WATER AUTHORITY

STATE OF ISRAEL

July 27-29, 2016
Brasilia, Brazil

Closing the gap

The ISRAELI story

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The overall goal of the Israeli Water Authority

Assure that water will be sustainable, available, reliable, in the required quantities, locations and qualities.

Water demand forecast (MCM/Year)

Year	2008	2013	2015	2020
Agriculture	930	1030	1030	1030
Industry	85	95	100	110
Urban	730	740	780	880
Aquifer rehabilitation	0	120	130	150
Neighbors	130	130	150	150
Nature	7	50	50	50
Total demand	1,882	2,165	2,240	2,370

These figures include effluents, storm water and brackish water for agriculture irrigation in the amount of 500 MCM/Year.

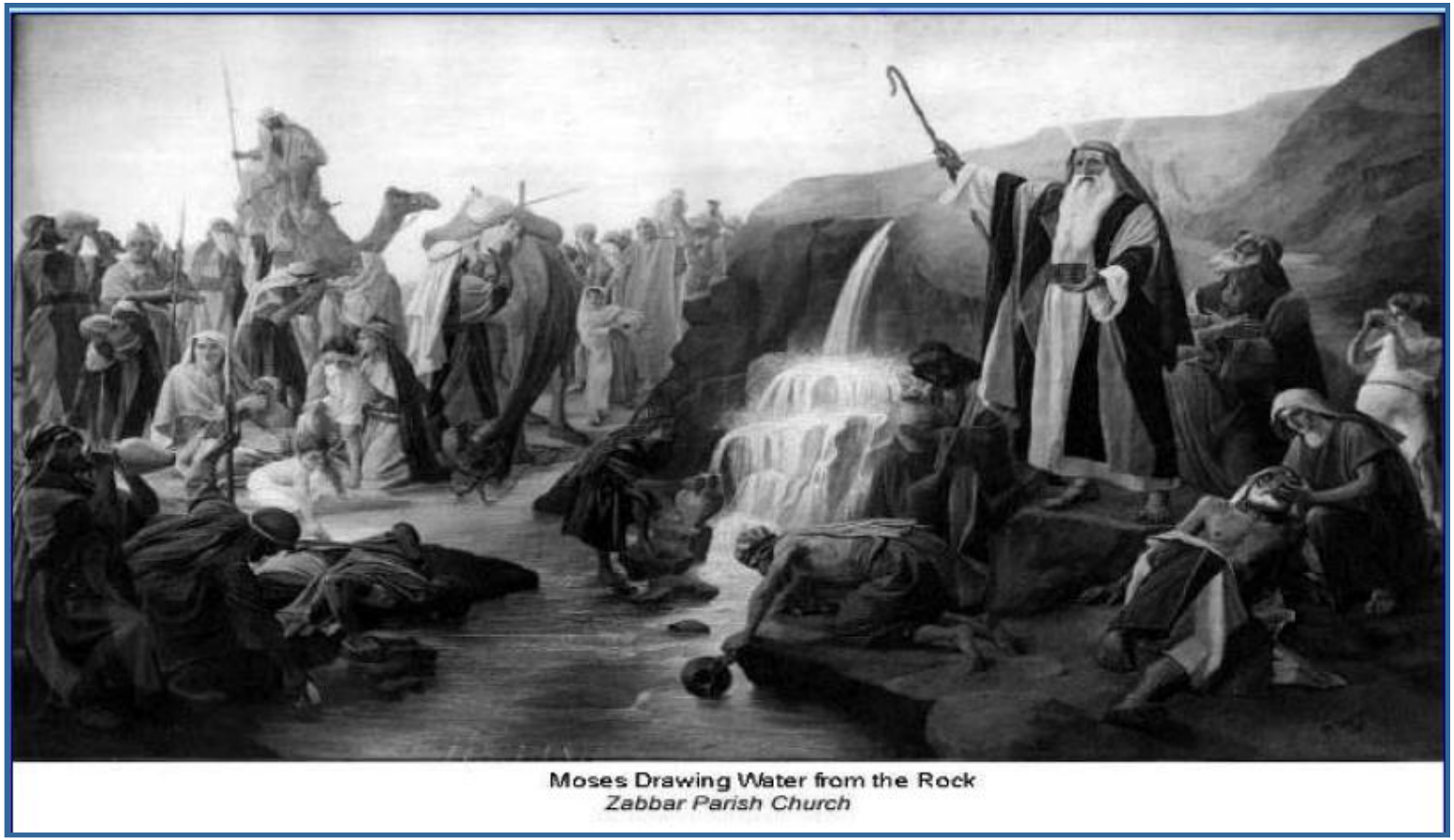
Water resources including desalination (MCM/Year)

Year	2008	2013	2015	2020
Natural resources	675	1,170	1,170	1,170
Water reuse	500	500	550	550
Brackish water desalination	30	50	70	70
Sea water desalination	140	495	585	585
Total resources	1345	2,215	2,375	2,375
Total demand	,1882	2,165	2,240	2,370
Gap	-537	+50	+135	+5

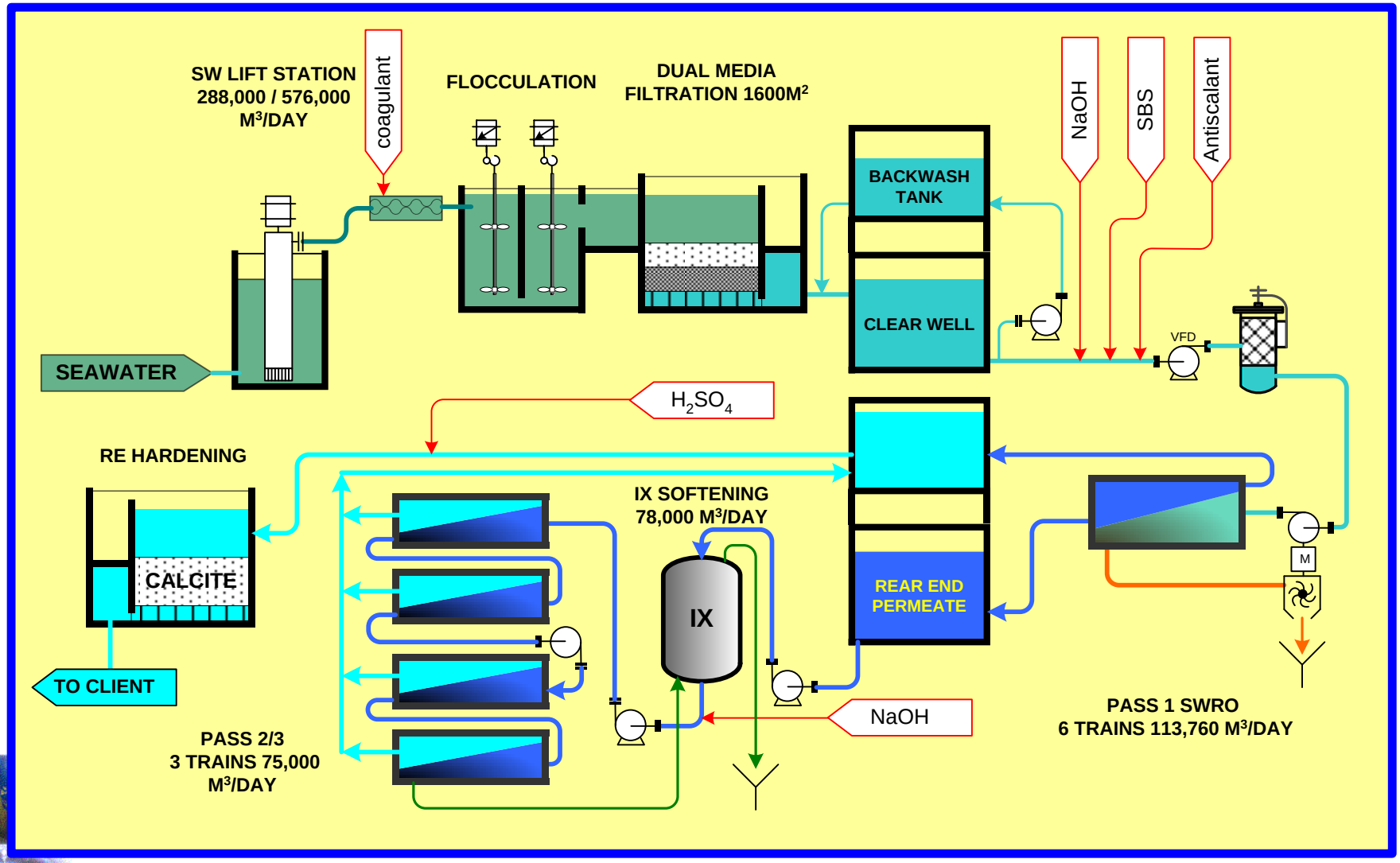
WATER AUTHORITY

STATE OF ISRAEL

Because we don't share Mose's abilities to draw water from the rock...



Moses Drawing Water from the Rock
Zabbar Parish Church


SW LIFT STATION
288,000 / 576,000
M3/DAY
coagulant
FLOCCULATION
DUAL MEDIA
FILTRATION 1600M2
NaOH
SBS
Antiscalant
BACKWASH
TANK
CLEAR WELL
VFD
SEAWATER
H2SO4
RE HARDENING
CALCITE
TO CLIENT
IX SOFTENING
78,000 M3/DAY
IX
REAR END
PERMEATE
M
NaOH
PASS 2/3
3 TRAINS 75,000
M3/DAY
PASS 1 SWRO
6 TRAINS 113,760 M3/DAY

CLOSING THE GAP

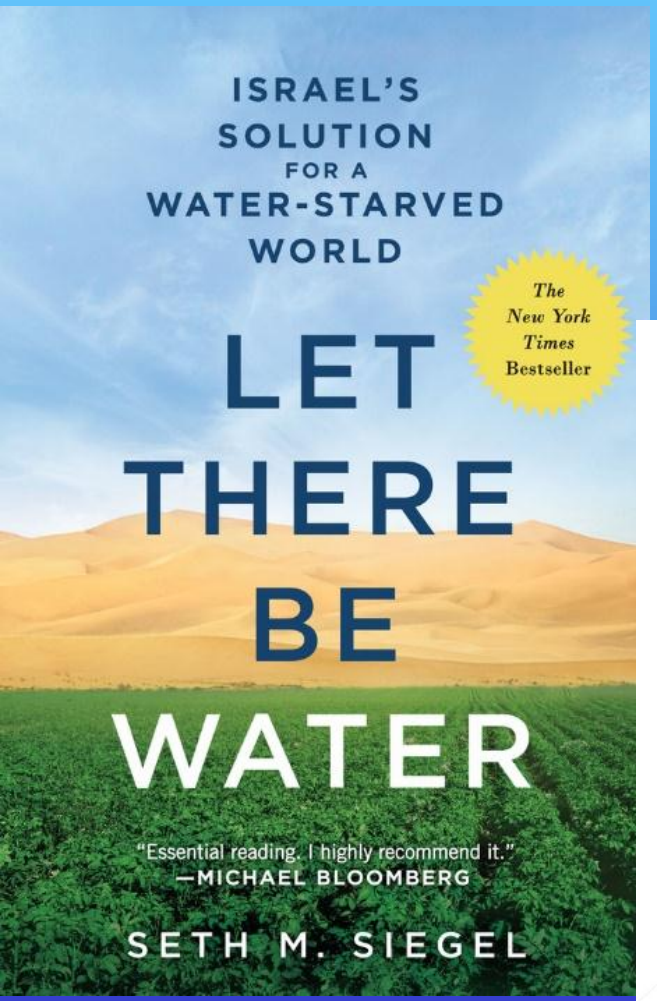
- Water saving and efficient use of water.
- Water reuse.
- Desalination.

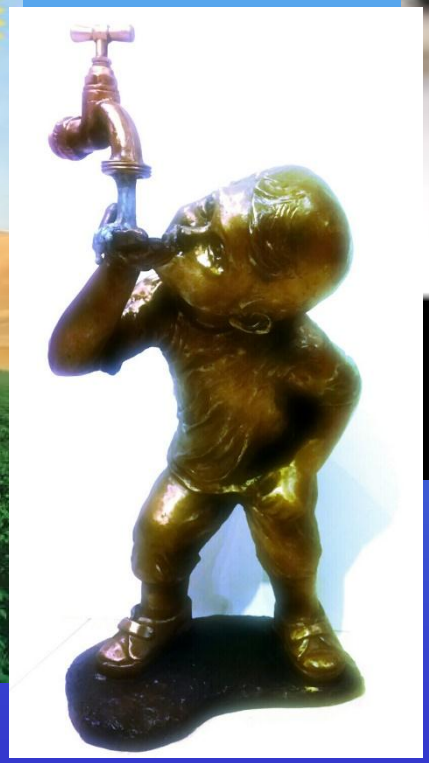
REDUCING WATER DEMAND

Water saving and efficient use of water

- Media publications.
- Teaching activities in schools.
- Water leakage in piping (developing new technologies).
- Using water saving plantation (including new developments).
- Advanced irrigation systems (including new developments and improvements).
- Real water price .

Media publications and campaigns





Water saving

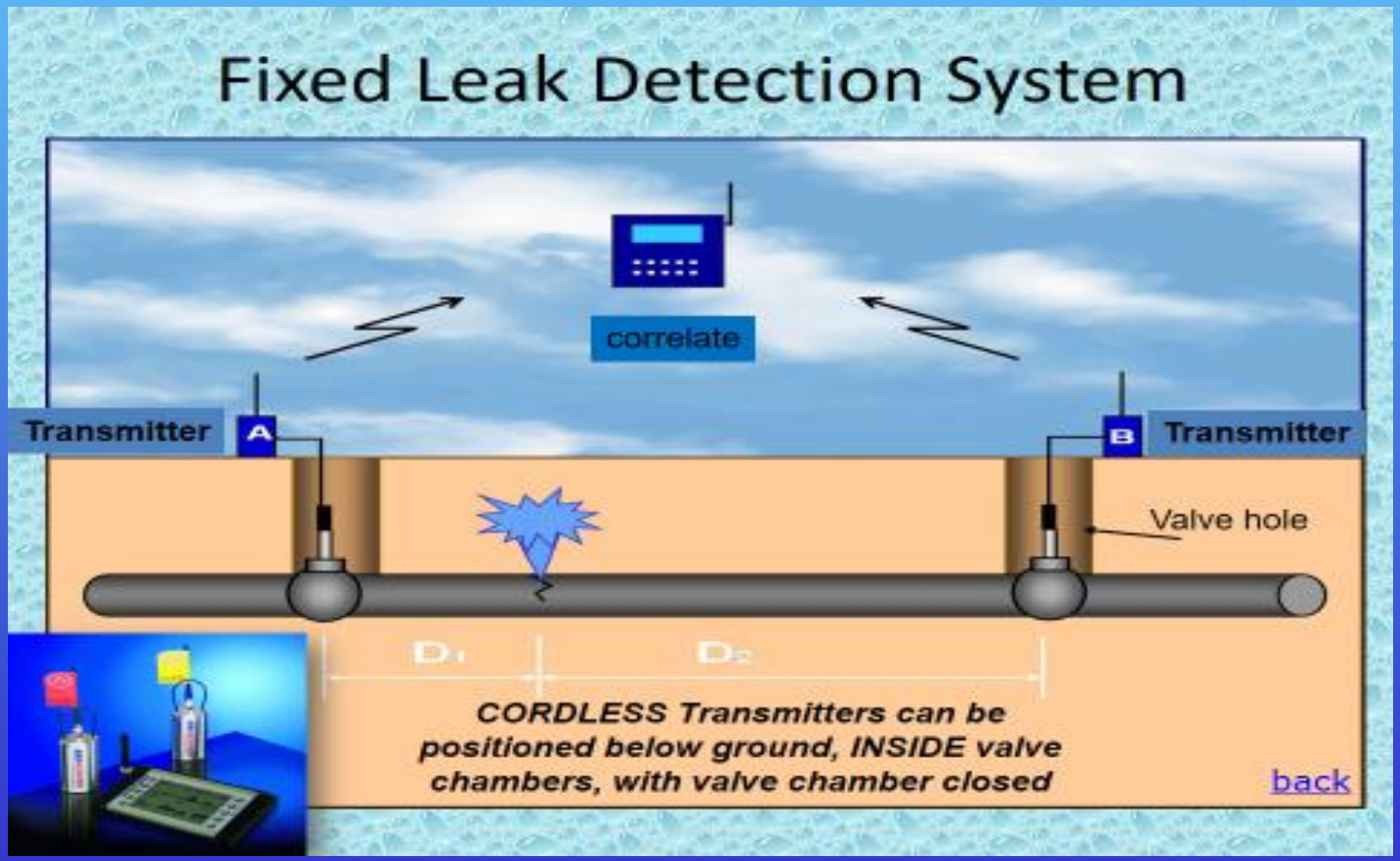
רשות המים

Water Saving- Irrigation

רשות המים

Water Loss in pipes

Water loss in Israel less than 10%



REDUCING WATER DEMAND

Water Tariffs.

Real water tariffs is the basis for a sustainable water infrastructure

- **Urban and Industrial Tariffs.**
- **Agriculture Water and Effluent Tariffs.**
- **Neighbors Tariffs.**

Water Tariffs

sector	Drinking water quality		Effluent
	tariff ($) per CM for first 3.5 CM/Month	Tariff($)	Tariff($)
Urban	2.5	3.5 (above 3.5 CM)	
Industry		3.5	
agriculture		0.7	0.4
neighbors		0.04-0.4	

Resources for increasing water supply (cont')

Water Reuse

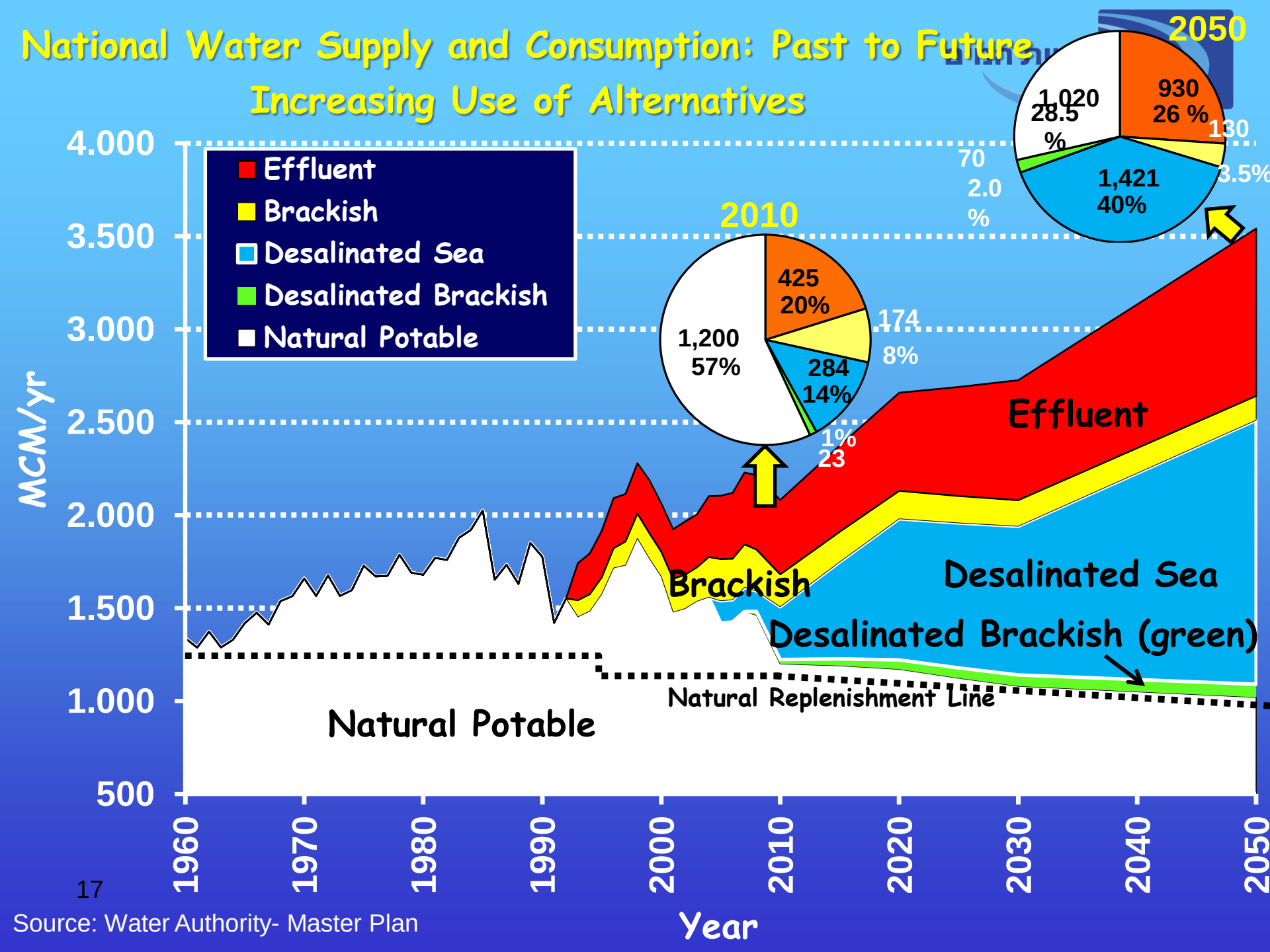
- Increasing effluent upgrading to a level of tertiary treatment for unlimited irrigation.
- Increasing construction of new water reuse systems.
- Encouraging more farmers to irrigate with effluent instead of fresh water.

רשות המים

Shafdan WWTP

National Water Supply and Consumption: Past to Future

Increasing Use of Alternatives



Source: Water Authority- Master Plan

רשות המים

Water Technologies

- Advanced Filtration Systems.
- Advanced water leakage detection systems.
- Water saving and efficient use of water.
- Developing water saving plantation.
- Storm water treatment and collection.
- Water security.
- Smart city
- National water management

Resources for increasing water supply (cont')

Brackish water Desalination

- Increasing existing BWRO plants.
- Encouraging construction of new BWRO plants.
- Encouraging technology improvements for BWRO plants.

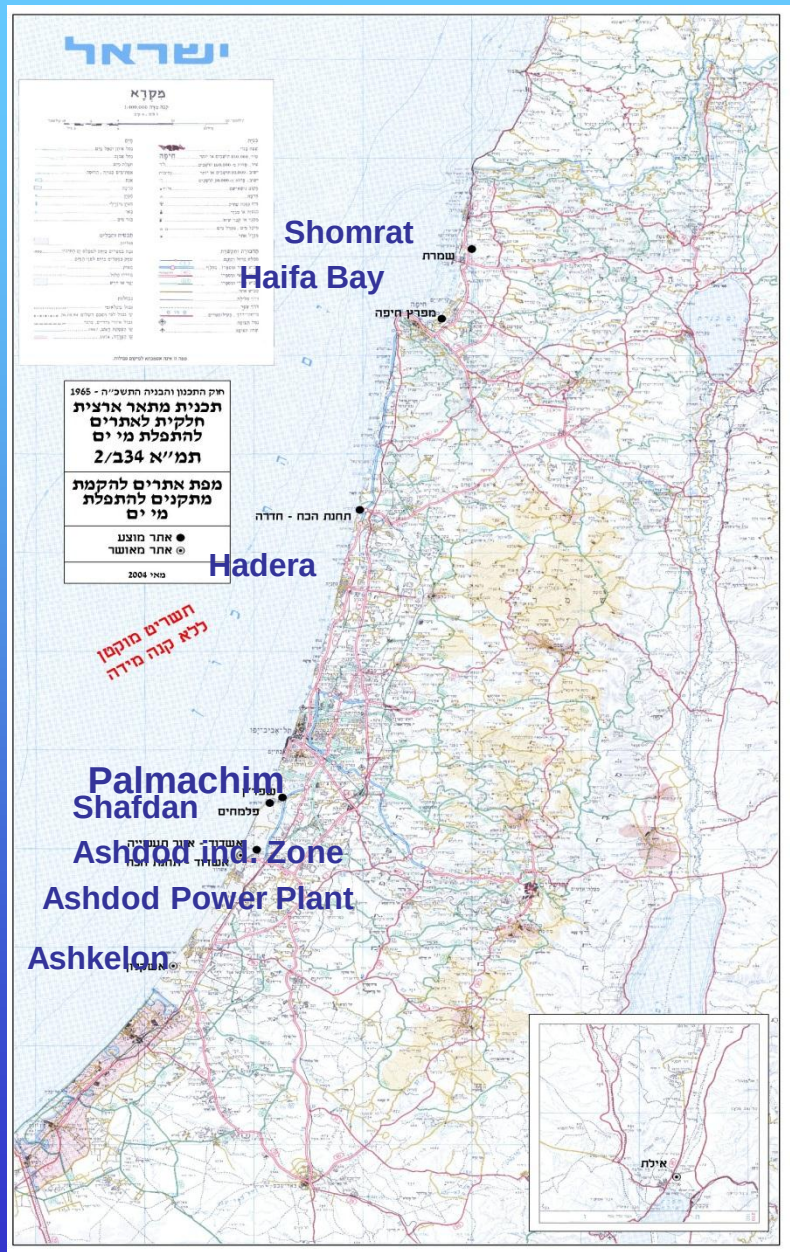
Resources for increasing water supply (cont')

Sea water Desalination

- Increasing existing SWRO plants.
- Encouraging construction of new SWRO plants.
- Encouraging technology improvements for SWRO plants in Pretreatment and Post Treatment.
- Encouraging Energy Saving Technology improvements for SWRO plants.

National Plan 34/b/2

For desalination of 755 MCM/Year



Capacity MCM/Year	Project Location
30	Shomrat
30	Haifa Bay
100	Hadera Power plant
200	Sorek
100	Palmachim
150	Asdod Industrial zone
45	Ashdod power plant
100	Ashkelon
20	Eilat

Water Desalination Prices
US$ Per CM

(VAT not included)

Project name	Ashkelon	Palmachim	Hadera	Sorek
Fixed price	0.4	0.35	0.25	0.25
Variable price	0.3	0.45	0.4	0.27
Total price	0.7	0.8	0.65	0.52

Desalination Water Quality

Quality parameter	units	Contractual Demands			Ashkelon Actual	Palmachim Actual	Hadera Actual
		Ashkelon	Palmachim	Hadera			
Chloride	ppm	20	80	20	*10-15*	*30-40*	*10-15*
Boron	ppm	0.4	0.4	0.3	*0.2-0.3*	*0.3-0.38*	*0.2-0.3*
pH	ppm	7.5-8.5	7-8	7.5-8.5	*8-8.5*	*8-8.5*	*8-8.5*
LSI		-0.2 to 0.5	-0.5 to 0.5	0 to 0.5	*0 to 0.5*	*0-0.5*	*0 to 0.5*
Alkalinity	ppm*			>80	*45-50*	*40-45*	*> 80*
Hardness	ppm*	>60	>75	80-120	*90-110*	*85-95*	*80-120*
Turbidity	NTU	<0.5	<0.8	<0.5	*0.15-0.2*	*0.15-0.2*	*0.15-0.2*

* As $CaCO_3$

Water supply	Agreement method	Capacity MCM/Year	Location
August 2005	BOT	100	Ashkelon
May 2007	BOO	30	Palmachim
2013	BOT	150	Sorek
2013	BOT	100	Ashdod
December 2009	BOT	100	Hadera
2010-2013		105	expansions
		585	Total

Operation stage 12.2009

Hadera

(130)

Operation stage 8.2013

(150)

sorek

Operation stage 5.2007

(45)

Palmachim

Operation stage 8.2015

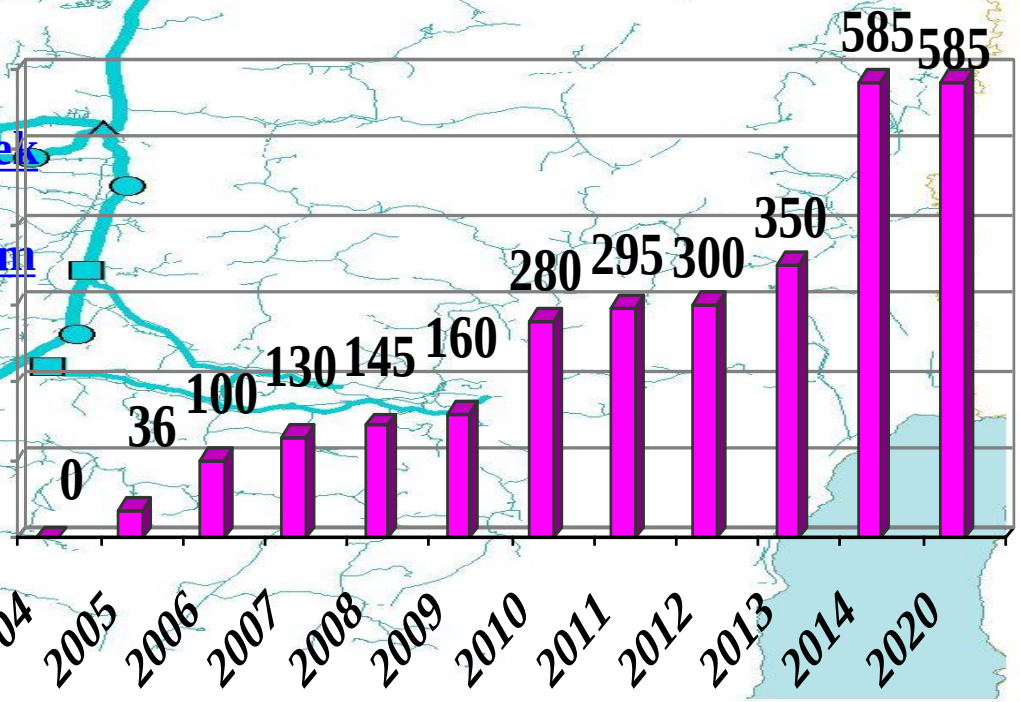
Ashdod

(100)

(120)

Ashkelon

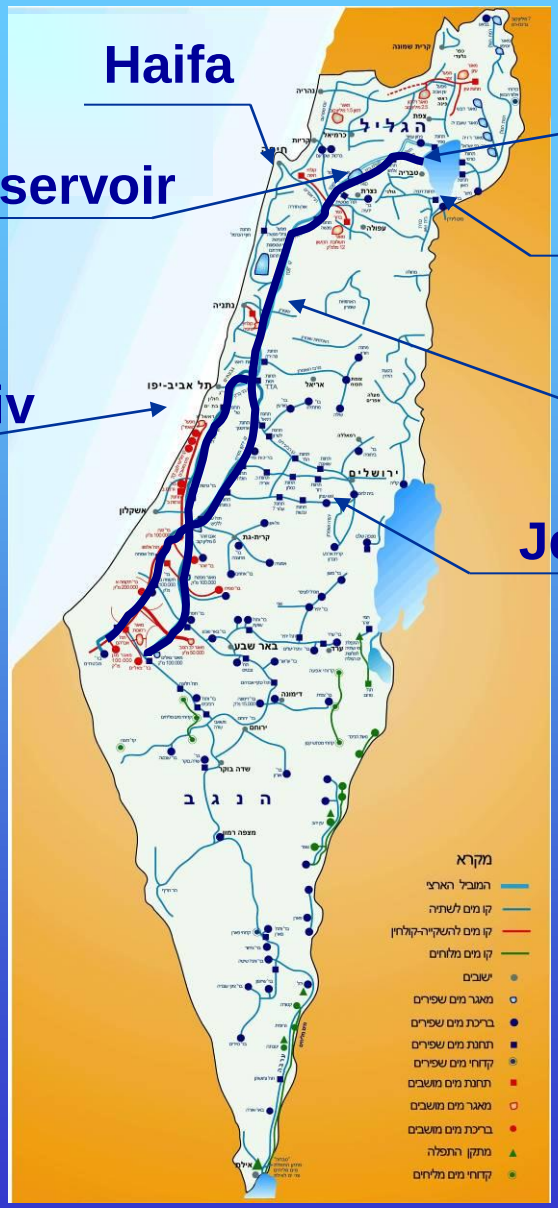
Operation stage 8.2005

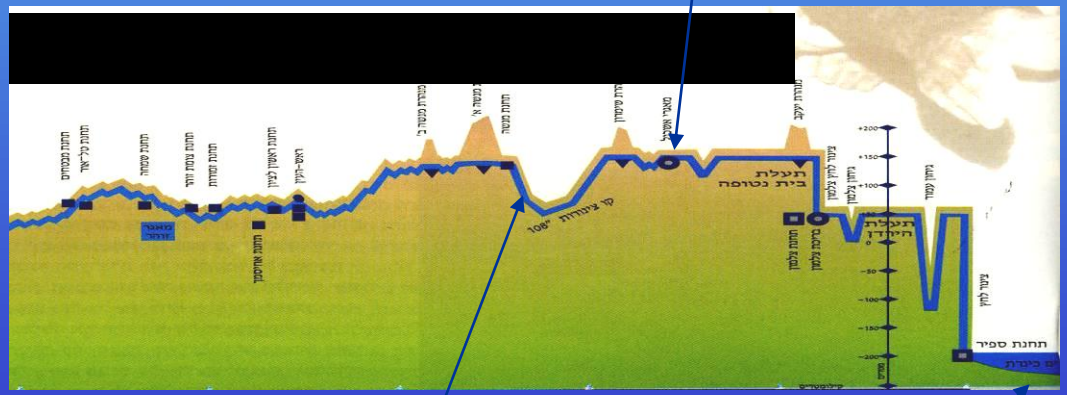


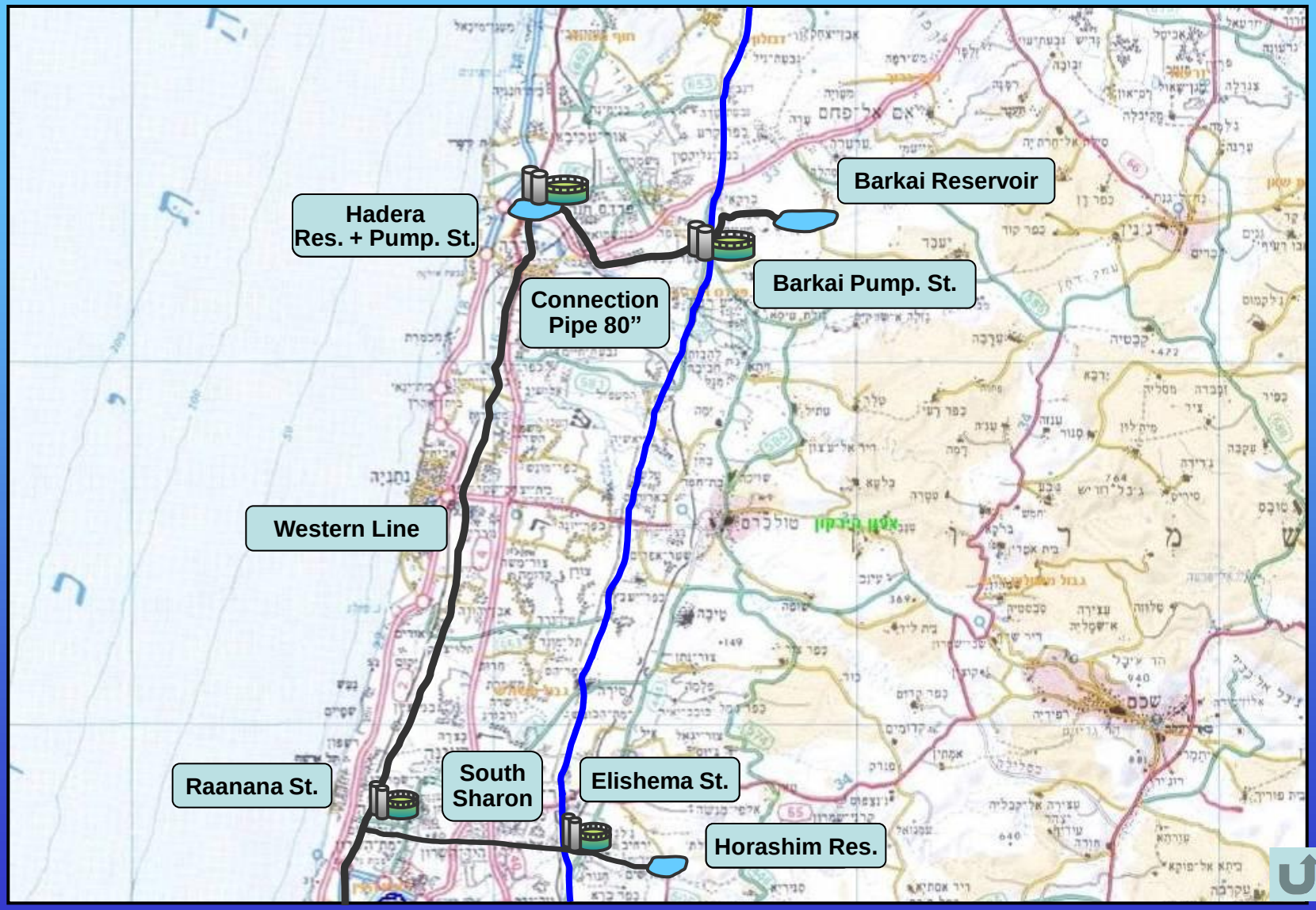
רשות המים

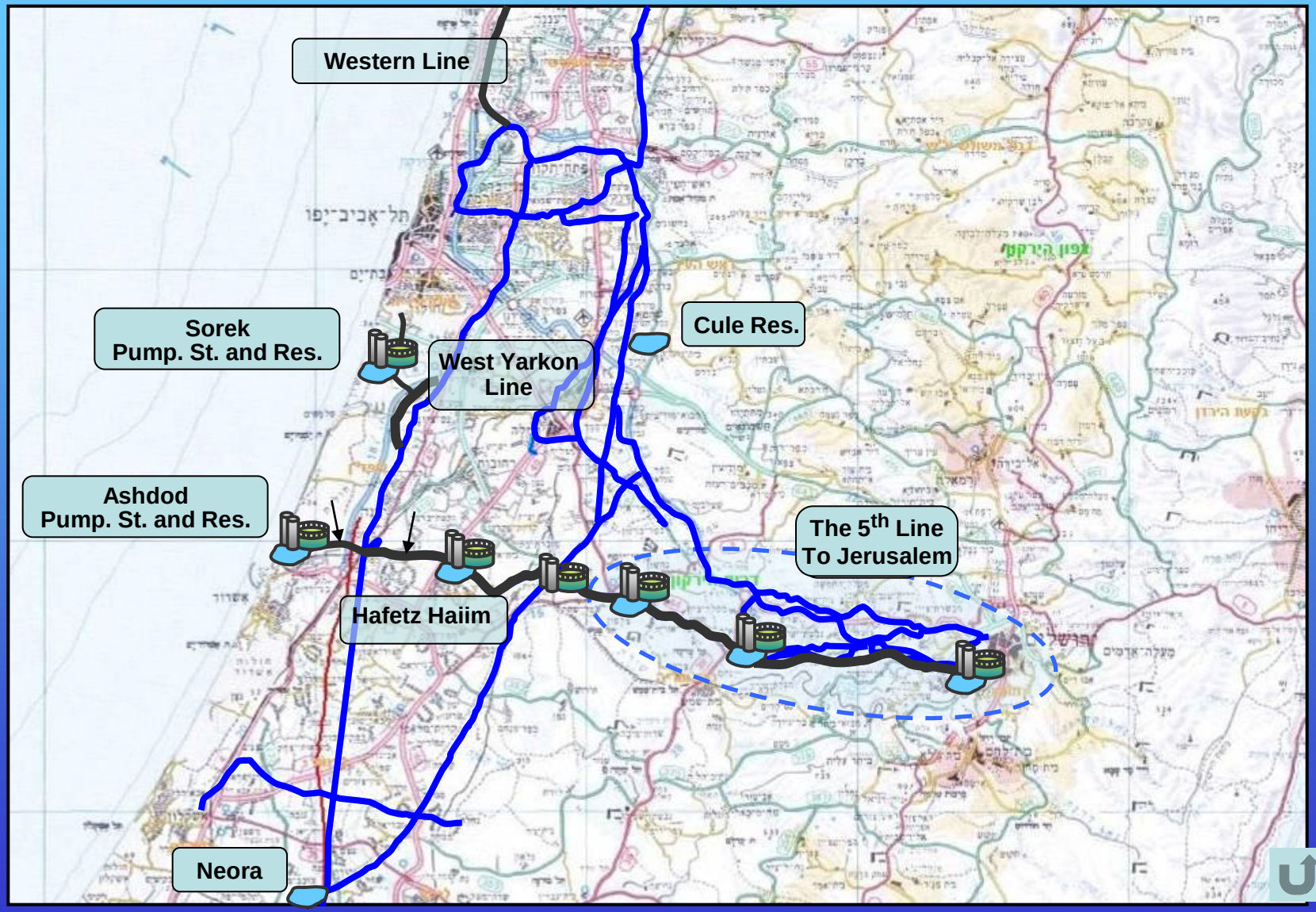

Israel National Water System
Kiryat Shmona
Nahariya
Hagalil
Karmiel
Krayot
Haifa
Tiberias
Nazareth
Golani
Afula
Hadera (127)
Netanya
Tel Aviv-Yaffo
Ariel
Sorek (180)
Palmachim (45) (90 + future)
Ashdod (100)
Ashkelon (120)
Jerusalem
Kiryat Gat
Kiryat Arba Hebron
Be'er Sheva
Arad
Dimona
Yerucham
Ketziot (2.8)
Halutza settlements
Negev
Mitzpe Ramon
Eilat (16)
Legend
The National Carrier
Potable water pipeline
Effluents pipeline (irrigation)
Brackish water pipeline
Towns
Potable water reservoir
Potable water ponds
Potable water wells
Recycled effluents ponds
Recovered water ponds
Brackish water desalination facility
Brackish water desalination facility under construction
Brackish water wells
Seawater desalination facility
Seawater desalination facility under construction
Pumping station
Legend by basins
Kinneret and Golan Basins
Western Galilee Basins
Carmel Basin
Coastal Basin
Eastern Basins
Arava Basin
Negev Basin
Mountain basin (Yarkon Taninim)
WATER AUTHORITY
www.water.gov.il
The Water Authority

Main Water Supply System






Barkai Reservoir
Hadera
Res. + Pump. St.
Barkai Pump. St.
Connection
Pipe 80”
Western Line
Raanana St.
South
Sharon
Elishema St.
Horashim Res.


Western Line
Sorek
Pump. St. and Res.
West Yarkon
Line
Cule Res.
Ashdod
Pump. St. and Res.
The 5th Line
To Jerusalem
Hafetz Haiim
Neora

Energy in Desalination Plants

- Reduced Specific Energy to 3.5 Kw/CM
- Every Desalination Plant will have its own IPP NG.
- Solar Panels at the new Desalination plants.

New Resources and Renewable Energy

The Israeli Infrastructure ministry had decided to have independent private power plants of a total capacity of 4000-5000 MW in the next 10 years.

NG IPP	**2500-3000 MW**
Solar Energy	**250-500 MW**
Wind energy	**250-400 MW**
Pumped storage	**1000-1100 MW**

Renewable Energy

Solar Energy- The Israeli Government decided to build two solar power Plants in tow technologies:

- Solar thermal plants for 80-110 MW
- Photo voltaic plant of 15-30 MW.

The PQ was published at 2009 and the tender will be published in few month.

The plants will start its production at 2014.

Renewable Energy

Solar thermal plants

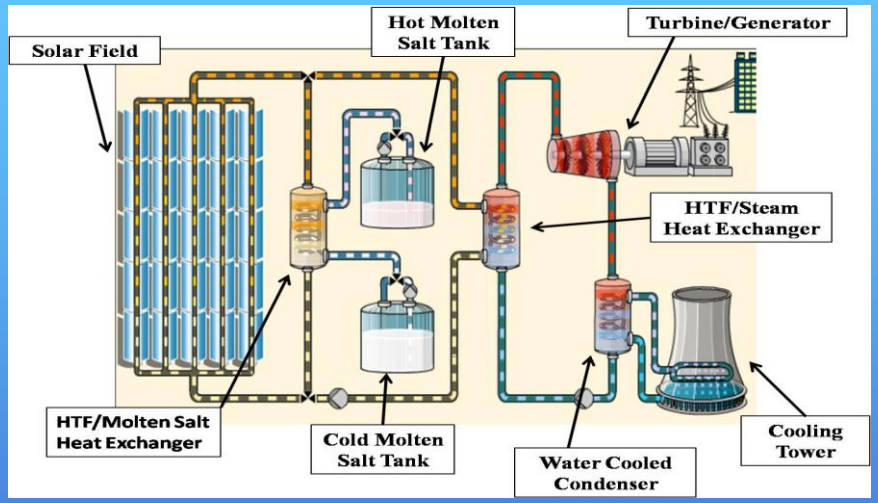
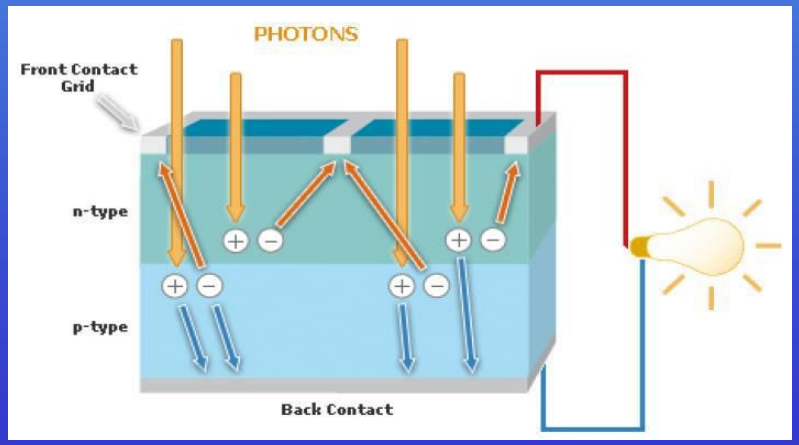
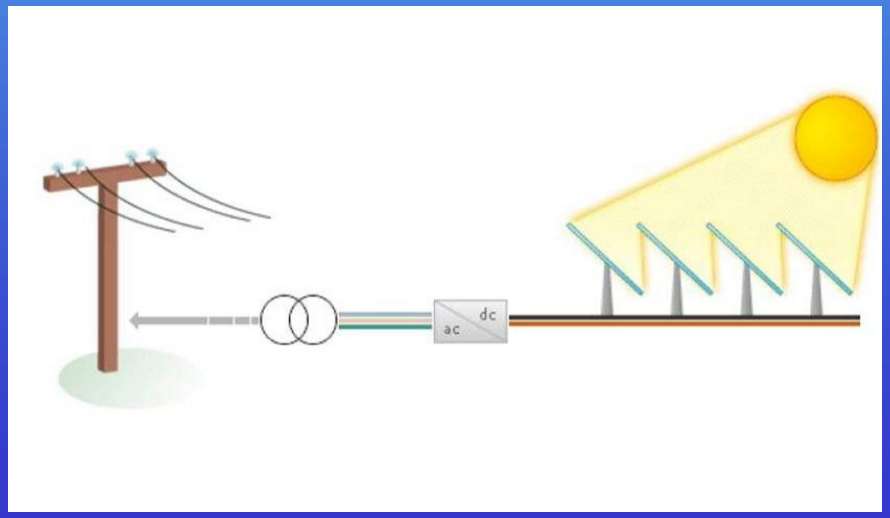


Photo voltaic plants



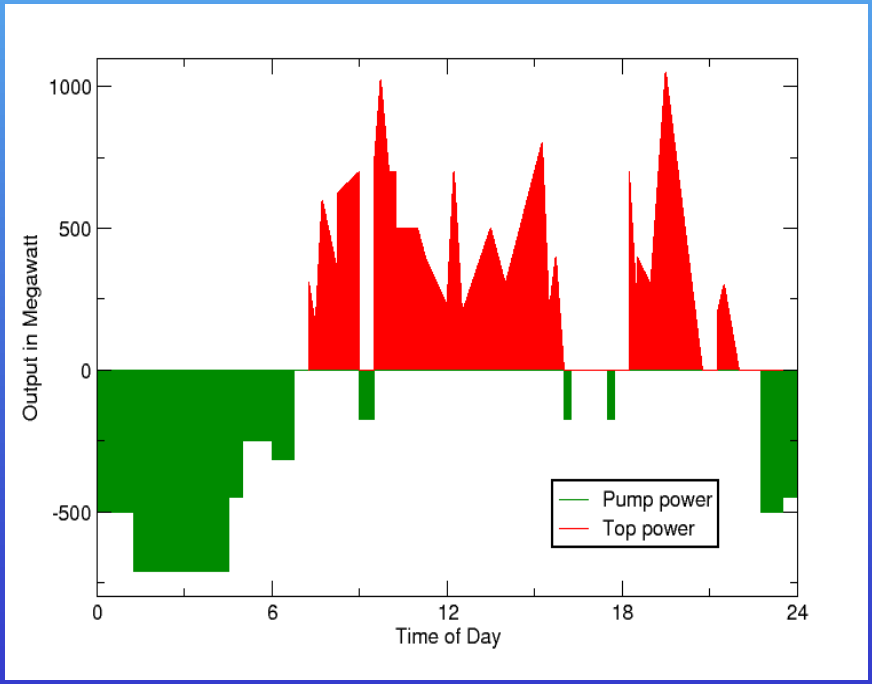


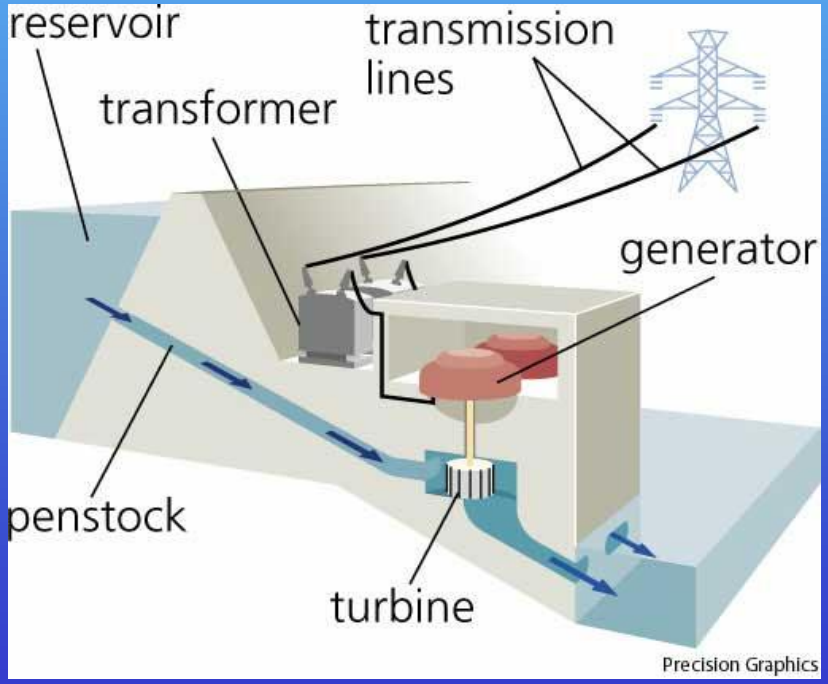
Renewable Energy

Wind Energy- at present we have in Israel a wind turbine farm of 6 MW. The potential is 600 MW.

Renewable Energy

Pumped Storage Energy- There are already three approved projects of a total capacity of 700MW.





Environmental Aspects

Concentrate to the sea:

- Advanced defuses
- Monitoring plan

Coagulants Lend Removal

Using NG instead coal power plants:

- Impurities reduction of 80%

Green Chapter in the Desalination Tenders:

- Using local recycled material
- Environmental friendly design

Ashkelon Desalination Plant

רשות המים

Construction beginning January 2003

Operation beginning August 2005

Production capacity 120 MCM/Year

Palmachim desalination plant

רשות המים

Construction beginning January 2005

Operation beginning January 2005

Operation capacity 90 MCM/Year

Hadera desalination plant

רשות המים

Construction beginning June 2007

Operation beginning December 2009

Production capacity 127 MCM/Year

Soreq desalination plant

רשות המים

Construction beginning January 2011

Production capacity 150 MCM/Year

Operation beginning August 2013

Ashdod desalination plant

רשות המים

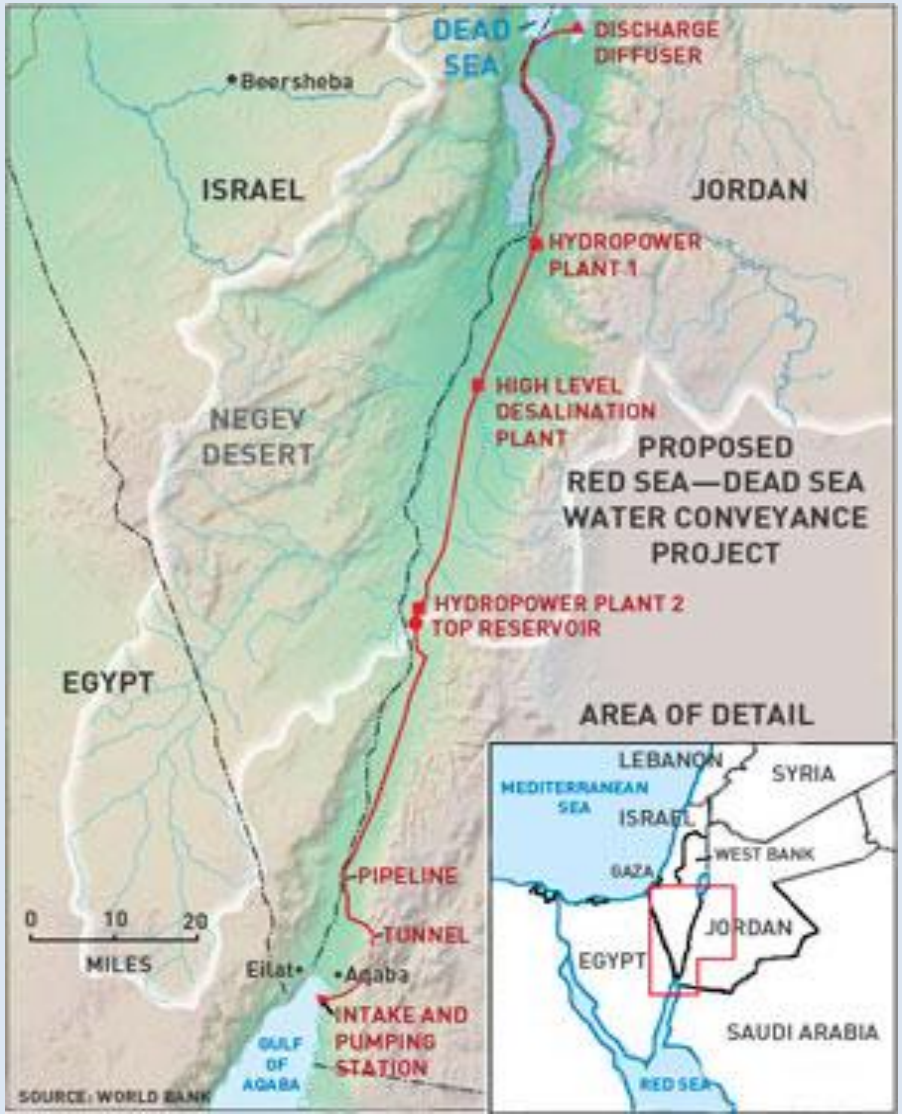
Construction beginning June 2011

Operation will start by the end of 2015

Planned production 100 MCM/Year

Water Issues with Jorden and Palestinians

- Water supply.
- Capacity Building.
- Red-Dead Pilot Project.


DEAD SEA
DISCHARGE DIFFUSER
Beersheba
ISRAEL
JORDAN
HYDROPOWER PLANT 1
HIGH LEVEL DESALINATION PLANT
NEGEV DESERT
PROPOSED RED SEA—DEAD SEA WATER CONVEYANCE PROJECT
HYDROPOWER PLANT 2 TOP RESERVOIR
EGYPT
AREA OF DETAIL
PIPELINE
TUNNEL
0 10 20
MILES
Eilat
Aqaba
INTAKE AND PUMPING STATION
GULF OF AQABA
SOURCE: WORLD BANK
LEBANON
SYRIA
MEDITERRANEAN SEA
ISRAEL
WEST BANK
GAZA
JORDAN
EGYPT
SAUDI ARABIA
RED SEA

Thank you