the billionth of a meter scale) with unique novel properties,

which could be used for new applications, and/or for reducing the costs of existing applications

Nanotechnology

Israel Nanotechnology Initiative: Chronology (2002)

- Prof. Ziv, President of Israel Academy of Sciences and Humanities and Chair of the TELEM Forum, established a Committee to develop long-term plan for Nanotechnology R&D infrastructure in Israel
- Members: Dr. Dan Maydan, Prof. Gad Bahir, Prof. Uri Banin, Prof. Ori Cheshnovsky, Prof. Joshua Jortner, Mr. Dan Vilenski, Dr. Meir Weinstein, and Dr. Giora Yaron
- Recommendations:
 - Launch Israel Nanotechnology Initiative as a five-year program aimed at realizing ten-fold increase in local capability
 - Invest over \$300 million in select application areas in Defense, Electronics, Energy, Environment/Water Desalination, and Nano-bio
 - Set up Board of Directors to implement initiative

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- Board of Directors nominated; members: Dr. Dan Maydan, Mr. Yehuda Bronicki, Dr. Moshe Goldberg, Prof. Yoseph Imry, Prof. Joshua Jortner, Mr. Israel Makov
- BOD created Israel Nanotechnology Trust as a fund-raising and allocation mechanism
- Shimon Peres champions worldwide nanotechnology campaign
- **Priorities:**
 - **Novel water desalination solutions**
 - **Nano prototyping center in the Negev**

Nanotechnology: Potential to Improve Health, Wealth, and Sustainable Development

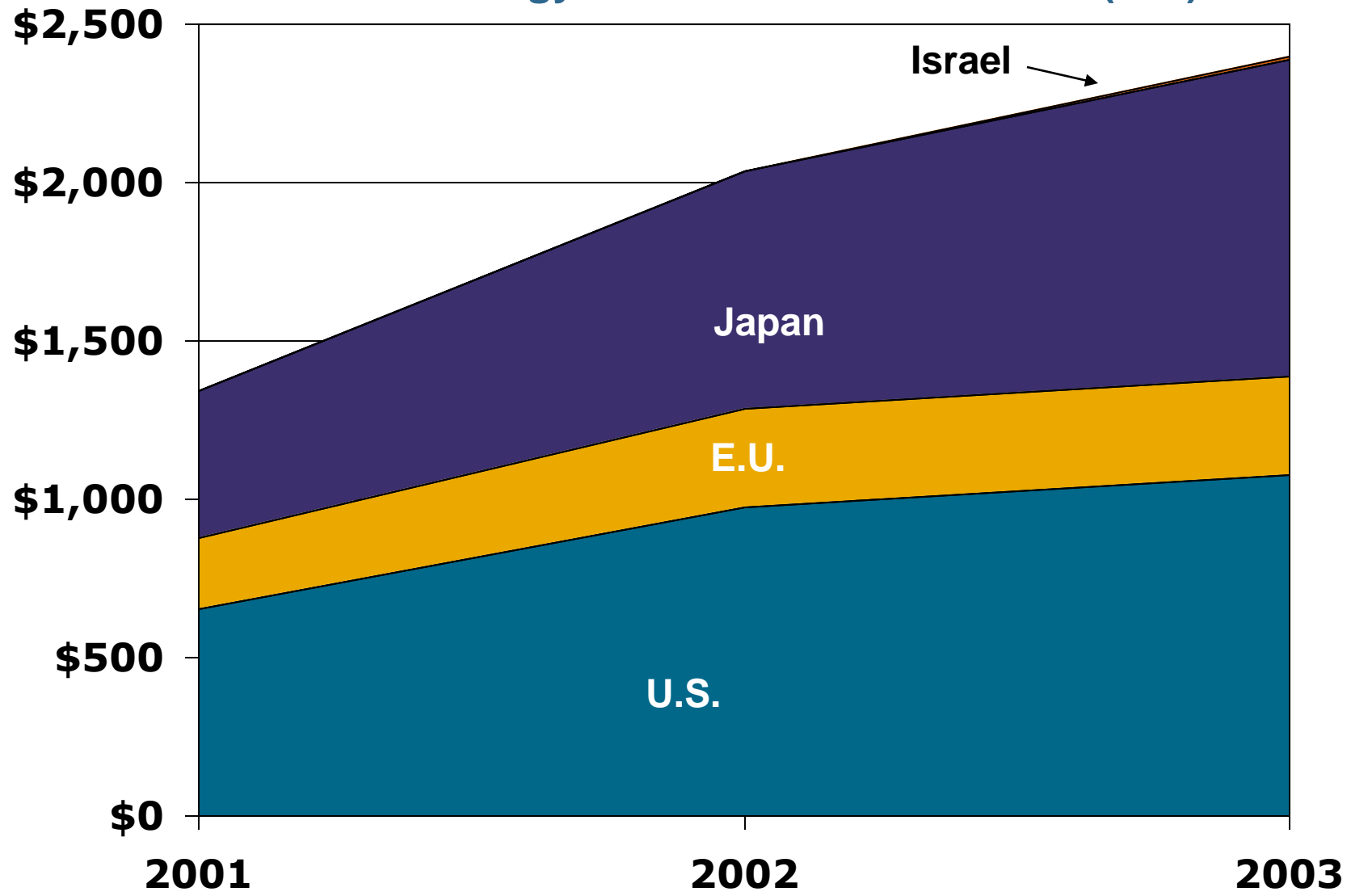
- Health
 - Key to future pharmaceuticals production
 - Extended human physical capabilities
- New industrial capabilities
 - New materials with high performance and unique properties
 - Higher-yielding processing industries
- Environment/Sustainable Growth
 - More economical water filtration and desalination
 - Improved agricultural yields
 - Renewable energy sources and reduced energy consumption

Israel's Situation

- The opportunity
 - Nanotechnology represents a potential major disruption to a host of science, technology, business, and defense fields
 - This provides Israel with
 - a near-term opportunity to focus research
 - a long-term opportunity to gain economic and national benefits
- *Vision: to make Nanotechnology the next wave of successful industry in Israel by creating an engine for global leadership*
- The challenge
 - Strong infrastructure is critical
 - Israel has special security and economic needs
 - Israel's resources pale in comparison to global efforts
 - Nanotechnology's potential scope is "too broad"
 - Risk of fragmentation of efforts across institutions, subjects

Israel's Resources Pale in Comparison to Global Efforts

Nanotechnology Government R&D Funds (\$ M)



Recommendation: FOCUS

- Mission: Launch immediately a *collaborative* government/academia/industry/*world Jewry* initiative to allow Israel to *efficiently* reach *critical mass* in Nanotechnology
- Priority applications meeting Israel's economic needs: Defense, Electronics, Energy, Environment/Water Desalination, Nano-bio

Investment Plan Overview

	Research	Technology Development
Target Result	Know-how and tools required for technology development	Opportunities ready for "transfer" to product innovation and commercialization, VCs, etc.
Effort led by....	Universities, research institutions, and national labs	Industry
In collaboration with...	Industry	Universities
5-year Infrastructure Investment	\$100M + <i>Future: \$100M+</i>	\$25M
5-year Project Investment	\$15M +	\$75M
Source of Funds	Private Donors + Telem (incl. Ministries of Defense, Industry) + matching funds, international collaboration (e.g., BSF, GIF)	Telem, Ministry of Defense, Ministry of Industry (Magnet, OCS), other public (to be negotiated), industry, global, international collaboration (e.g., BIRD, EU programs)
Success Metrics (2007)	<ul style="list-style-type: none"> ▪ 40 graduates annually ▪ High quality, interdisciplinary publications ▪ 100 patents 	<ul style="list-style-type: none"> ▪ 100 patents ▪ \$40 industry funding ▪ 5 start-ups with \$150M in VC funding and 750 employees

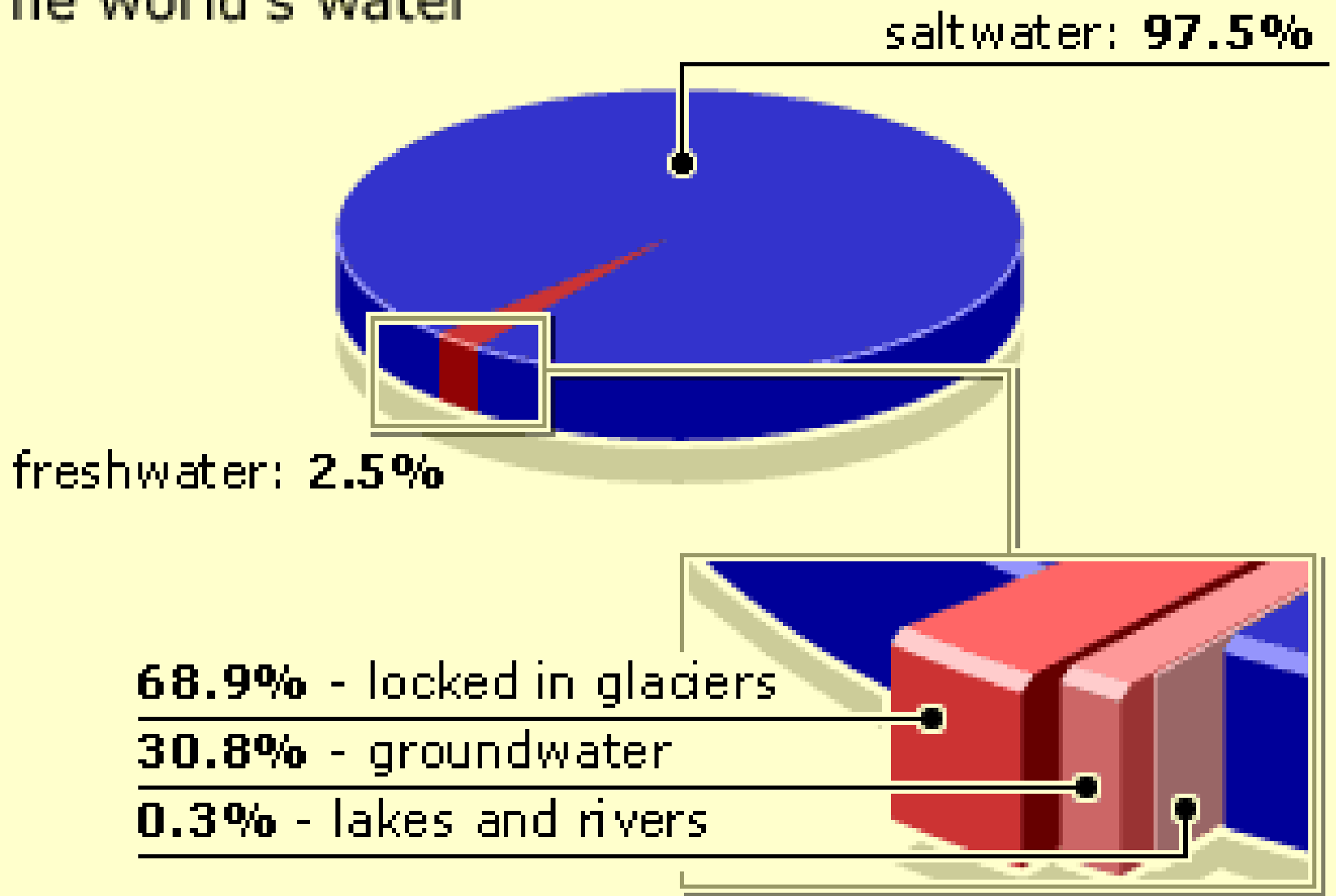
Israel Nanotechnology Initiative: BOD Priorities

- Promote the establishment of local Nanotechnology-based industry
 - Exploratory mini-fund for water desalination
 - Nanotech prototyping center (water, energy)
 - Research projects—water initiative
- Establish a national policy of resource allocation
- Formulate a long range program for research and technology development as well as for a world-class infrastructure to support it
 - Mapping of activities and proposals in Israel (RFP, survey, ...)
 - Research infrastructure
- Actively seek resources from public and private sources to support the program
 - Government (infrastructure)—\$60M allocated over five years
 - Jewish institutions: JNF, UIA/UJC, Jewish Agency, Keren Hayesod, ... on-going effort through **Israel Nanotechnology Trust**, with strong support from Shimon Peres
- Provide leadership and guidance throughout the implementation of the program

The Global Need for Water

- Fresh water (available per capita) is declining as:
 - Fresh water resources are fixed
 - Population increases
 - Developing countries improve their quality of life and level of industrialization
 - Salinity levels in many fresh water aquifers increases
- Critical water shortage in many parts of the world:
 - Estimated 1.5 billion people do not have access to adequate supplies of safe water
 - Thousands of children and adults die every day due to water related diseases
 - Many more suffer from a range of related debilitating illnesses

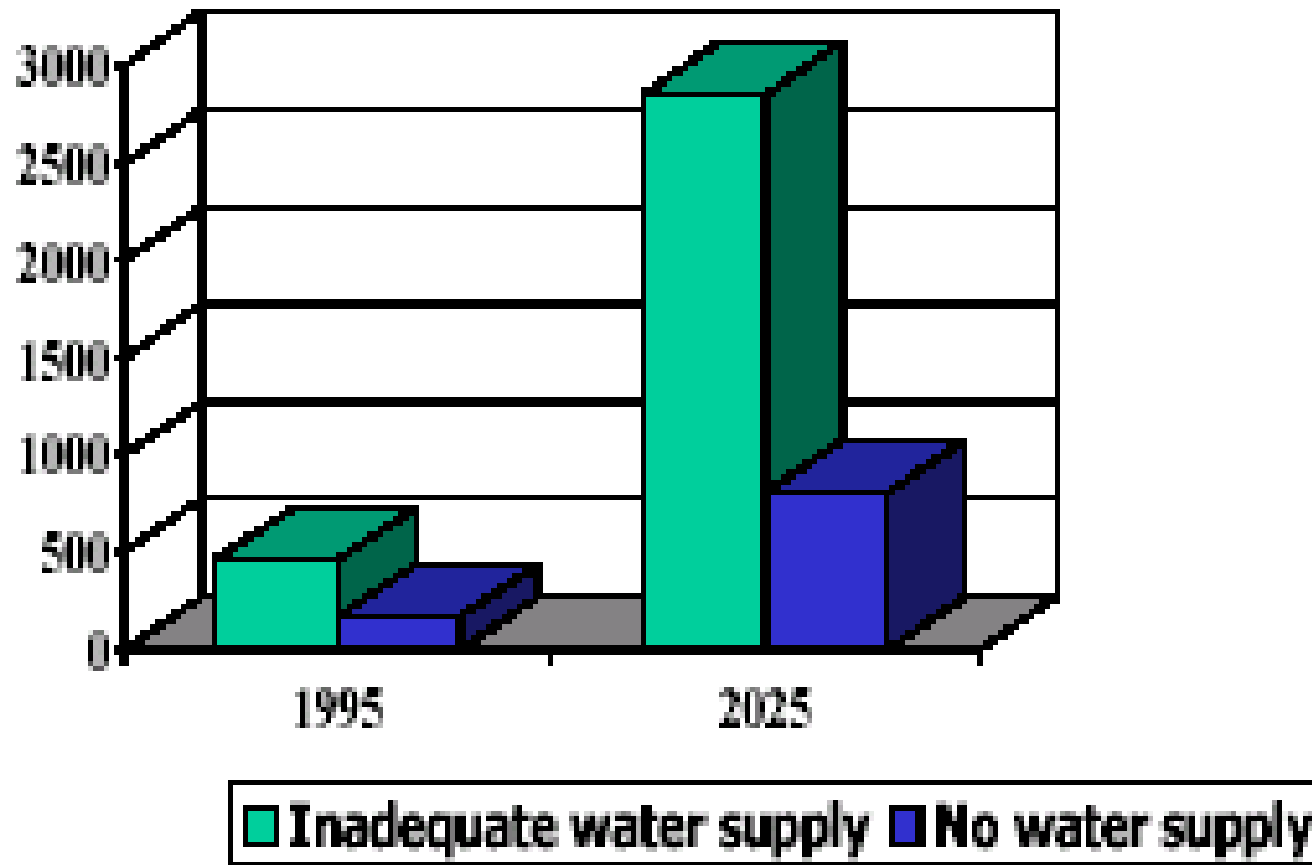
The world's water



SOURCE : UNEP

Dire Predictions

World population suffering from water shortage (millions)



Source : Masons Water Yearbook 2001

Potential Benefits to Israel from Leadership in Clean Water Technologies

- Commercial success and Economic development
- Global cooperation and intergovernmental programs
- Humanitarian and environmental contribution

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