The evolution of the Water Sector in Israel

Integrative Water Resources Management in Israel

December 6th, 2021

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Coordinator of International Projects
Mekorot- Israel National Water Company

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Technology

Management

Management=Education
(Value of the Water)

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Technology is a Way to improve results or processes,

it's not a Goal

Creation of the State of Israel (1948)

Foundation of the National Water Company – Mekorot (1937)

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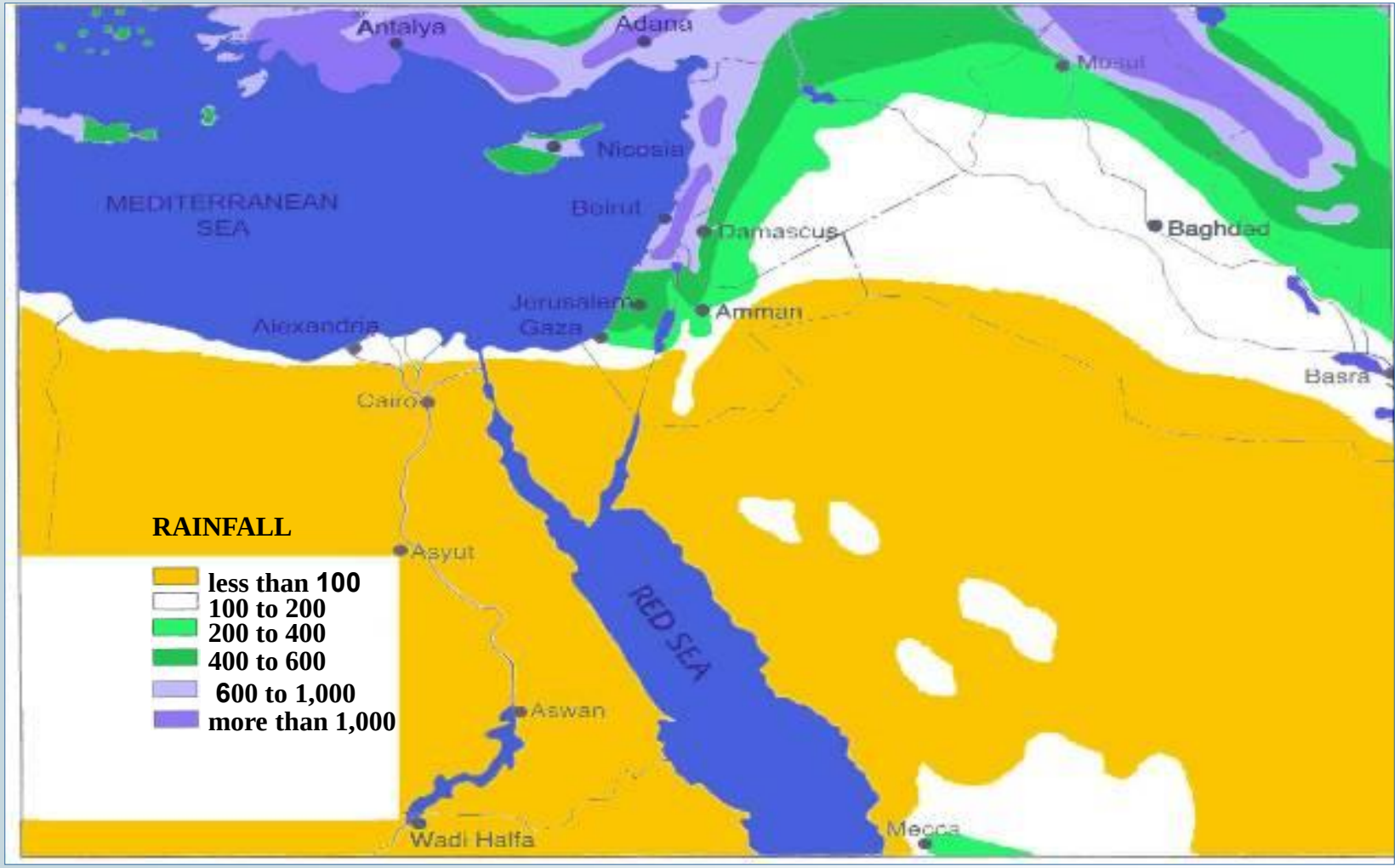
Annual Rainfall in Israel – Desert Border



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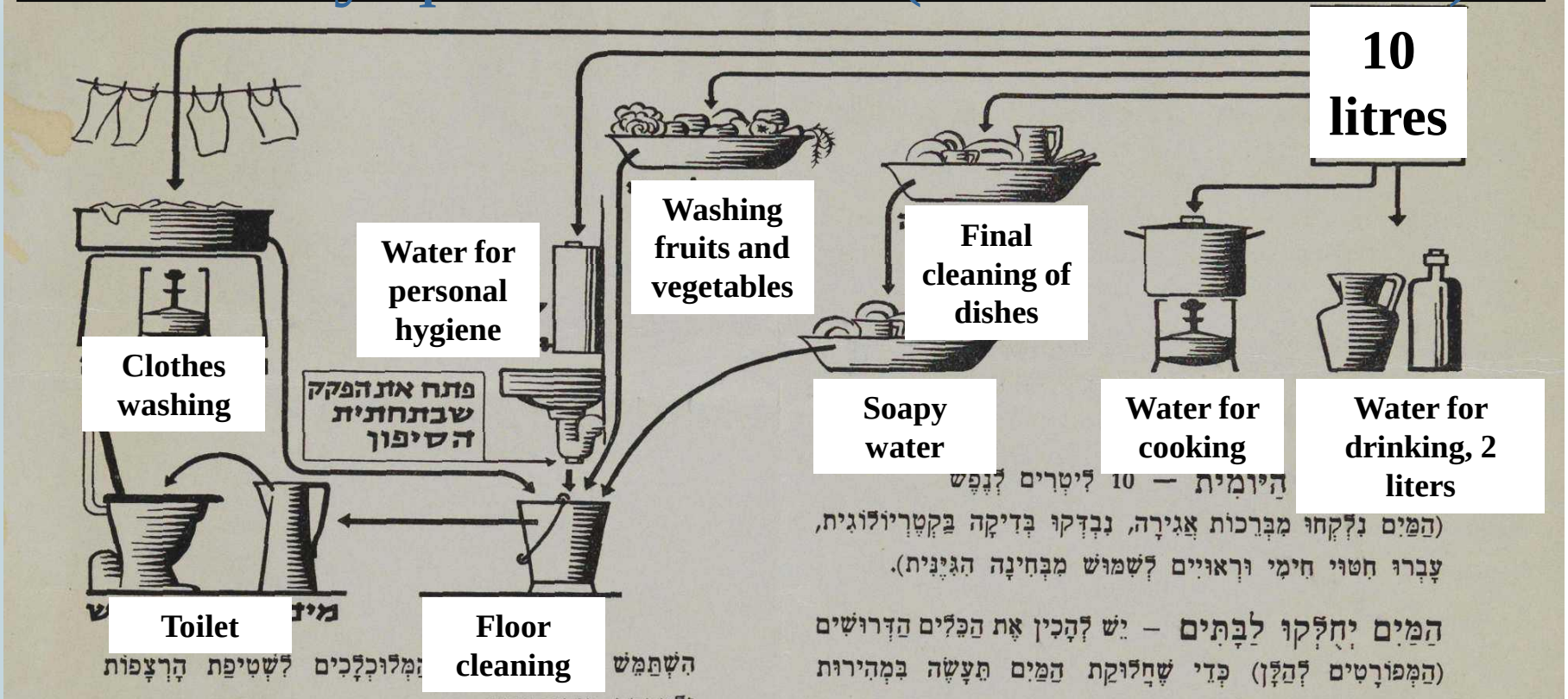
State of siege in Jerusalem-1948

Indications for the efficient use of the daily quota of water (Jerusalem-1948)



4 Pillars of the Israeli Water Sector

The measurement of water law (1955)
All water supplied/consumed, must be measured

(2005) Centralized Management: only 1 responsable
Water Authority

Water Law (1959)
All forms of water resources belong to the **Public** and should be managed by the **State**

(2005) The Israeli's Water Sector is self-financed

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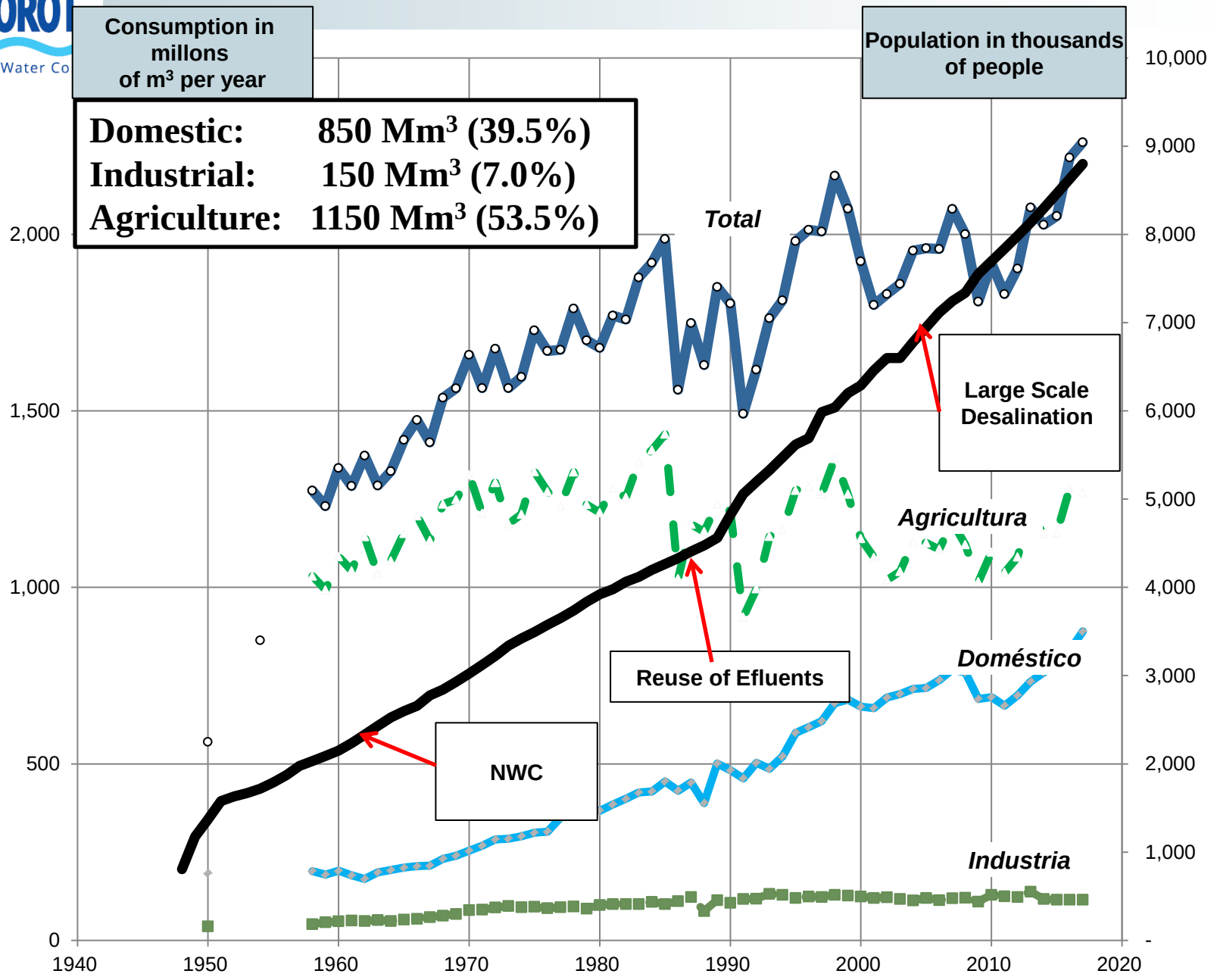
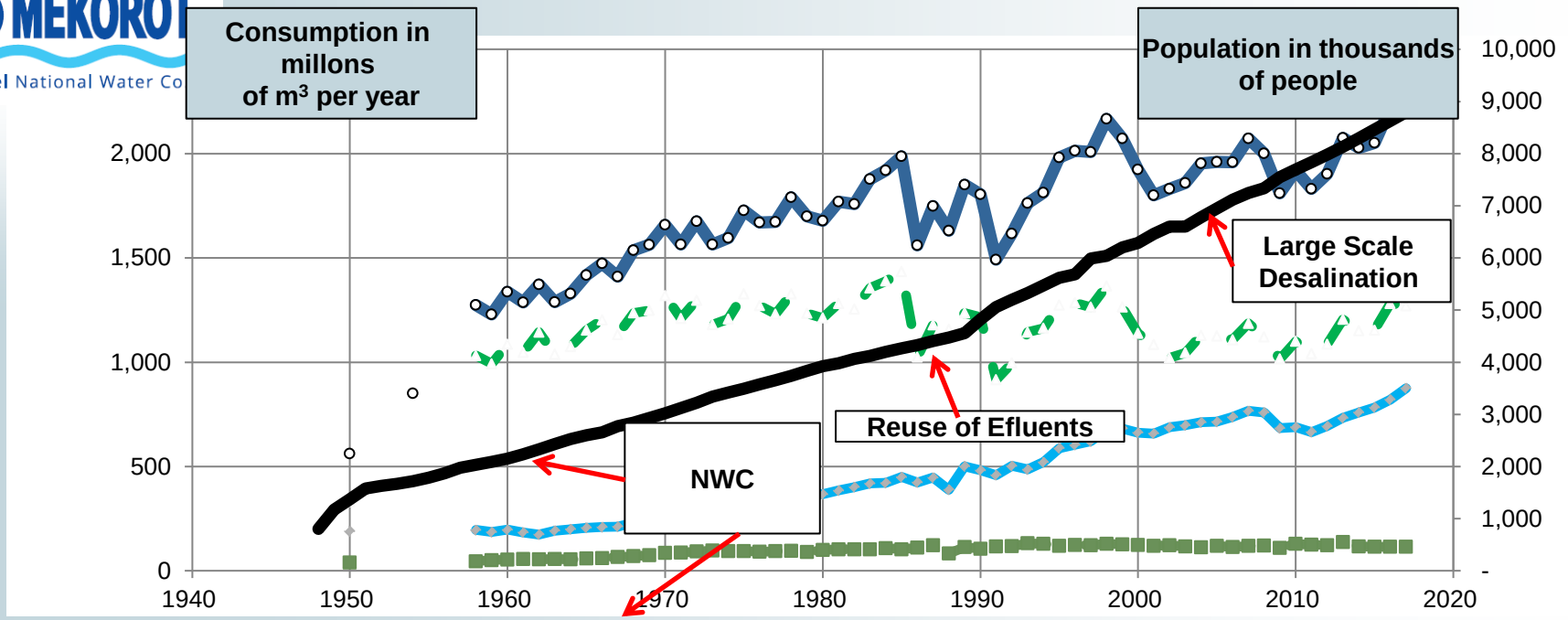


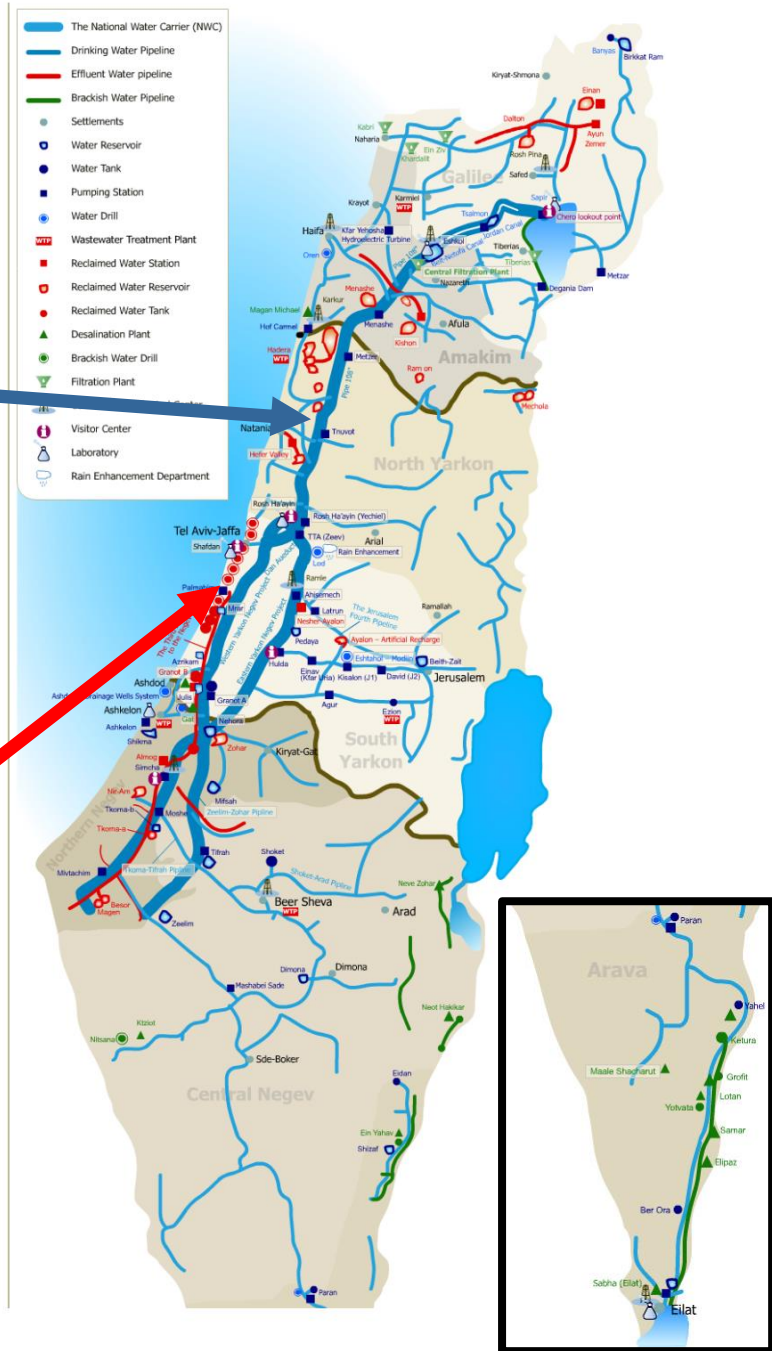


Implemented Policies					
	Agricultura Irrigada. Infraestruc-tura. Regulación.	Shifting from surface to pressurized irrigation. Increasing usage efficiency. Introduction of automation technologies of fertilization and filtering.	Brackish Water usage. Full Pressurized Irrigation. Automation	Increasing the reuse of effluents. Development of monitoring technologies.	New regulations for the reuse of effluents. Desalinated water.

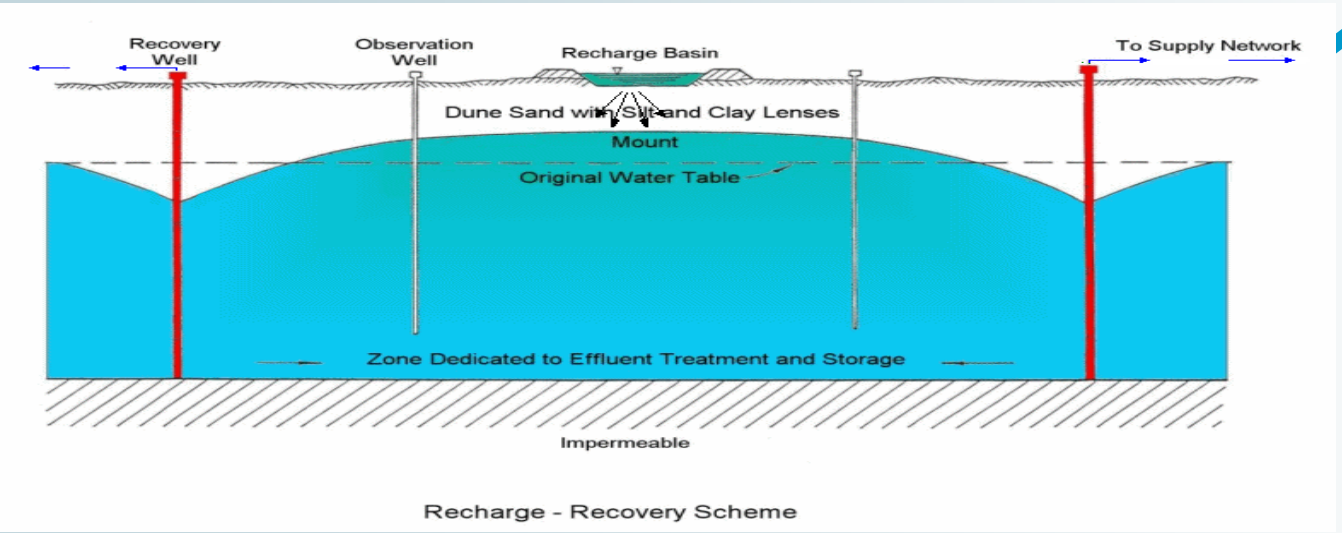
Regional Projects- National Projects

NWC: 5% of the GDP (1964)

- Effluent reuse (1989)

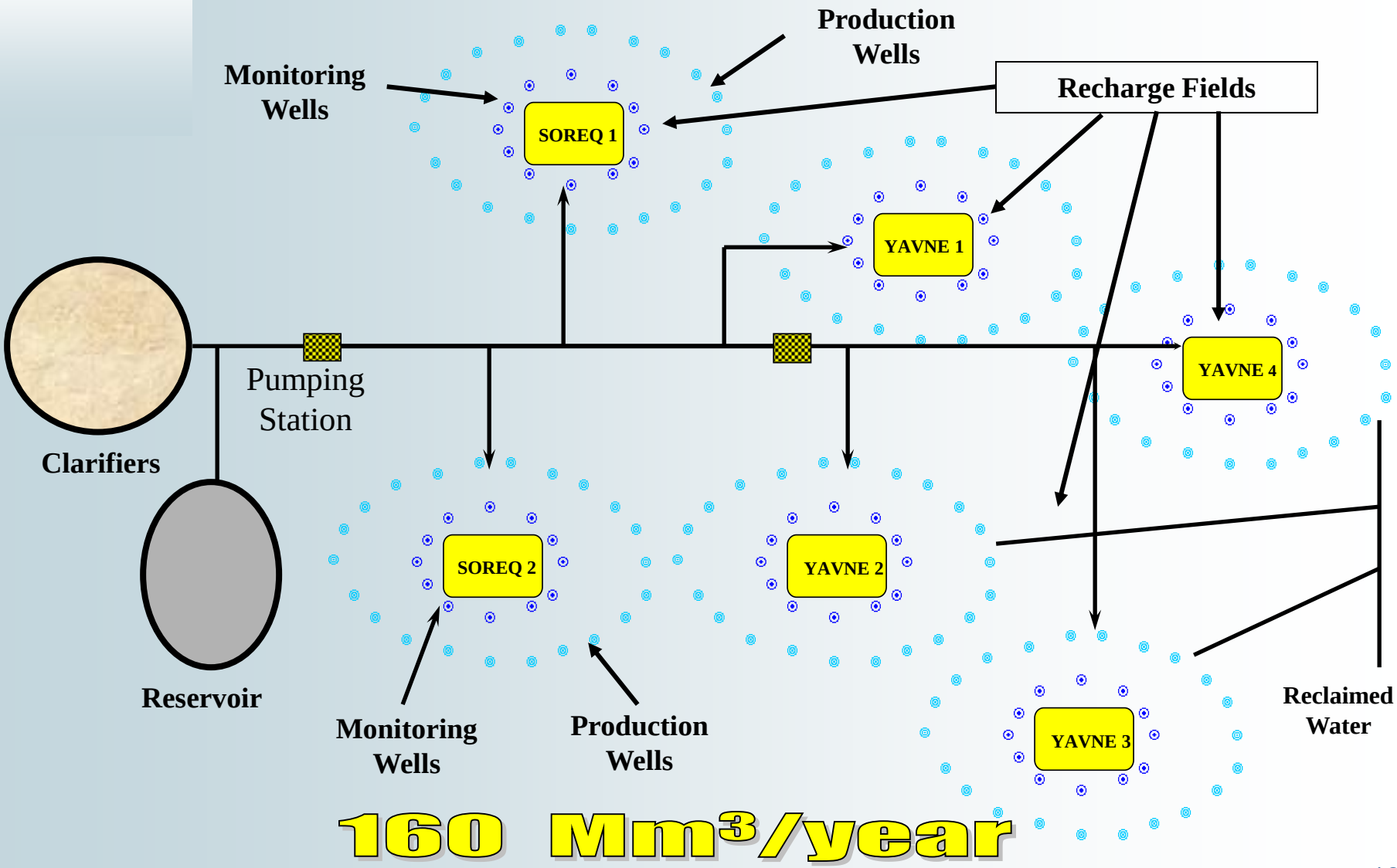


Shafdan: Plant for the treatment and reuse of the Dan Region's sewage



Recharge - Recovery Scheme

Soil Aquifer Treatment - SAT



Shafdan Plant – Upgrade

New primary clarifiers

New Anaerobic Digesters

Bio Generator System for the production of electrical energy from biogas

56,000 MWh produced, 68% of the 82,000 MWh required

Energy of the process: 0.60 KWh/m^3

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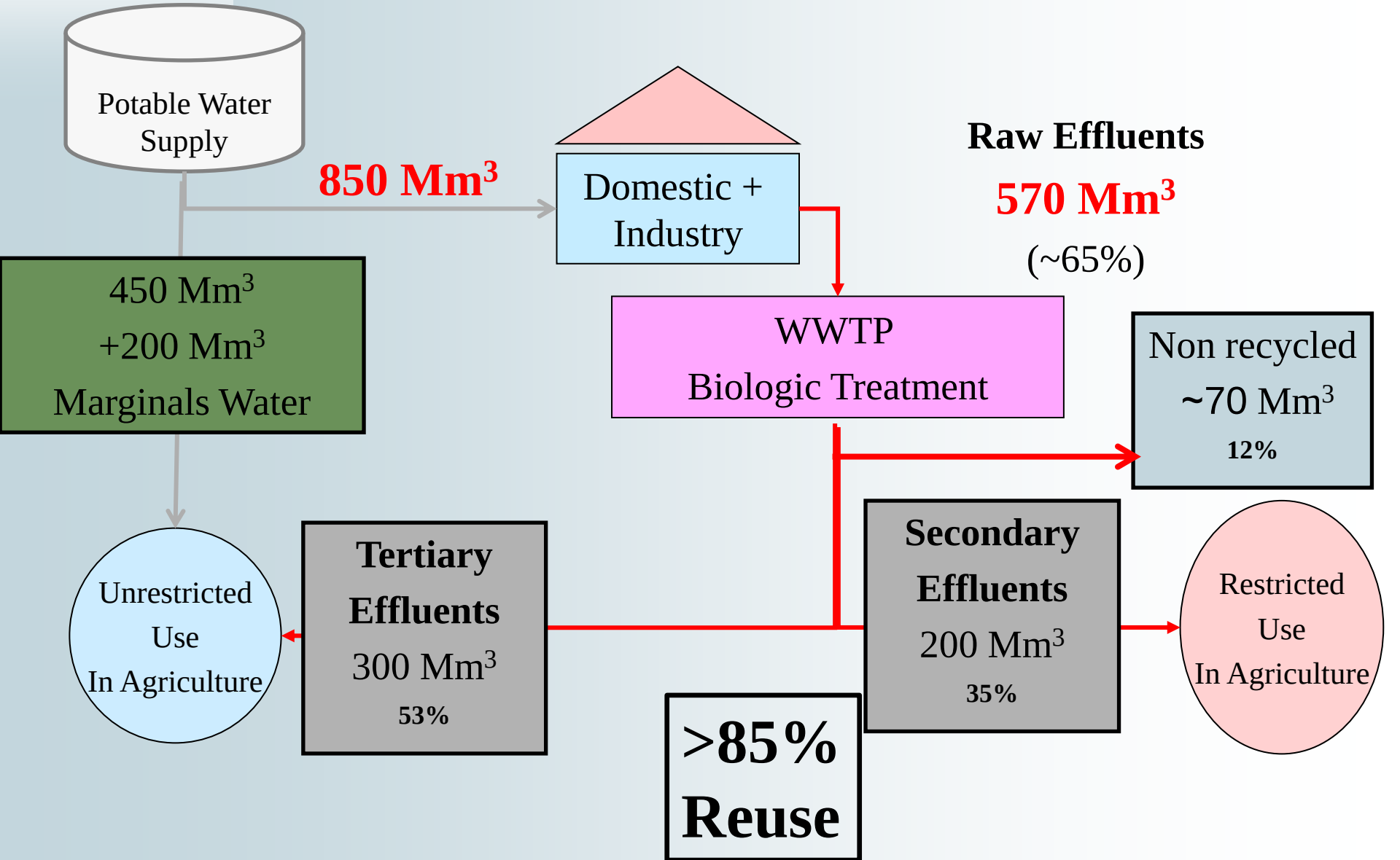
Annual Supply of Potable Water & Reuse of Effluents



Circular Economy

68%

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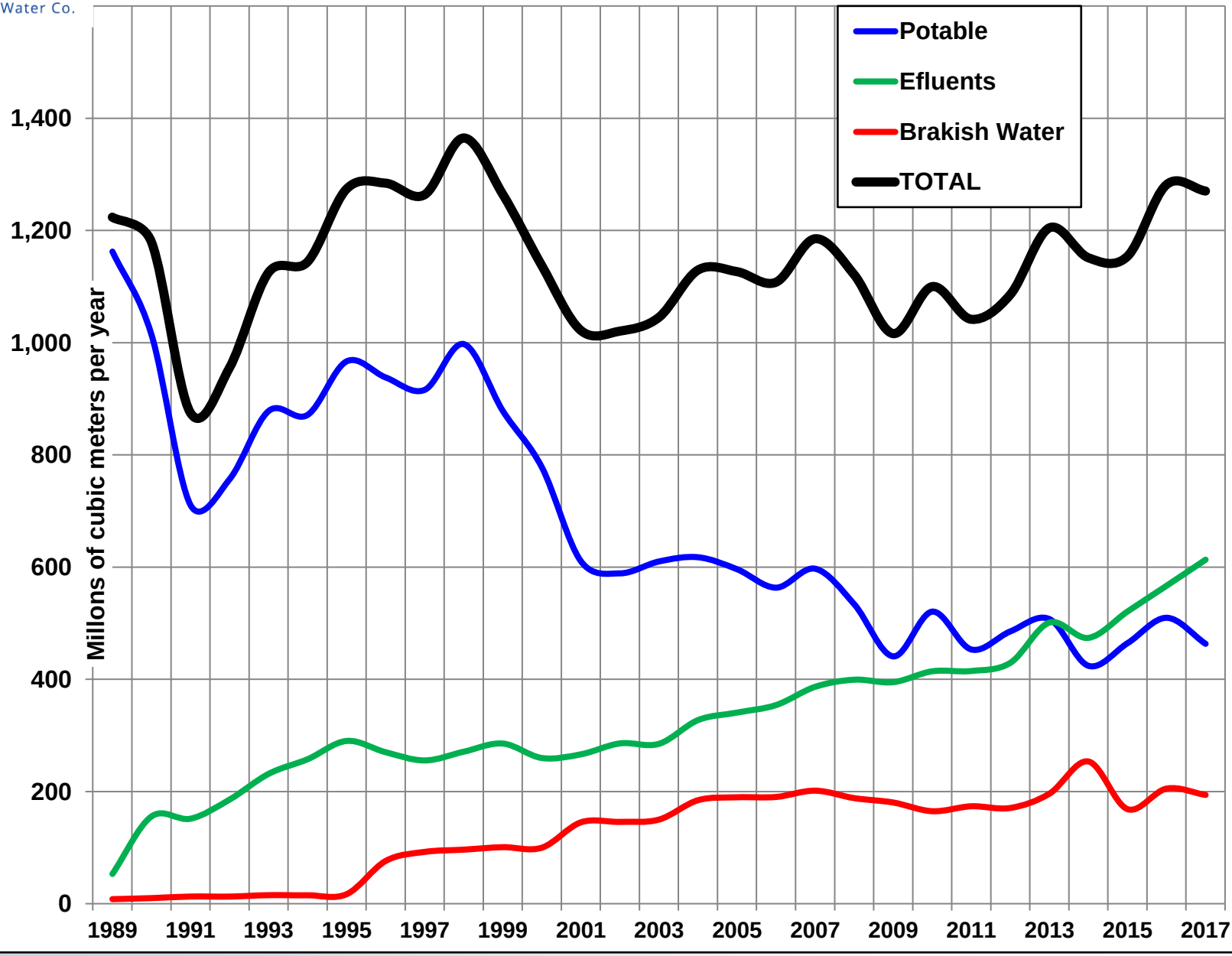
Agricultural consumption by type of resource



Water Usage in Agriculture

1960: 80,0% ⇒ **2020: 53,5%**

	Agriculture (%)	Domestic (%)	Leakages	Net Effluents	Reuse	Reuse (% Agr)
Israel 2020	53.5	46.5	(10%) 4.65	(66%) 31	(85%) 26.35	**49.2**
Israel 1960	80.0	20.0	(10%) 2.0	(66%) 13	(85%) 11.33	**14.2**
AMLAT /Africa /India	80.0	20.0	(40%) 8.0	(50%) 10	(50%) 5.00	**6.2**

Future Projection of Effluents reuse

1. Industrial
2. Indirect Potable
3. Marginal agriculture

Use in Agriculture

The quota for each farmer is defined according to

- ***size of the land***
- ***geographic region***
- ***water resources availability***

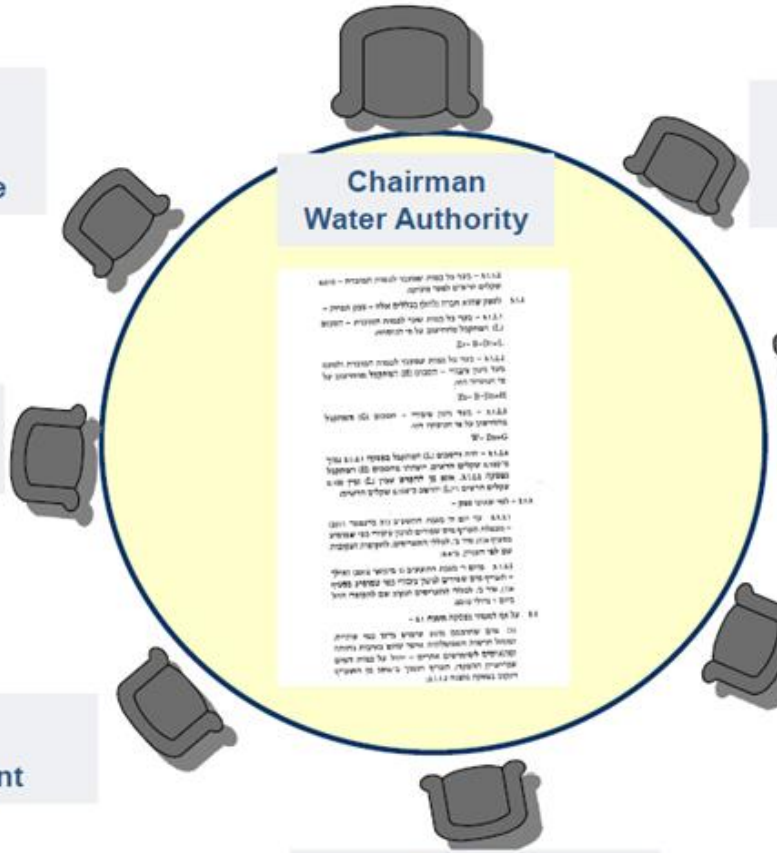
4 Pillars of the Israeli Water Sector (3/4)

(2005) Centralized Management: only 1 responsable

Water Authority

Water Authority Board

ONE table for decision making



Member
Public Representative

Chairman
Water Authority

Member
Public Representative

Member
Ministry of Finance

Member
Ministry of Agriculture

Member
Ministry of Environment

Member
Ministry of Infrastructures, Energy & Water

Member
Ministry of Interior

The Israeli Water Sector (2005)

The Water Authority

Mekorot	***Corporations***
Bulk water supply	Inside the cities

4 Pillars of the Israeli Water Sector (4/4)

(2005) The Israeli's Water Sector is self-financed

The water price

- Is uniform over Israel (Domestic and Agriculture)
- All the costs are divided by the quantity of water supplied
- It includes the development of the future projects

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Corporations
45%

Mekorot
20%

Composition of the domestic water price (2020)

Desalinated Water
15%

WWT
20%

Water Prices
($/m^3, VAT included)

- **Agriculture:**

		Potable Water	Shafdan-Reclaimed Water	Effluentes for Unrestricted Irrigation	Low Quality Effluentes
I	Within the quota	0.76	0.37	0.40	0.35
II	Up to 10% (8%) above quota	1.20	1.11	0.49	0.43
III	More than 10% (8%) above quota	2.01	1.91	0.60	0.51

Since 01/06/17 the price of the potable water for agriculture is uniform

- **Domestic Use:**
  - Basic Quantity, 3.5 m^3/person-month 2.18
  - Additional Consumption 3.98

Distribution of Agricultural Inputs in Israel

• Forages	33,8%
• Depreciation	14,5%
• Miscellaneous	10,1%
• Fuel, lubricants and electricity	10,0%
• Pesticides, fertilizers and manure	8,5%
• Seeds and seedlings	8,4%
• ***Water***	***8,4%***
• Packaging materials and contracted transport	6,3%

Uniform prices (domestic and agriculture)

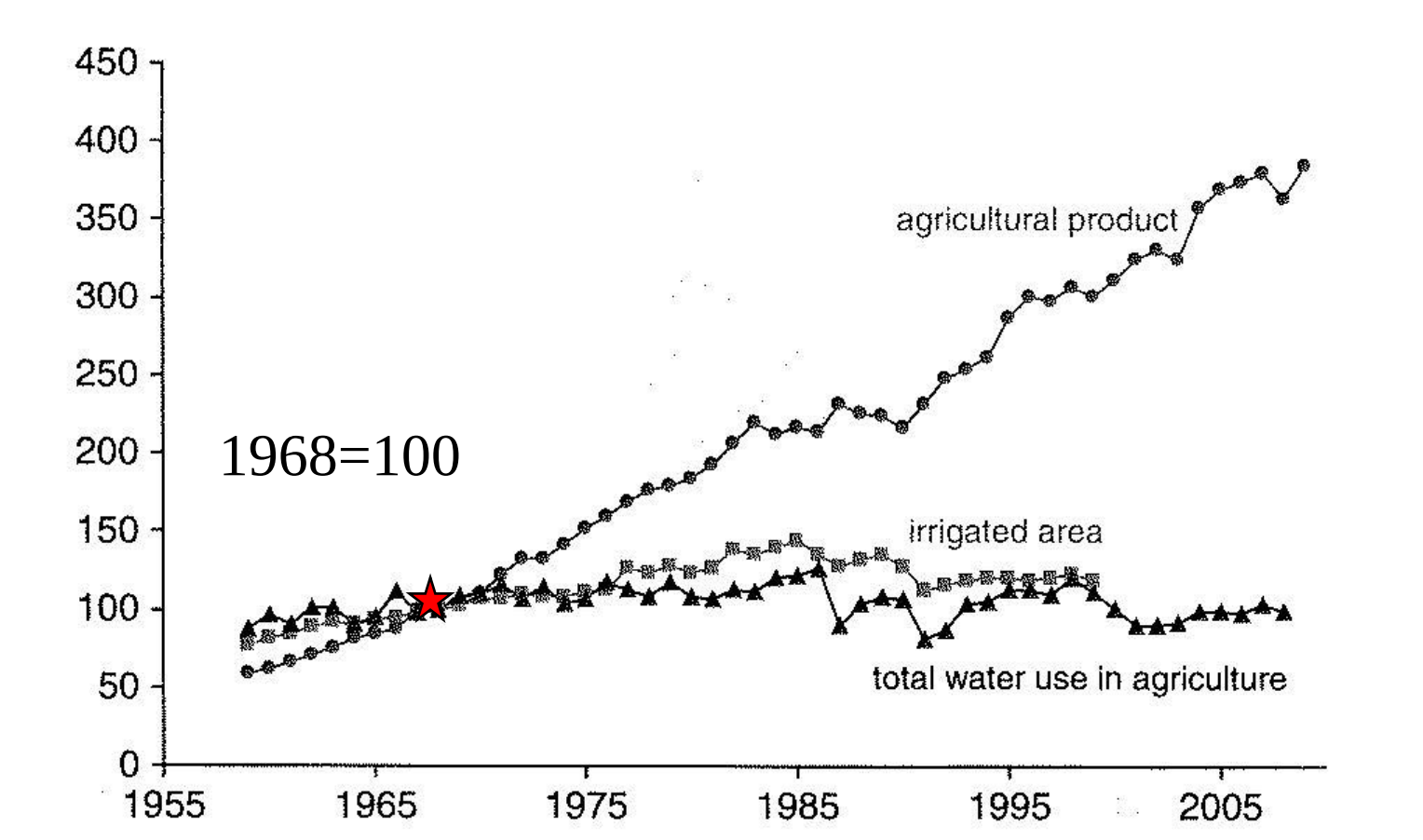
incentives the introduction of:

1) new technologies

2) more expensive water resources

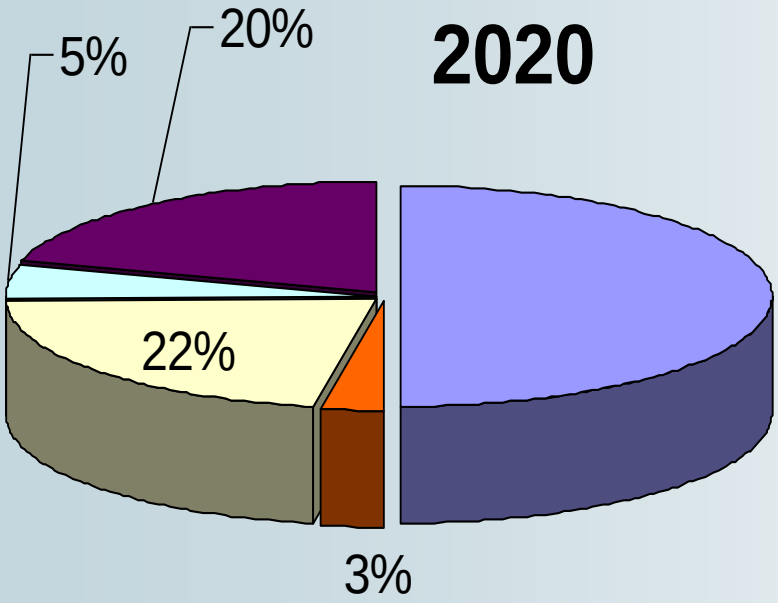
3) cheaper money

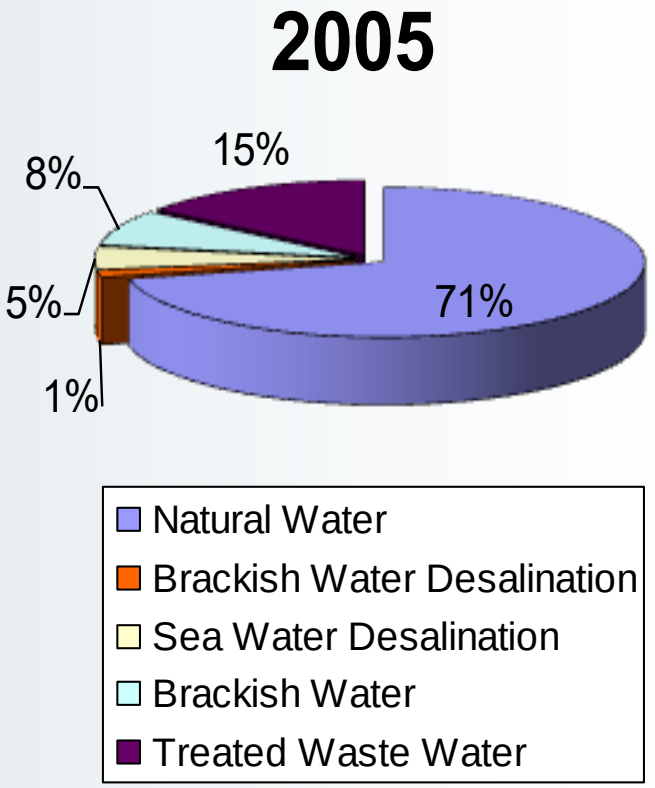
Evolution of agricultural production



(Y. Kislev, 2010)

Water Sources in 2005 and 2020





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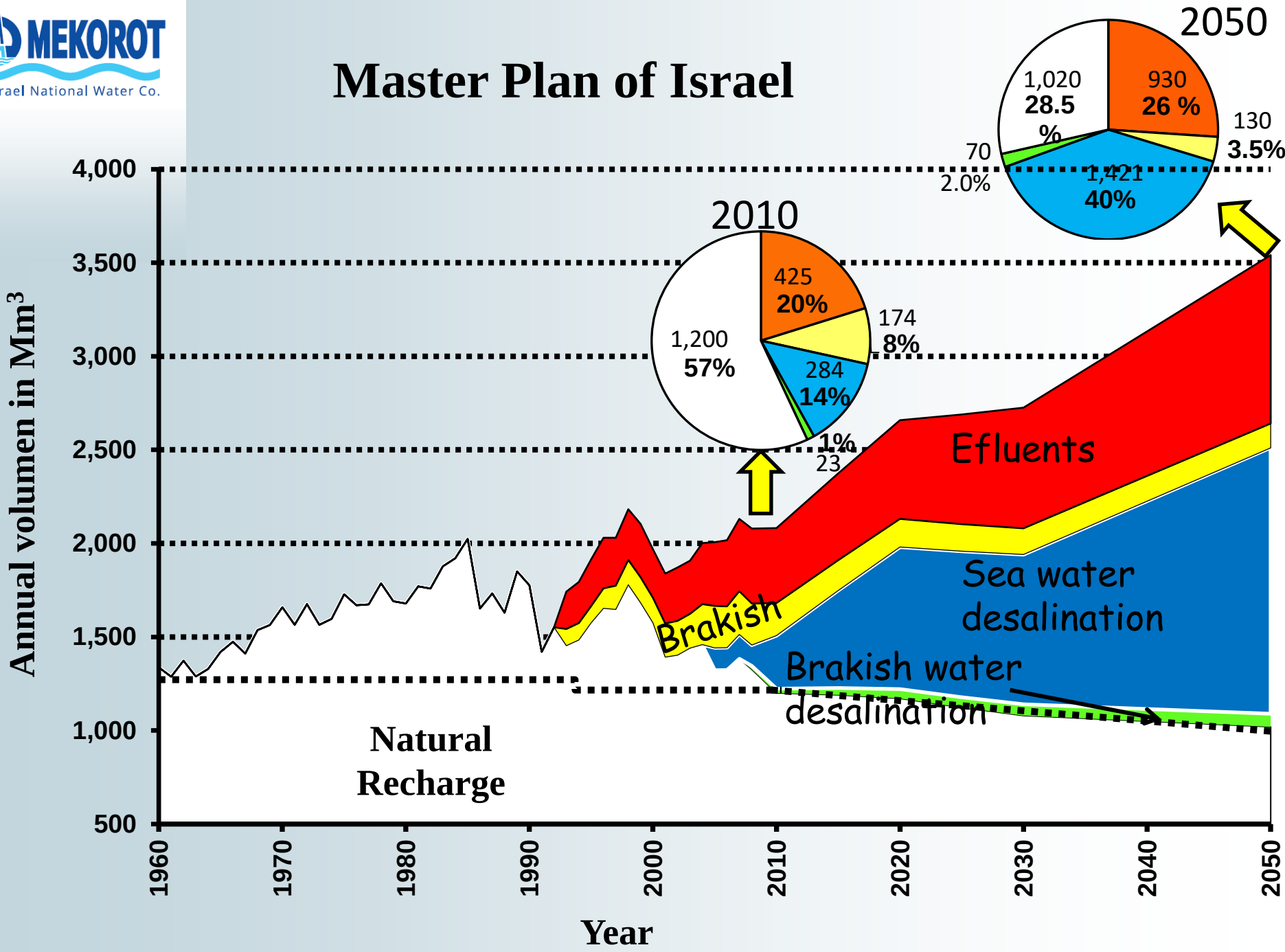
Master Plan of Israel



Source: Water Authority

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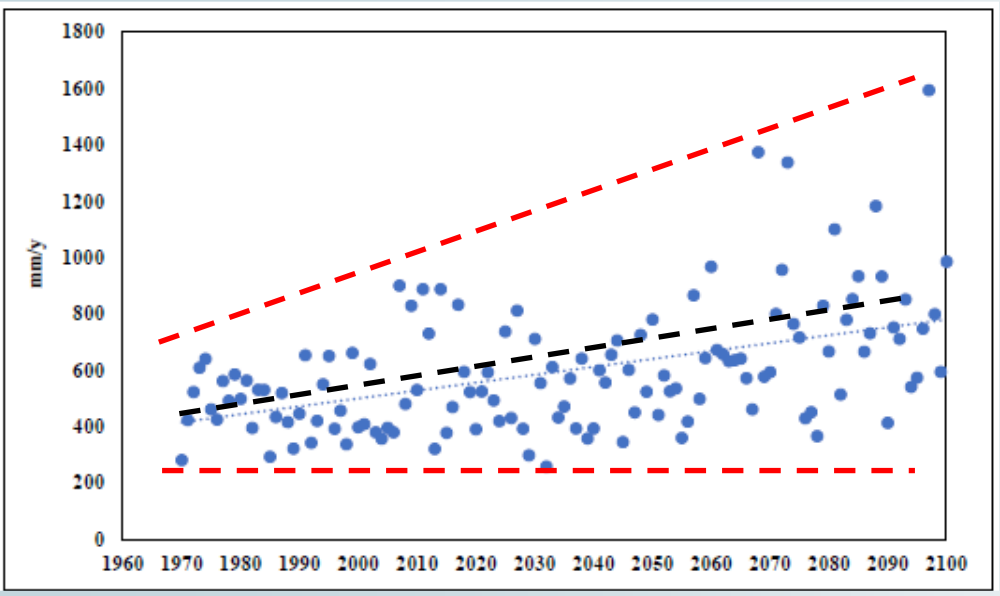
Climate Change-
Increase in the Interannual Variation



More extreme values:
More years with floods and droughts

Increased uncertainty

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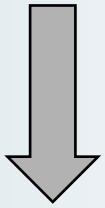
Climate Change-

Increase in the Interannual Variation

Increased uncertainty

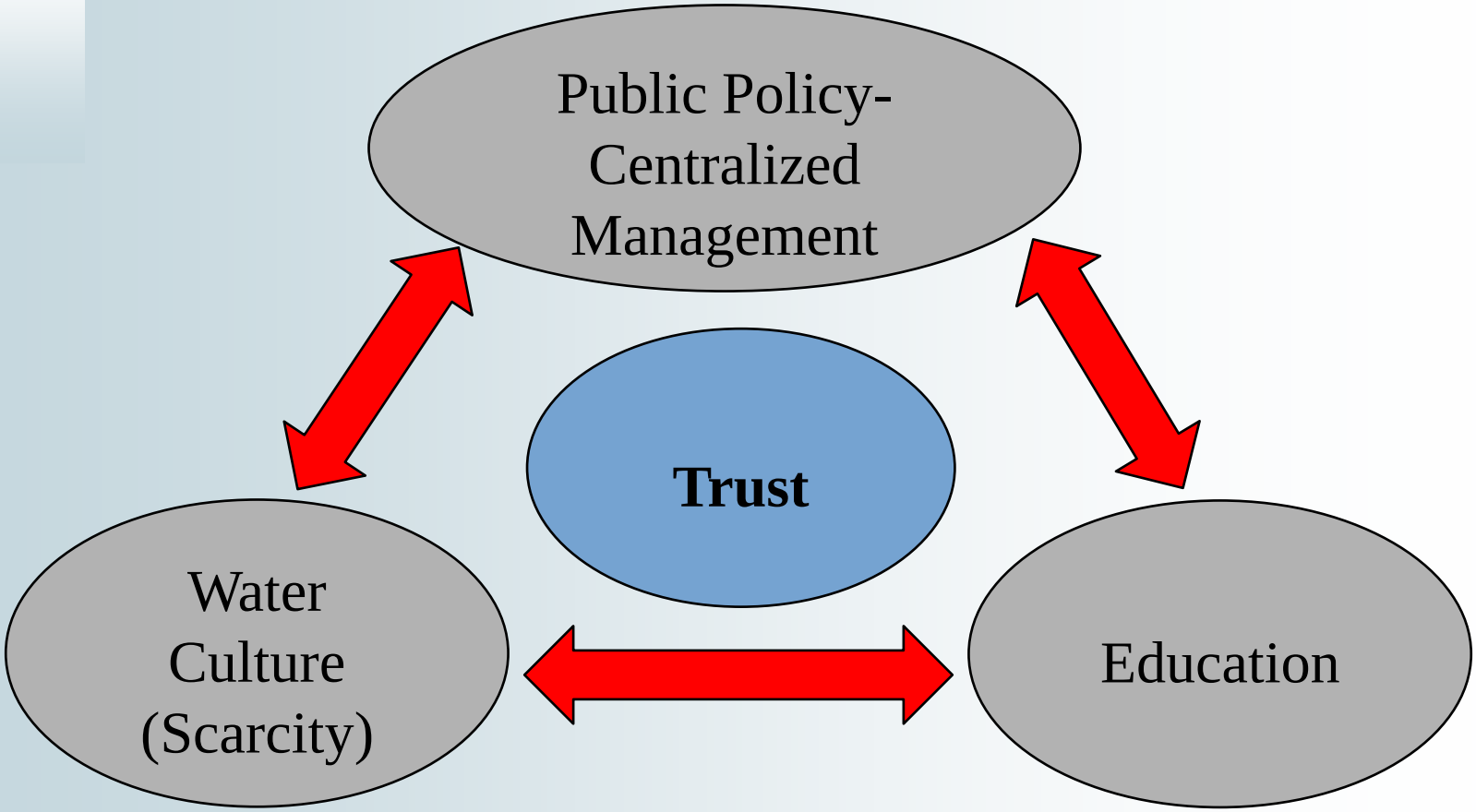


Technology must reduce uncertainty

Summary

- Learn (study) all the water resources
- Define the objectives of the sector
- Planning (short, medium and long term)
- Reducing the uncertainty
- Implement *clear* policies
- Implement *gradually*
- Educate
- Train
- Execute

Summary


Public Policy-
Centralized
Management
Trust
Water
Culture
(Scarcity)
Education

Questions/Reflections

1) *Country/Region Project?*

2) *Role of the Water Sector and its Objectives*

3) *There are all the tools to achieve the objectives? There are barriers?*

4) *It is necessary to make some changes?*

Facts and Figures about **Mekorot**

304,000 water samples analyzed per year	3,000 production and supply installations	10 command and control centers	43 desalination plants
12,000 km of water pipelines	over 1,000 active wells drilled	70% of the total water consumption in Israel	13 wastewater purification facilities and reclamation plants
Integrating 600 million m3 of desalinated seawater per year	85% of potable water in Israel	6 certified laboratories in Israel	1.6 billion m3 of water supplied per year (423 billion gallons)

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Mekorot's Consultancy Services Abroad

Master Plans for Water Sector- State Level (G2G)

Desalination: consulting and planning services (OC).

General design for all aspects of water engineering (desalination, sewage treatment, hydrology, drilling and supply systems).

General supervision and management control.

Energy efficiency.

Water loss and NRW management.

Command and control.

Cyber and infrastructure protection.

Water Innovation & Technologies Examples

Cyber Security for IoT Devices & Sensor Data Health in Water Operations

- Providing threat detection **At The Source**
- Reflecting the **healthiness of the data** and security level
- Using Machine Learning and AI to **detect abnormal behavior** of sensors data
- Presenting the system's condition as **"IXDen Grade"**

IXDen

IoT security that makes sense

CQM WATER
MEKOROT INNOVATION

CQM WATER has developed and patented an automated self-cleaning On-Site Chlorine Generation technology, capable of disinfecting large range of water matrices.

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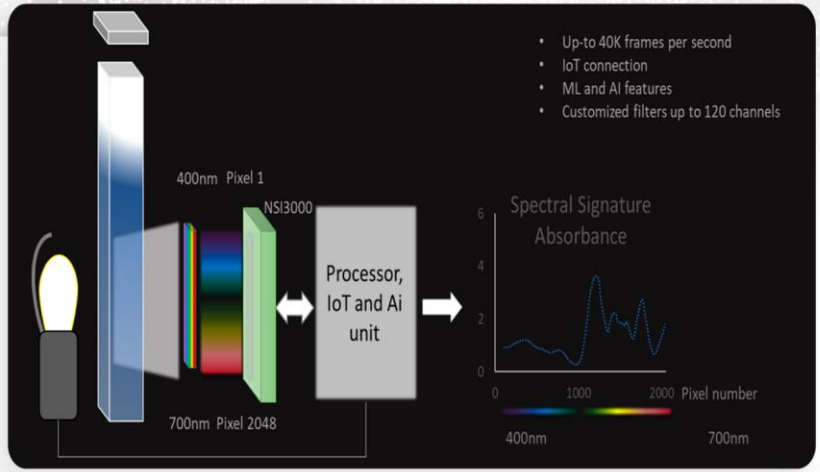
NEWSIGHT IMAGING
WHERE TECHNOLOGY SHINES



Spectral Sensing Technology

Water Quality Inspection

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Evolution Water

USING AI TO DRIVE SIGNIFICANT ENERGY SAVINGS IN WATER SYSTEMS

Simulator Area

1. Desealination
   1. 3 plants
   2. 5 water storage polls
   3. 16 water pump units
2. External Water Source
   1. 401- From Tel Aviv
   2. 2501 – From Ashkelon
3. Clients
   1. 7 Cities
      Rishon, Bat Yam, Holon, Moledet, Rehovot, Yavne, Ben Zaki and Hafez Haim
4. Drilling sites
   1. 6 sites
5. Hafez Haim
   1. 200K water storage
   2. 4 water pump units for

Results – Hafetz Haim (HH) Analysis

- HH water amount was maintained at safe and high levels
- AI Engine shifted water supply to low cost hours from peak

HOW IT WORKS

Using Deep Learning to determine capacity volume and relevant resources over time

An Artificial Intelligence based solution that dynamically right-sizes your energy consumption

Putting redundant capacity to sleep, saving energy and slashes electric bill

Big Data Analytics to ensure no KPI impact

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An international R&D center for wastewater treatment and recycled water

Northwestern University

evoqua WATER TECHNOLOGIES

DUPONT

suez

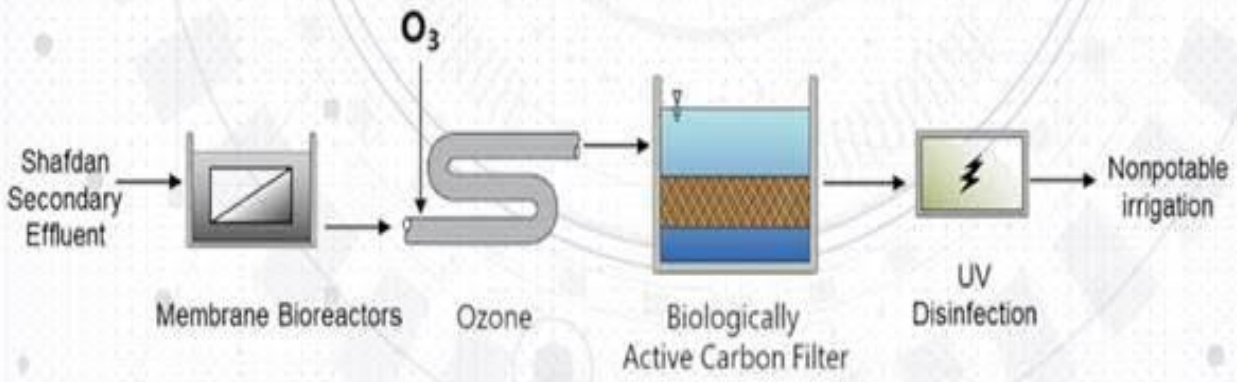
More than the SAT can HandleA New Era

The problem

The SAT fields are at capacity, but the plant needs to increase its maximum load

The solution

An Engineered treatment for excess effluents that cannot be infiltrated at the SAT



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Thanks