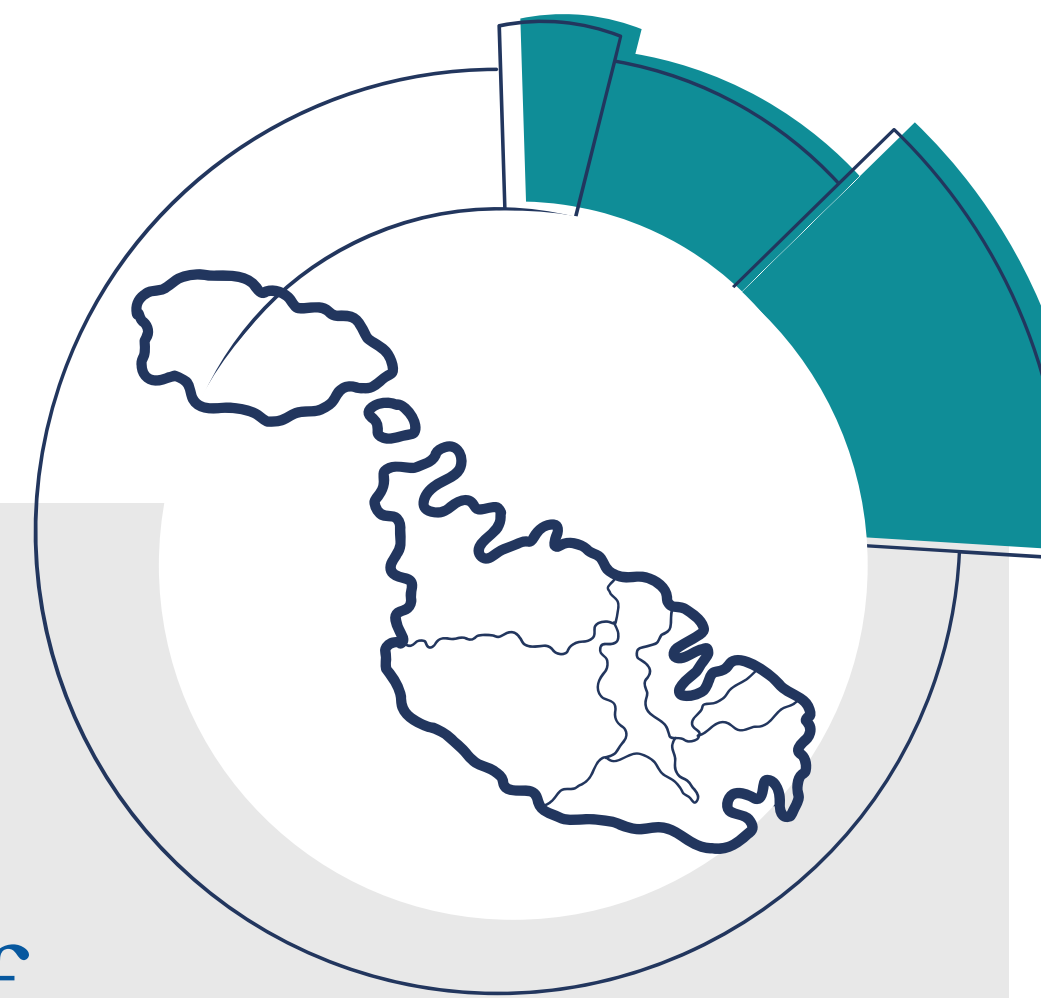


Ing. David Sacco – Chief Officer Corporate Strategy  
Ing. Stefan Cachia – Manager Corporate Strategy



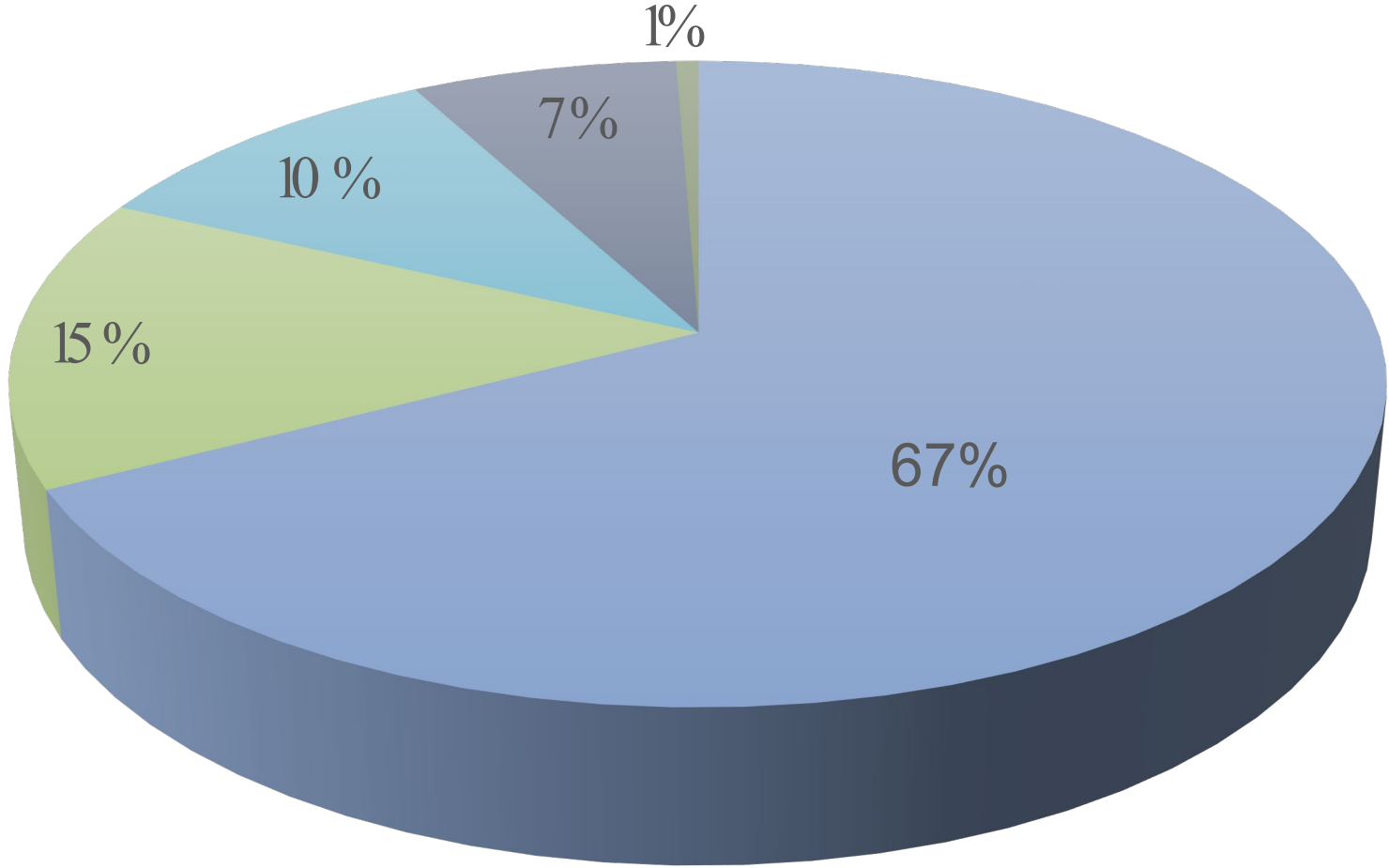
# Calculation methods on energy savings: water conservation measures in the context of Art.8 of the EED



# WSC Energy Profile

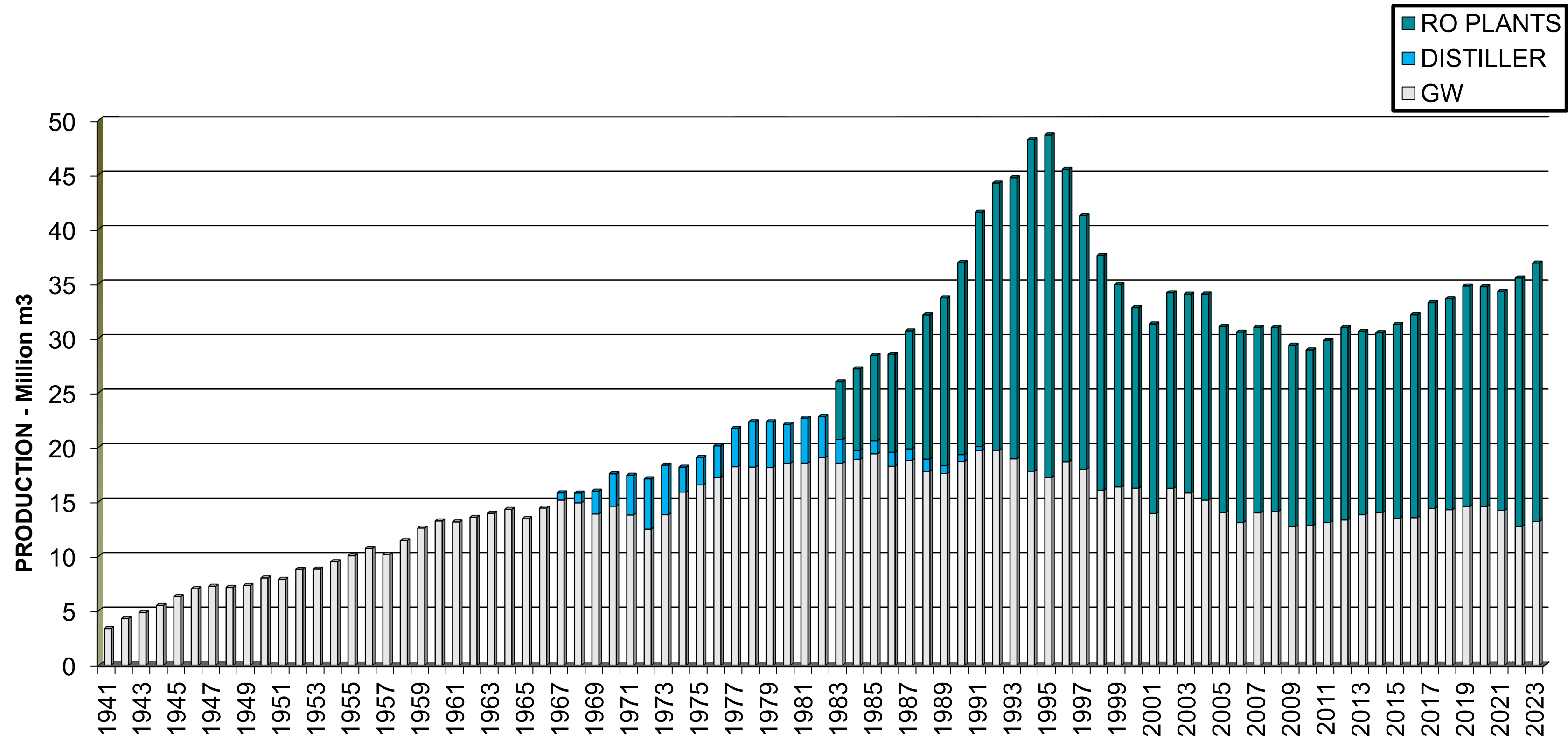
Sector	MWh	%
Desalination (RO)	109.5	67%
Wastewater Treatment (WWT)	23.8	15%
Groundwater Production & Distribution	16.5	10%
Wastewater Collection	11.8	7%
Administration	1.0	1%
TOTAL	162.6	100%

**WSC consumption accounts for circa 6% of the Total National Energy Demand**

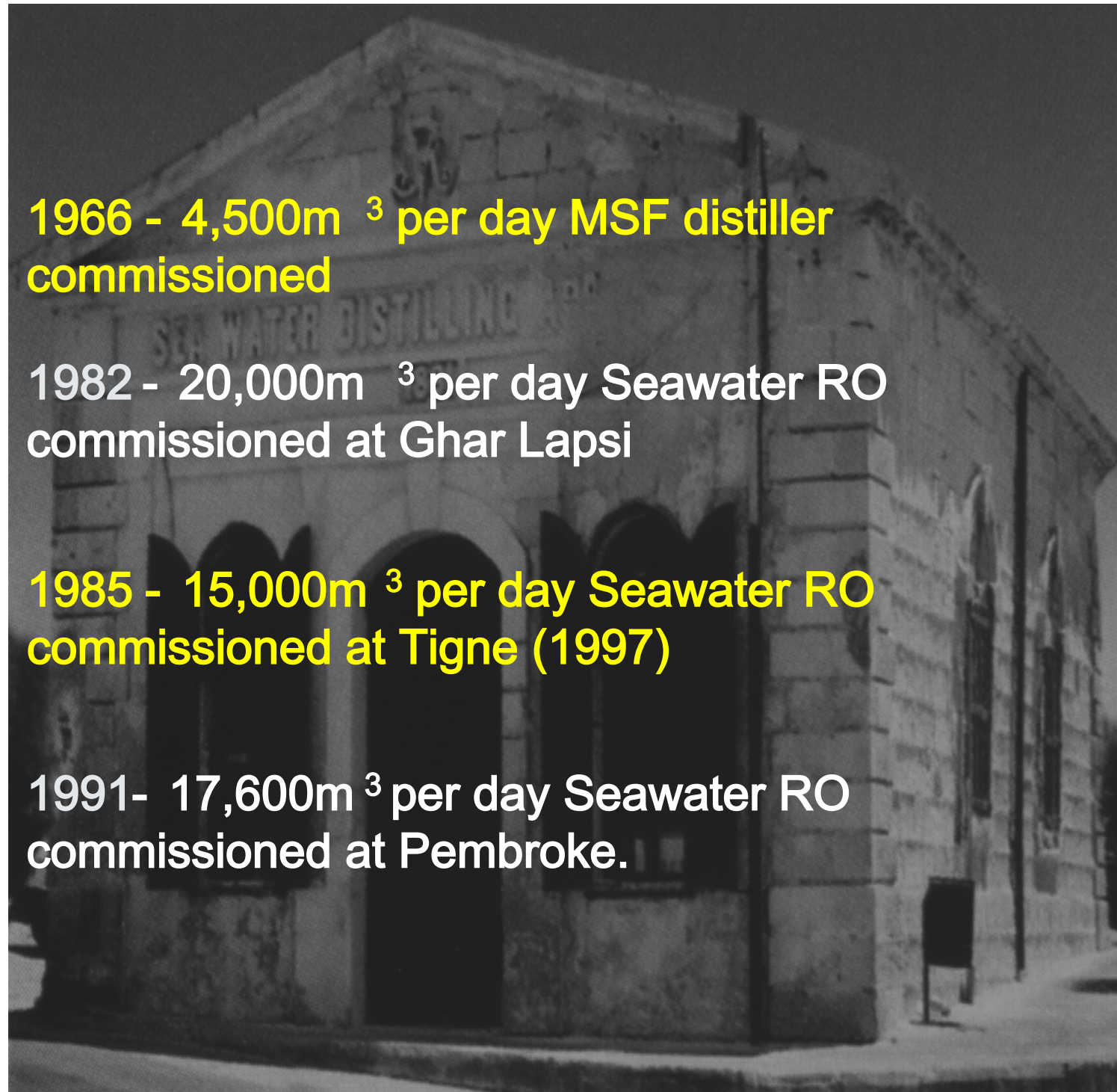


- Desalination (RO)
- Wastewater Treatment (WWT)
- Groundwater Production & Distribution
- Wastewater Collection
- Administration

# Water Production Profile in Malta



# History of Desalination in Malta



1966 - 4,500m<sup>3</sup> per day MSF distiller commissioned

1982 - 20,000m<sup>3</sup> per day Seawater RO commissioned at Ghar Lapsi

1985 - 15,000m<sup>3</sup> per day Seawater RO commissioned at Tigne (1997)

1991- 17,600m<sup>3</sup> per day Seawater RO commissioned at Pembroke.

1881- Commissioning of a Distiller for production of potable water following a drought.

1973- 2,250m<sup>3</sup> per day MSF plant commissioned in Gozo

1983 – 4,500m<sup>3</sup> per day Brackish RO commissioned at Marsa (1999)

1988 - 18,600m<sup>3</sup> per day Seawater RO commissioned at Cirkewwa

1994 - Pembroke RO upgraded to 54,000m<sup>3</sup> per day

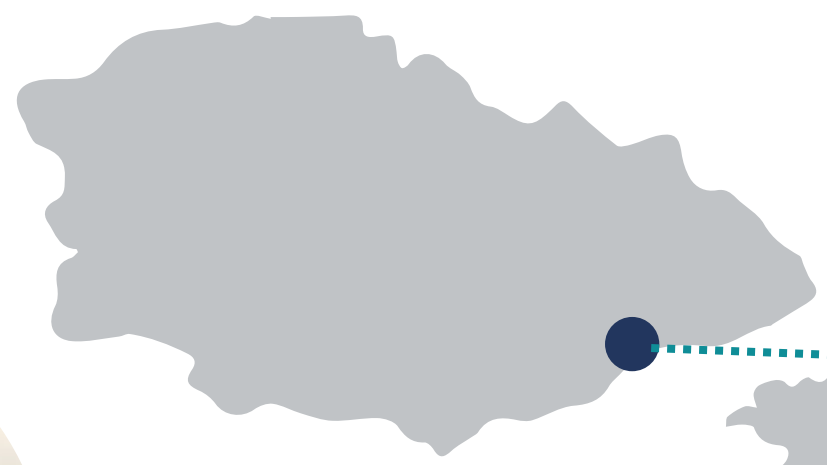
2021- 9,000m<sup>3</sup> per day commissioned in Gozo



# PLANNED RO CAPACITY UPGRADES



11,500 ➔ 21,500 m<sup>3</sup> /day



9,000 m<sup>3</sup>/day

127 k m<sup>3</sup>/day



95 k m<sup>3</sup>/day

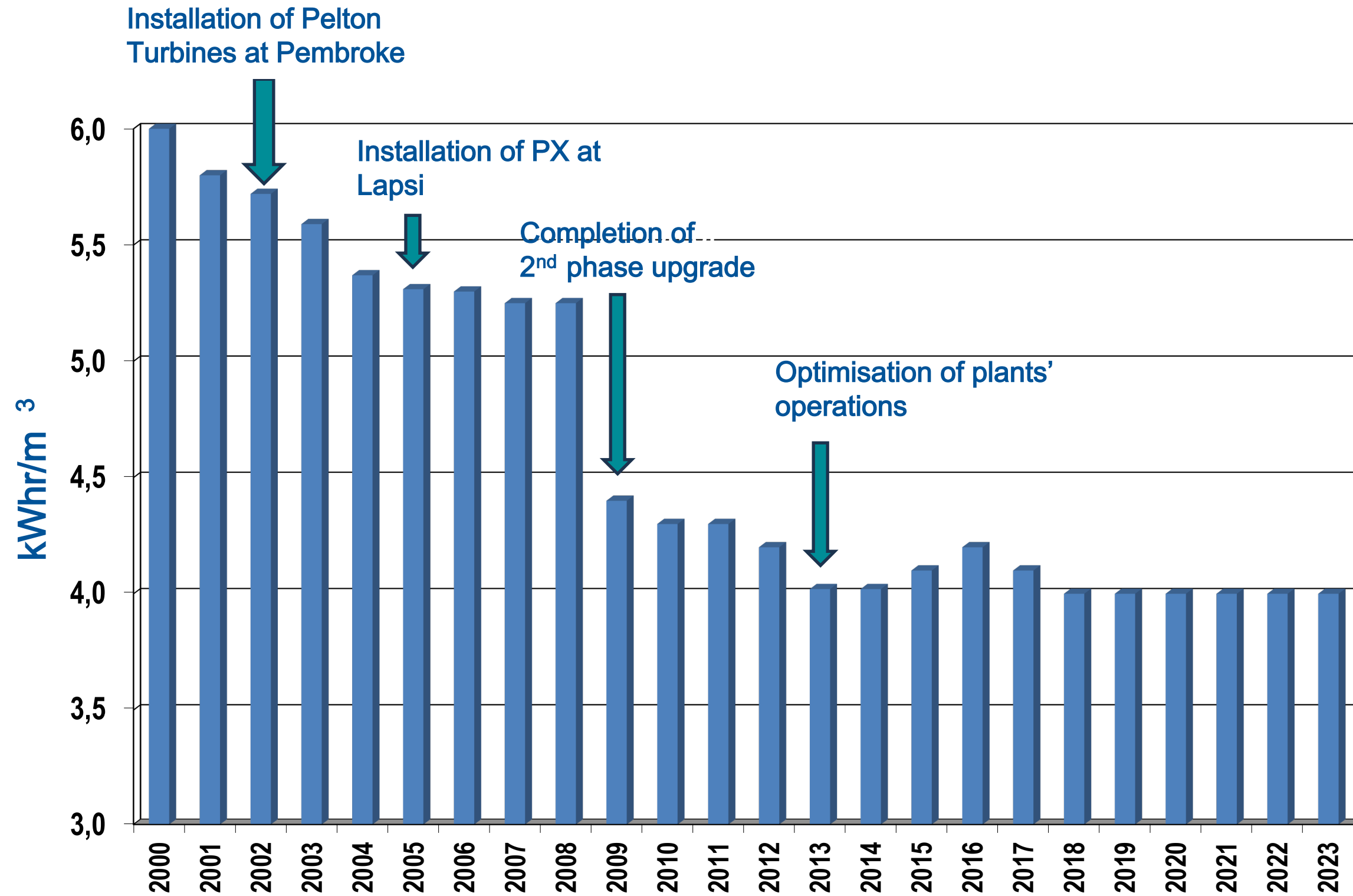


27,000 ➔ 30,500 m<sup>3</sup> /day



48,000 ➔ 66,000 m<sup>3</sup>/day

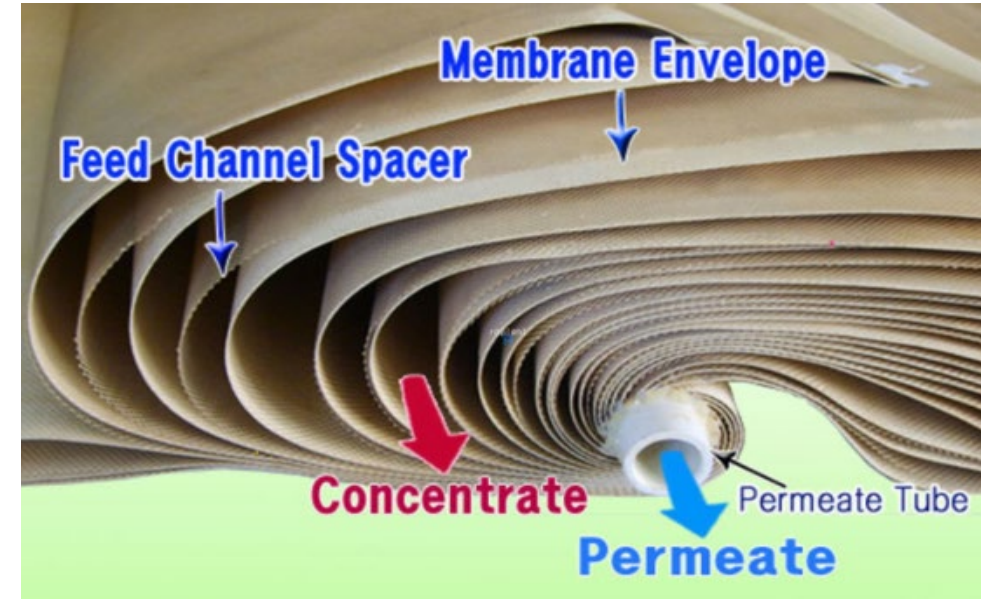
# Desalination: Specific Energy Trends



**NB Specific Energy INCLUDES well and booster pumps but excludes product transfer**



# Desalination: Membrane Development



Operating Pressure: 82Bar to 65Bar



Corresponding Energy Reduction - 20%



# Desalination: Energy Recovery Devices



Francis Turbine:  
75% Efficiency



Pelton:  
85% Efficiency



Pressure Exchanger:  
95% Efficiency



# Desalination: New Hondoq RO setting the benchmark

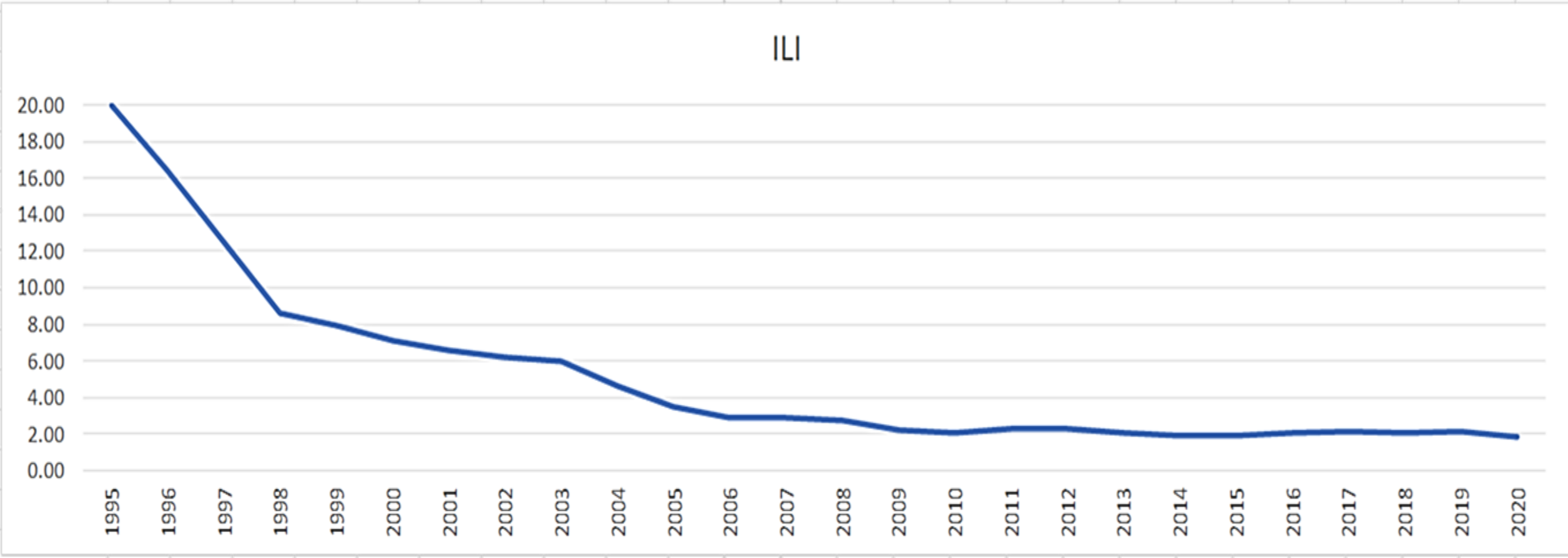


- Chemical-free operation
- Positive displacement HP Pumps
- Isobaric Energy Recovery Devices
- Premium efficiency motors
- On-site chlorine generation
- Innovative remineralization system (OMYA)

Total specific energy < 3 kWh/m<sup>3</sup> compared to 4 kWh/m<sup>3</sup> overall average

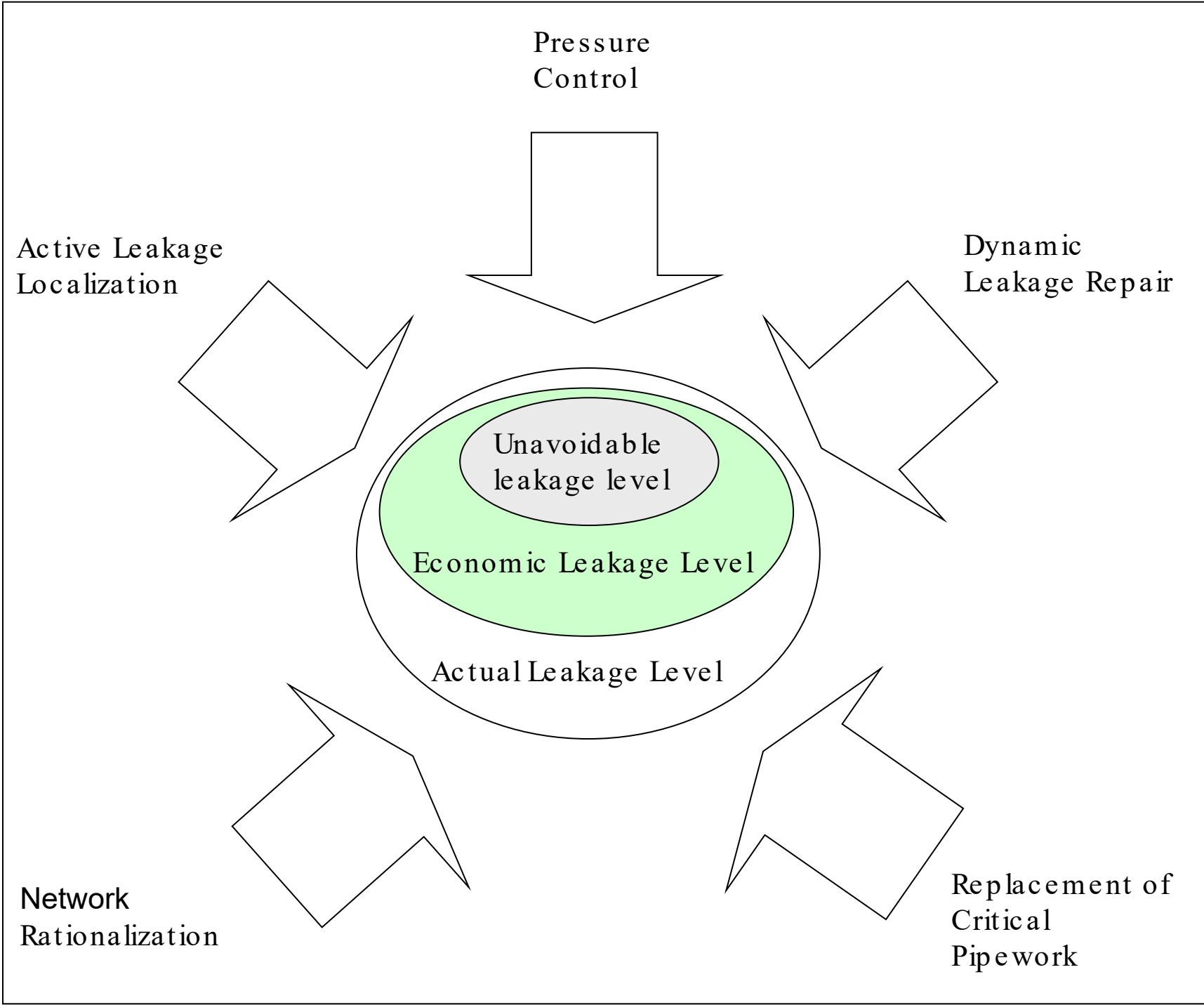
# Water Leakage Management

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>ILI</b>	19.95	16.40	12.50	8.60	7.90	7.10	6.60	6.20	5.99	4.61	3.48	2.90	2.89	2.75	2.20	2.10	2.28	2.29	2.09	1.94	1.91	2.06	2.18	2.09	2.14	1.87
<b>leakage in m3/hr</b>	3,900	3,146	2,391	1,637	1,475	1,346	1,210	1,193	1,157	936	747	645	637	609	481	460	493	496	452	407	394	427	451	433	444	389





# Water Leakage Management



# Desalination: Energy Savings Calculation

$$\text{Specific Energy Consumption (kWh/m}^3\text{)} = \frac{\text{Metered Energy Consumption (kWh)}}{\text{Metered Production (m}^3\text{)}}$$

$$\text{Annual Savings (kWh)} = (\text{SEC}_{\text{Year N}} - \text{SEC}_{\text{Reference Year}}) \times \text{Metered Production}_{\text{Year N}}$$



# Network Leakage Management: Energy Savings Calculation

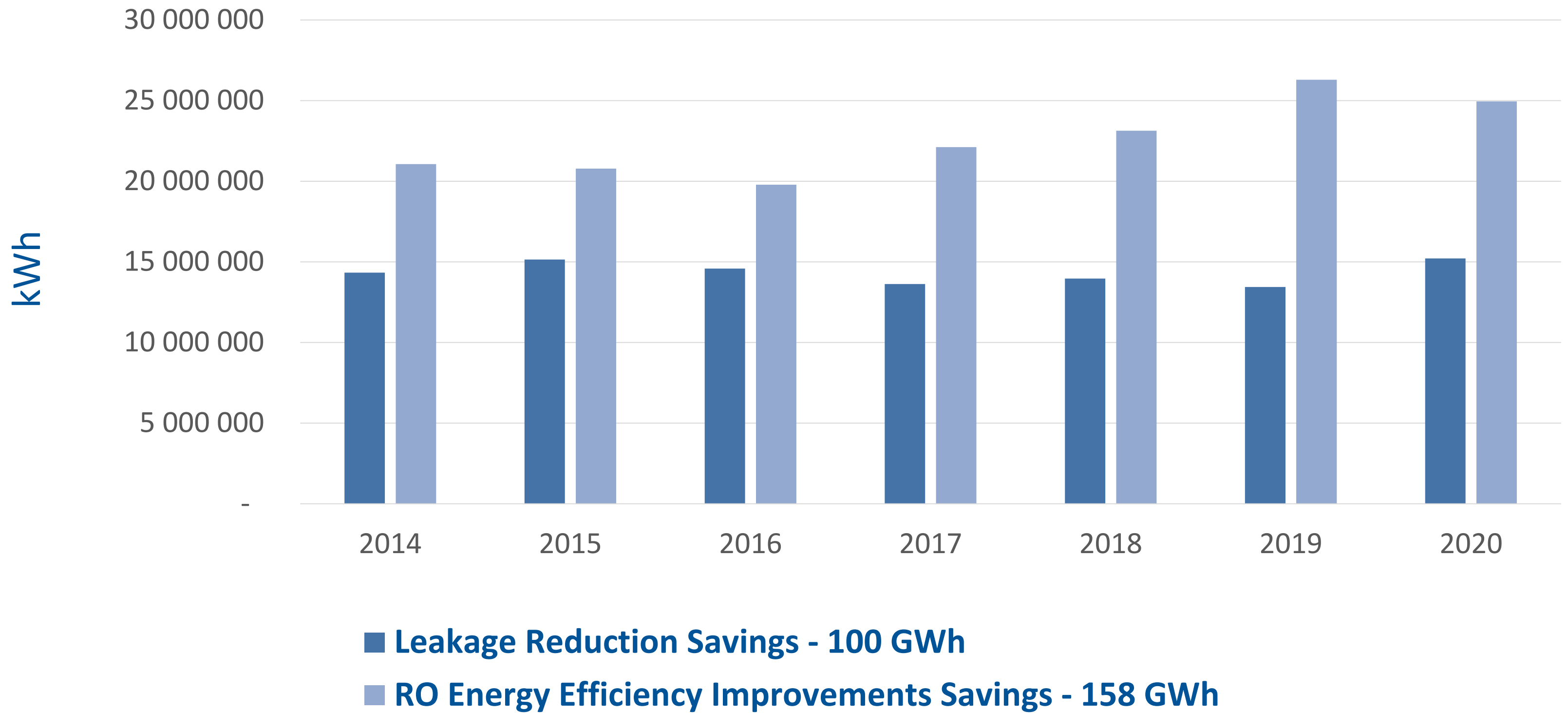
$$\text{Specific Energy Consumption for Water Production (kWh/m}^3\text{)} = \frac{\text{Metered Energy Consumption (kWh)}}{\text{Metered Production (m}^3\text{)}}$$

**SEC\_WP**

$$\text{Annual Savings (kWh)} = (\text{Leakage}_{\text{Reference Year}} - \text{Leakage}_{\text{Year N}}) \times \text{SEC\_WP}_{\text{Year N}}$$

# Calculated Energy Savings

## Energy Savings - 2014-2020 Reporting Cycle





# Offsetting Energy Demand – Renewables: PVs

## Current Scenario

- Four groups of Reservoirs are equipped with Photovoltaic Systems for a total annual generation of **5.52 GWh**.

## Future Scenario

- Eight additional sites to be equipped with Photovoltaic Systems for an extra annual generation of **6.1GWh**.
- In Total WSC will be generating **116 GWh** of renewable energy – a **7%** offset against energy drawn from the grid.

Location	PV Capacity (kW <sub>p</sub> )	Annual Yield (kWh)	Totals (GWh)
Fiddien Reservoir	1,000	1,600,000	<b>5,52</b>
Qrendi Reservoir	800	1,280,000	
Ta' Ċenc Reservoirs	650	1,040,000	
Ta' Qali Reservoirs	1,000	1,600,000	
Luqa Reservoir	707	1,131,200	<b>6,07</b>
Pembroke RO	898	1,436,800	
WSC Luqa HO	270	432,000	
Lapsi RO	491	785,600	
Cirkewwa RO	252	403,200	
Naxxar Reservoir	601	961,600	
Barkat STP	301	481,600	
Bulebel Warehouses	273	436,800	
<b>Total</b>	<b>7,243 kW<sub>p</sub></b>	<b>11.6 GWh/annum</b>	



# Solar Farms



Fiddien Reservoir



Qrendi Reservoir

Ta' Ċenċ Reservoir



Ta' Qali Reservoir





# Offsetting Energy Demand – Optimising Operations through AI

➤ **Automated computations to optimise energy for water production**

➤ **Optimisation of water quality parameters:**

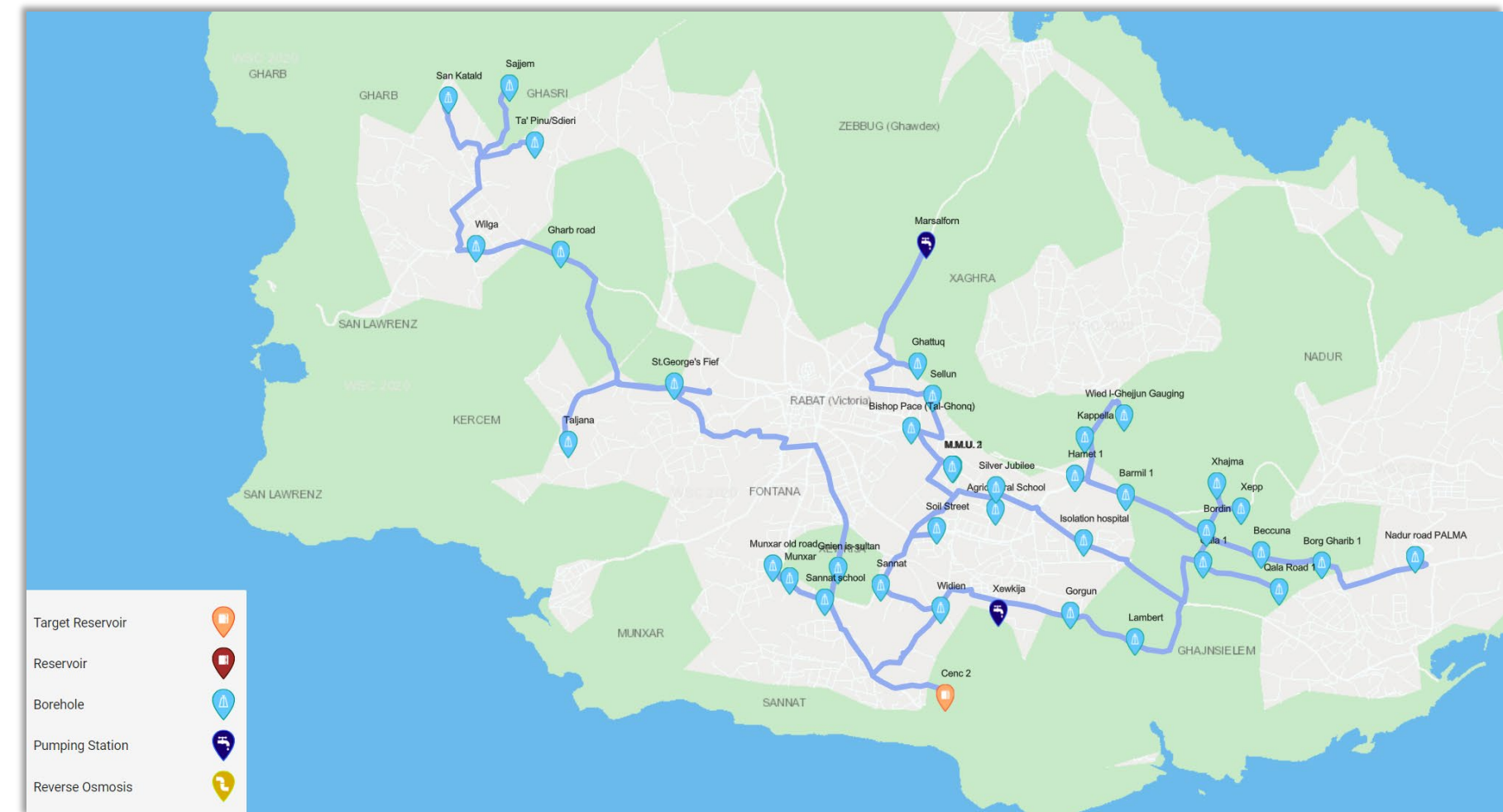
- *concentration of chlorides and nitrates in the water blend*

- *water levels in reservoirs*

➤ **Facilitate production source management subject to:**

- *production meeting demand*

- *Achieving the requisite quality at the lowest cost possible*



THANK YOU



Questions ?