WATER MANAGEMENT IN THE MALTESE ISLANDS

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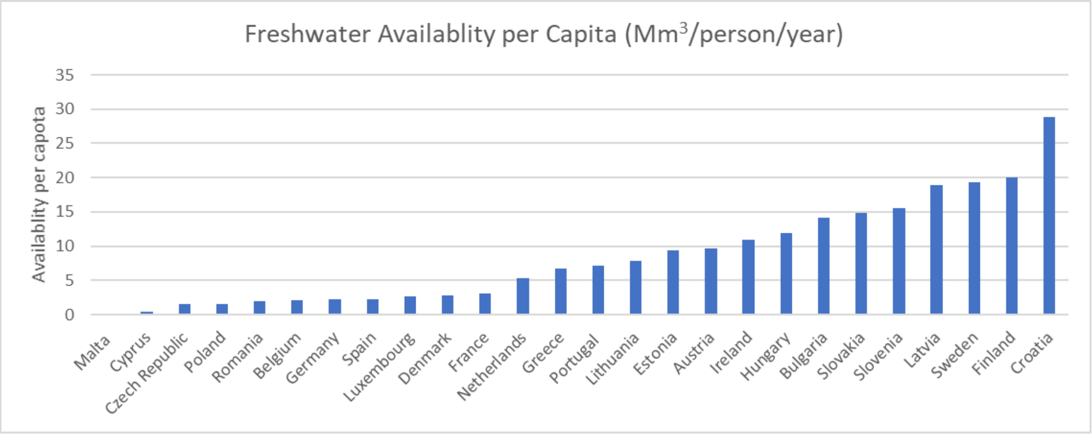
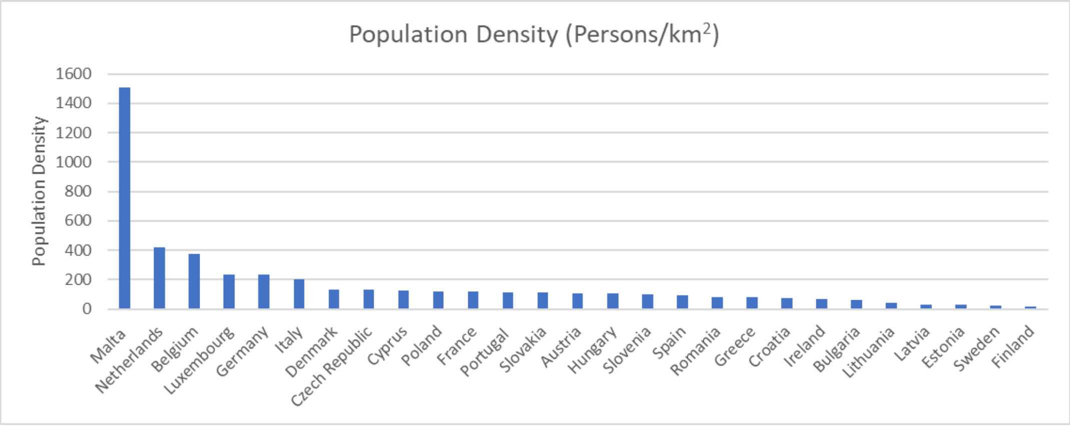
CONTEXT

- Climate: semi-arid with dry, hot summers and mild, wet winters.
- Geomorphology: small island, precludes the development of economically exploitable surface waters.
- Demography: the highest population density in the EU.

Low availability of Natural Water Resources, but high Specific Water Demand.



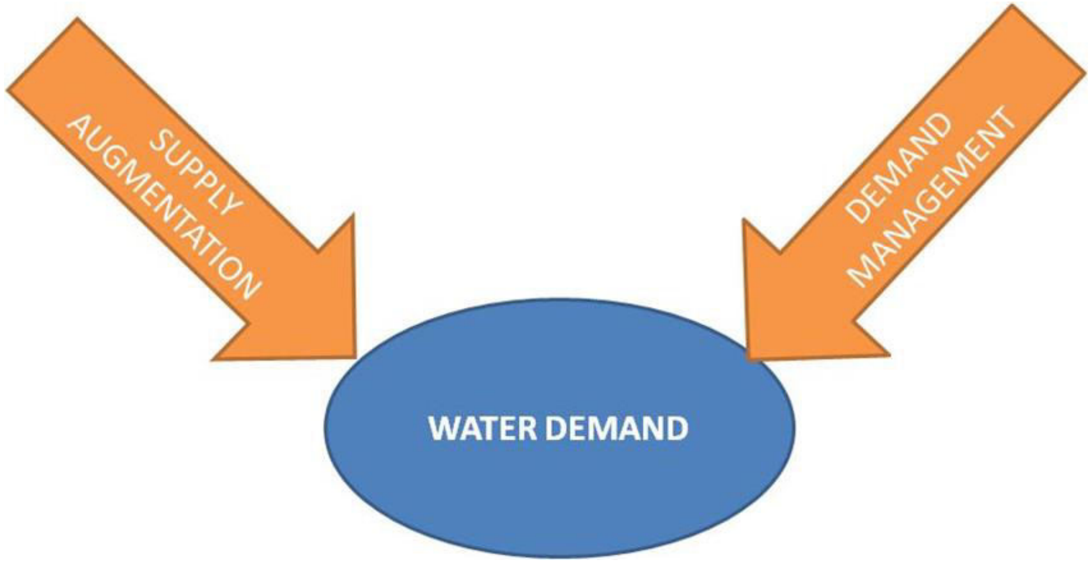


RATIONALE

Under these circumstances, development of a water management framework needs to starts with acknowledging reality.

Even if water demands are kept at highly efficient levels, there is insufficient natural freshwater resources to sustainably meet national demand.

Malta’s water management framework is based on a two-pronged strategy to achieve water security: meeting water demand through the conjunctive use of water supply augmentation and water demand management measures, in an increasingly sustainable manner.



BUT

In theory, it seems the prelude to a perfect story. But it is not!!

Malta's water strategy has been developed through a long learning curve, and is based on:

Embracing new technologies
Making (big) mistakes
Taking (important) corrective actions

This presentation will outline this iterative process which has led us to develop our current water management approach.

HISTORICAL CONTEXT

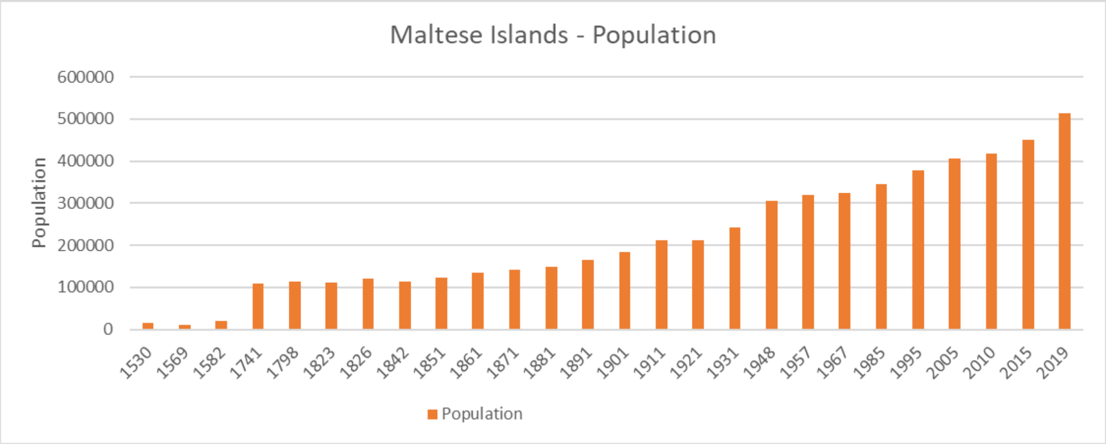
Traditionally Malta's water supply was dependent on groundwater – the only naturally renewable freshwater resource in the islands.

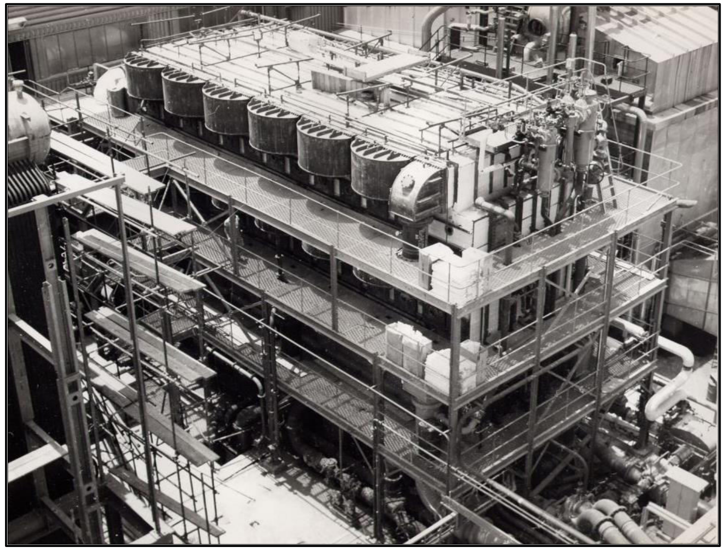
But, a steep population increase during the last two centuries, led to a continuously increasing water demand.

By the 1960's it was already event that groundwater on its own – was not sufficient to meet demand. First investments in commercial scale sea-water desalination – Multi-Stage Flash Distillation Plants.

But, the oil crises in the 1970's led to an increase in the price of water production – once more shifting production to groundwater.

By the early 1980's the aquifers were collapsing, leading to high salinity levels. Production was reduced, and with no alternative supplies, and this led to widespread water rationing.





DESALINATION

1982 saw the commissioning of the Ghar Lapsi Sea-Water Reverse Osmosis Desalination Plant. With a production capacity of 20,000 m^3/day, at that time was one of the largest commercial scale RO plants in the world.

To address water demand, additional desalination plants were commissioned:
Marsa – 1983 – 4,500 m^3/day (brackish-water)
Tigne – 1986 – 15,000 m^3/day
Cirkewwa – 1988 – 18,600 m^3/day
Pembroke – 1994 – 54,000 m^3/day

BUT

…… total water production was till not sufficient to meet municipal demand.

By 1995, the total water production capacity had reached around 52 Million m^3/year or 350 liters/capita/day.

The energy required for the production and distribution of drinking water exceeded 12% of the national electricity demand.

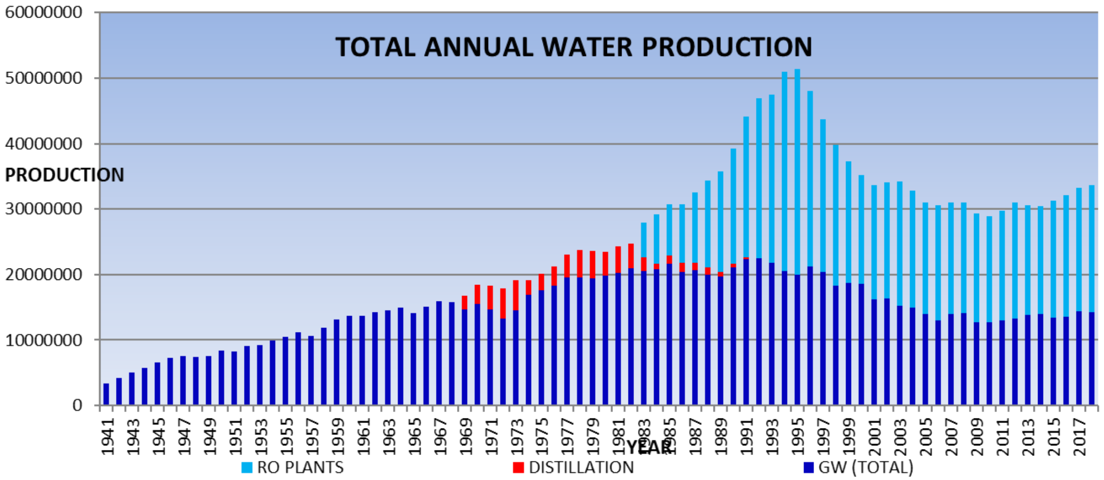
And the most energy consuming activity in households was the water supply.

Why?

The continuous change in pressure due to cuts in the water supply led to a deterioration in the distribution network. By 1995, leakage levels were estimated to have reached 60% of the total water supplied in the distribution network.

Over 25 million m^3 were being lost through network leakages every year.

The situation was not sustainable.



POLICY SHIFT

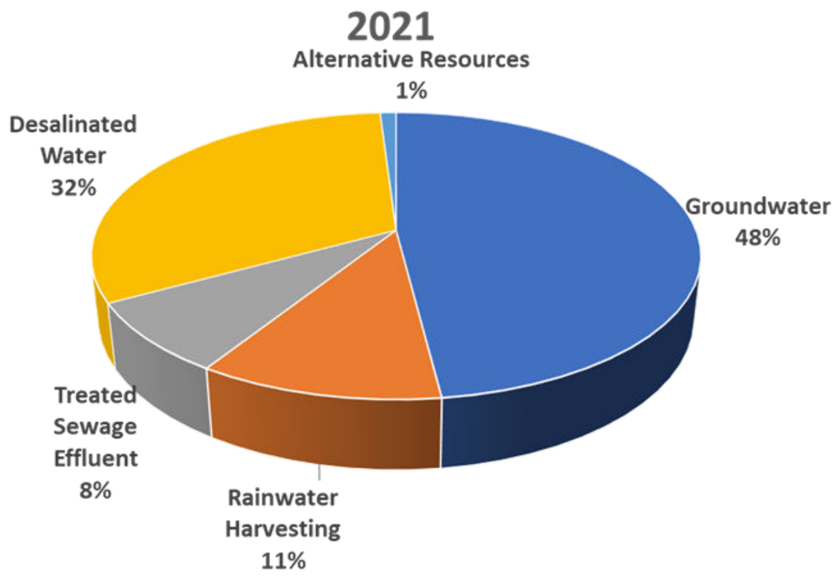
It became increasingly clear that water supply augmentation measures alone could not address Malta's water challenge.

Water supply augmentation measures had to be accompanied by water demand management measures.

Factors such as:
- Supply Diversification (Non Conventional Water Resources)
- Water Efficiency (National and User Level)
- Energy Efficiency

gained increasing importance in the water management framework.

And this approach still forms the basis of Malta's water policy today.



LEAKAGE MANAGEMENT

The launch of an aggressive leakage identification and management programme in the mid 1990’s led to a significant reduction in the system demand; whilst national demand was met.

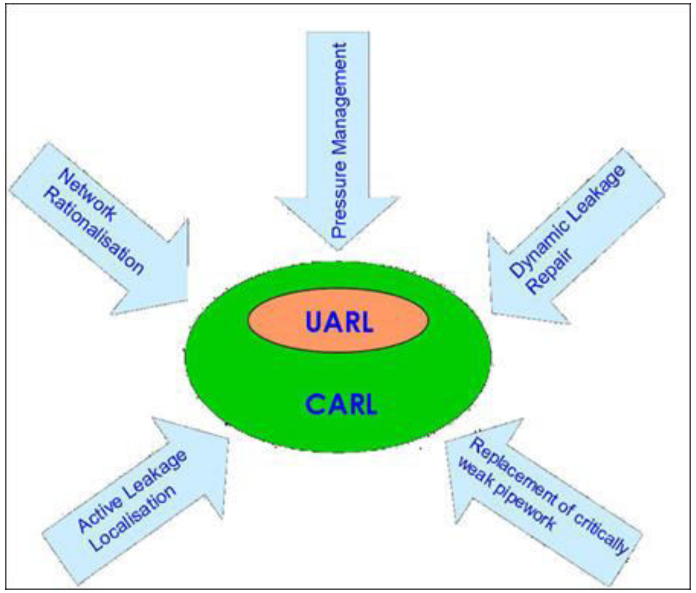
This even with an increasing population, improving standard of living and expanding economy.

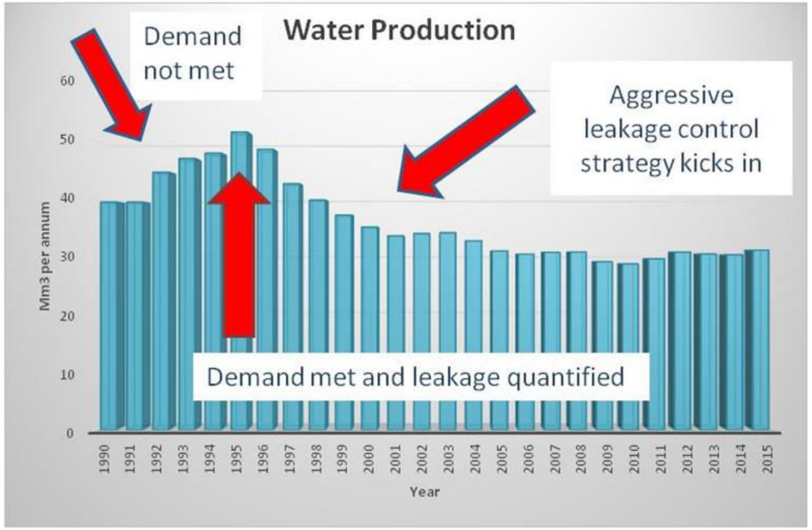
Water production could be reduced. Groundwater abstraction was lowered to improve the quality of abstracted water, as well as the production of desalinated water.

One desalination plant was closed, then another and ….. the remaining three were operating at half-capacity.

By 2000, water demand stood at around 60% of what it had been in the 1990’s:

- lower pressures on natural freshwater resources
- lower energy needs for sea-water desalination



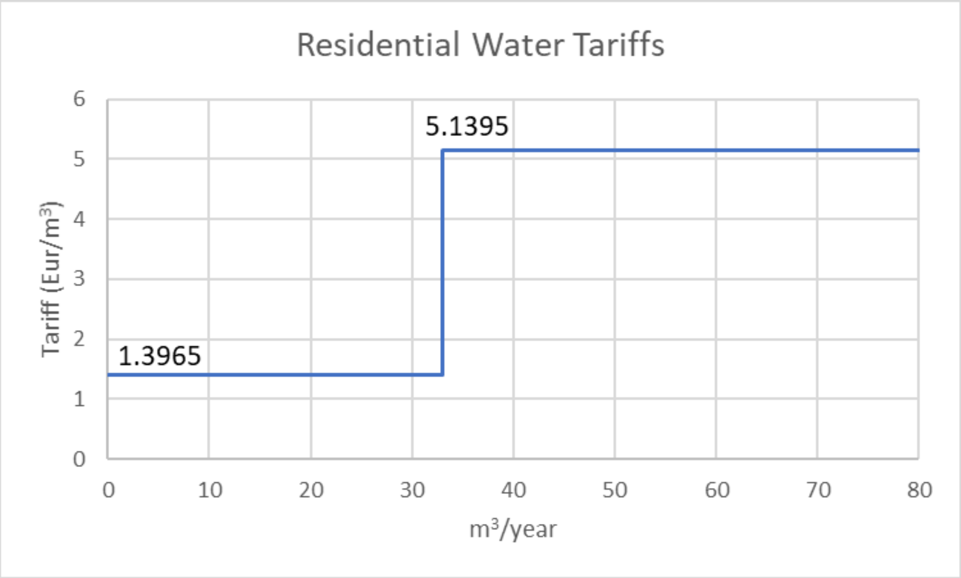


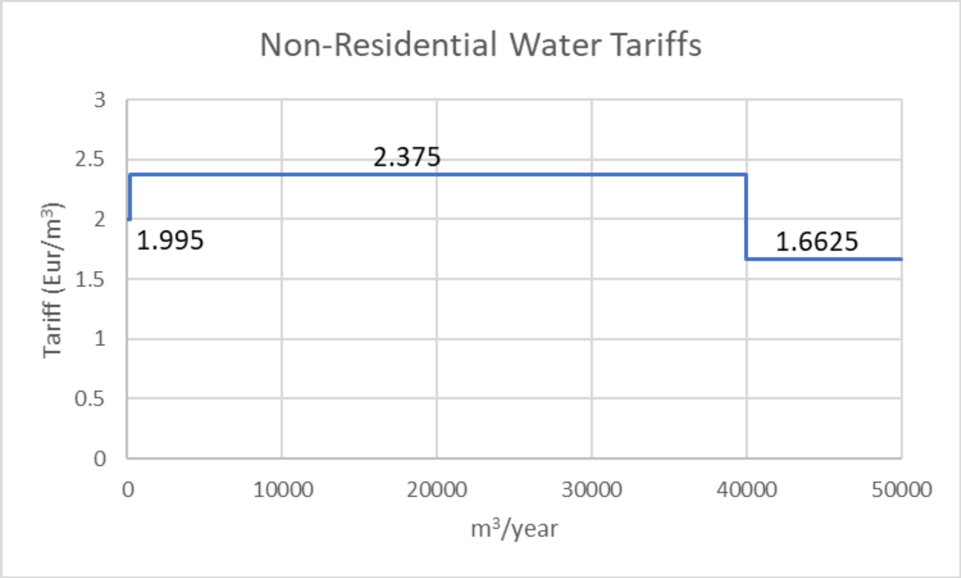
DEMAND MANAGEMENT

Demand management at user level was reinforced through economic instruments – namely a rising block tariff system.

Tariffs and a continuous engagement programme have contributed to maintaining the per capita water consumption low, and in the region of the 90 litres per person per day higher tariff threshold.

Per capita water consumption, today stands at around 110l/cap/day.





TRANSFORMATION

Security of Supply provides an opportunity for rethinking water services.

Updated strategy, increasing focus on:

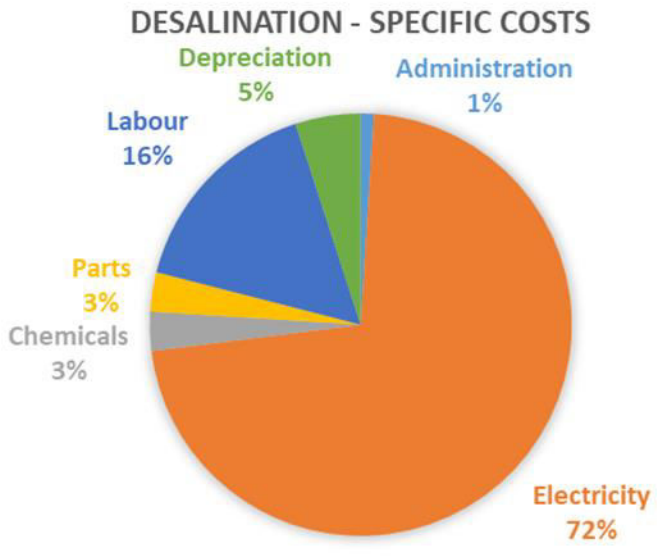
- The Water-Energy-Food-Ecosystems Nexus.
- Better service to consumers (including water quality).
- The impact of water services provision on the environment.

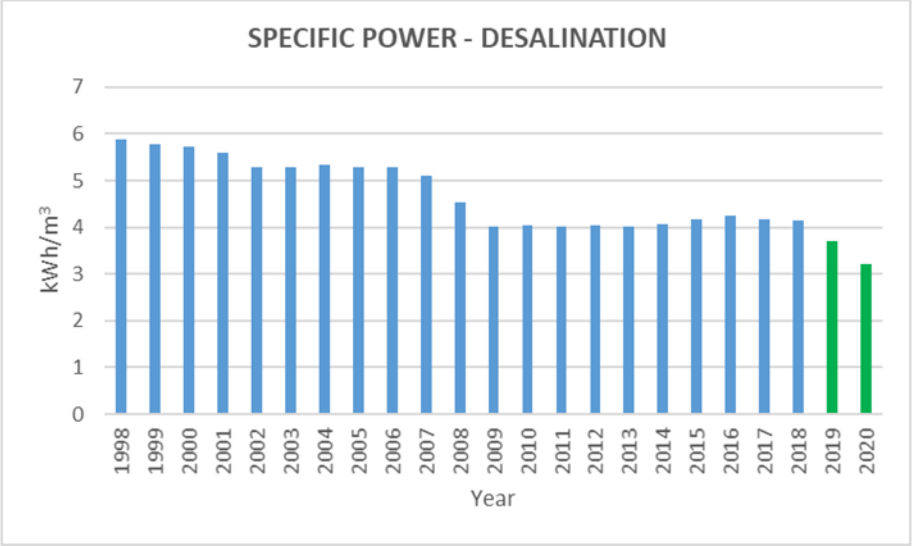
ENERGY EFFICIENCY

Investments in technologies for optimizing energy use in desalination plants:

Energy Recovery:
Desalination takes place in the membranes at a recovery rate of 40-45%. The reject amounting to 55-60% is fed back to the system to recover mechanical energy. Energy recovered can be up to 35-40% with old technology and 50-55% with latest technology.

Management System:
In-house real time decision making system for the production of potable water at the highest levels of efficiency, thus guaranteeing production of potable water at minimum resource cost.





WATER QUALITY

Desalinated water and groundwater are blended in distribution reservoirs – to optimize the quality of water supply.

Infrastructural investments are currently under way to optimize blending capacity and therefore better water supply quality on an island level.

The lower system demand (achieved through leakage management) enabled a reduction in groundwater abstraction and therefore a higher ratio of desalinated water in the blend.

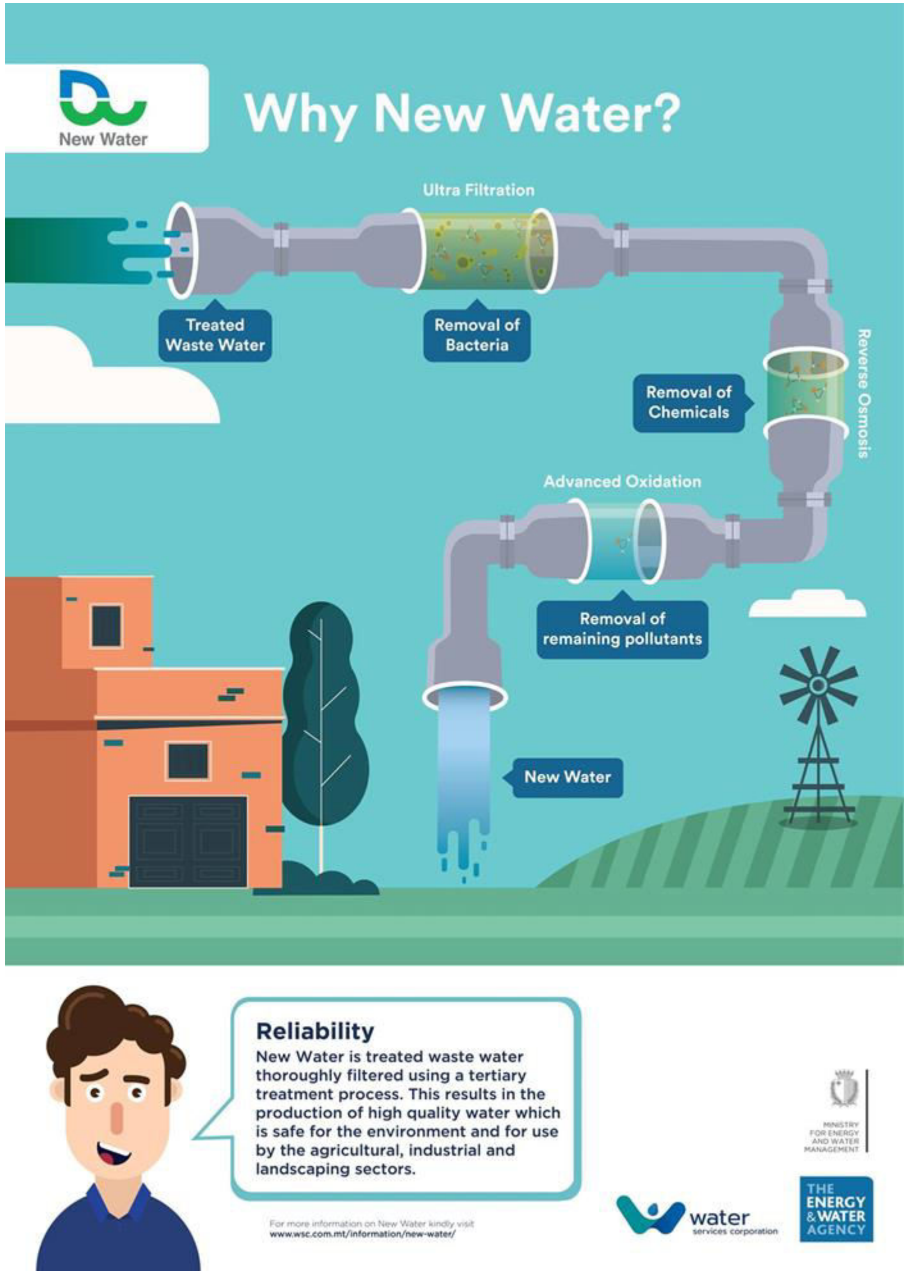
WATER REUSE

Further polishing of treated wastewater to reach quality levels required to ensure its safe use in agricultural irrigation, landscaping, industry and managed aquifer recharge.

Three polishing plants with a production capacity of 7 million m^3 developed as an additional step to the Urban Wastewater Treatment Plants.

Three additional treatment levels – UF, RO and Advanced Oxidation.

Once fully commissioned the project can address around 35% of the water demand of the agricultural sector.

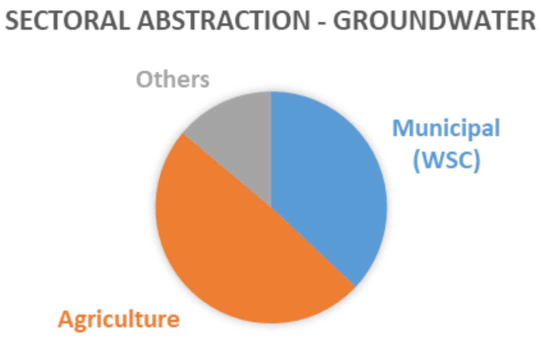


SUSTAINABILITY

Encouraging results in these different segments of the water supply chain highlighted the need for a more comprehensive approach in the planning of the water services provision.

but

A comprehensive approach needs also to consider all water uses, in particular private water use which is almost exclusively addressed by groundwater.



PRIVATE SECTOR

Can only be addressed when its water demand is acknowledged and addressed; and considered within a comprehensive management framework.

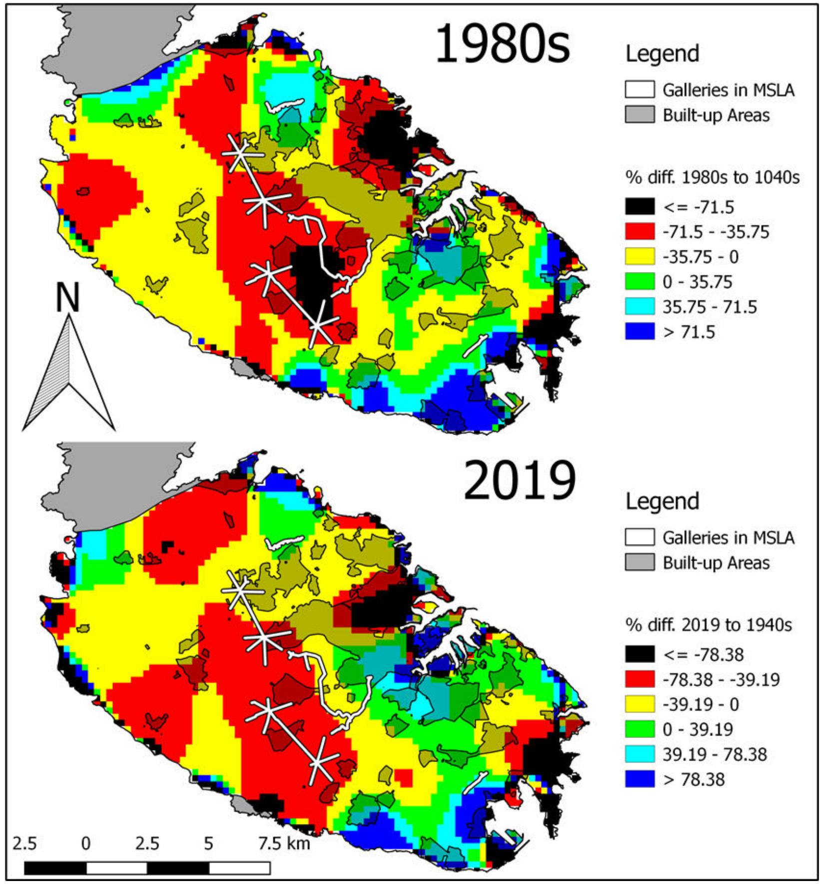
The alternative of water restricting measure will in all probability lead to either the collapse of the sector or to an increase in illegal activities.

Strategy aims at the development of alternative (non-conventional) water resources to diversify water supply resources and enable supply substitution. New Water (reclaimed water) and increased emphasis on rainwater harvesting.

Positive financial incentives:

- New Water is strategically priced lower than the abstraction cost of groundwater
- Grants for the development and restoration of rainwater harvesting infrastructure

Security of supply also facilitates private investment in the sector – including on water efficiency.

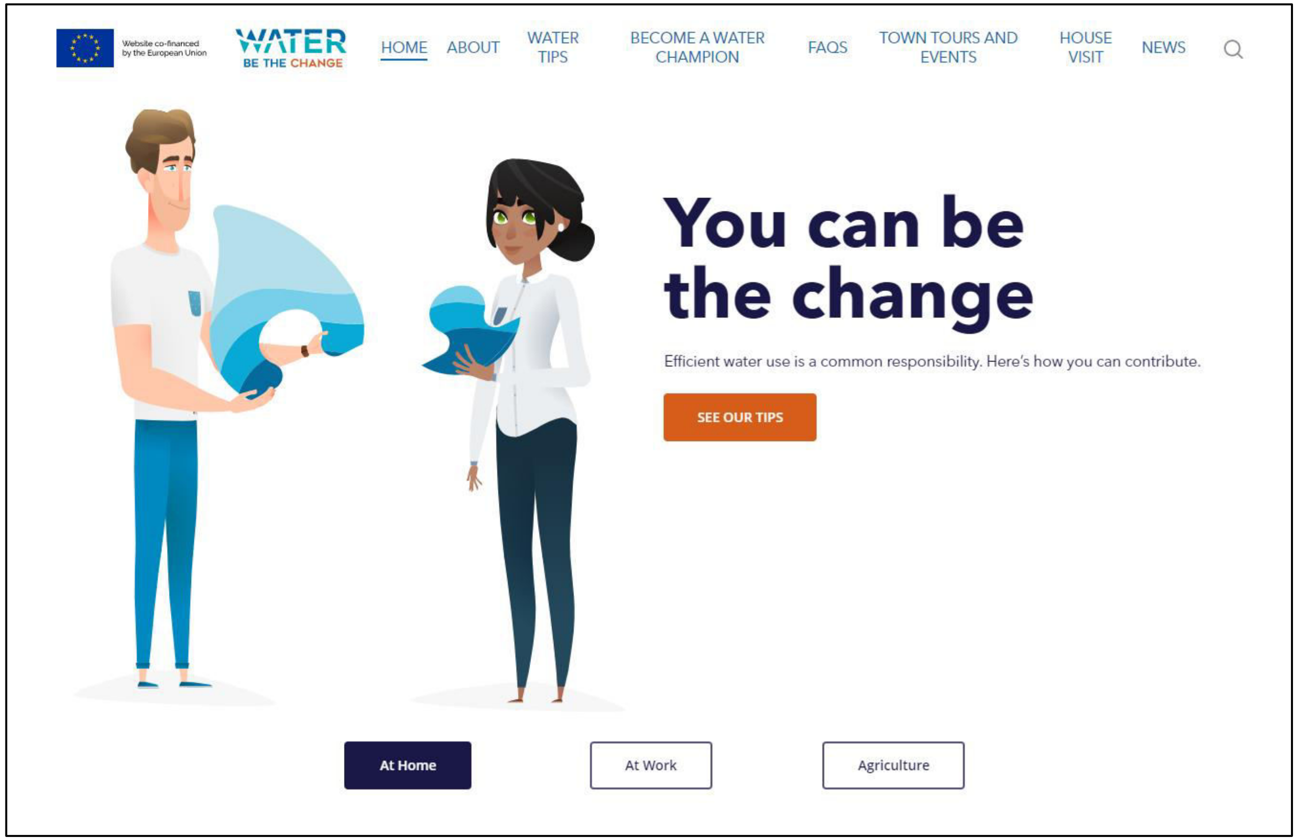


EMPOWERMENT

National Water Conservation Campaign

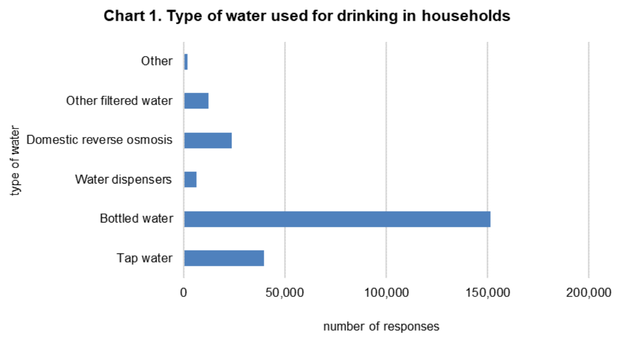
- Strong presence on National Media
- Water Roadshow in all towns and villages (distribution of water saving kits)
- Water Champions Scheme (Domestic, Agricultural and Public Offices)

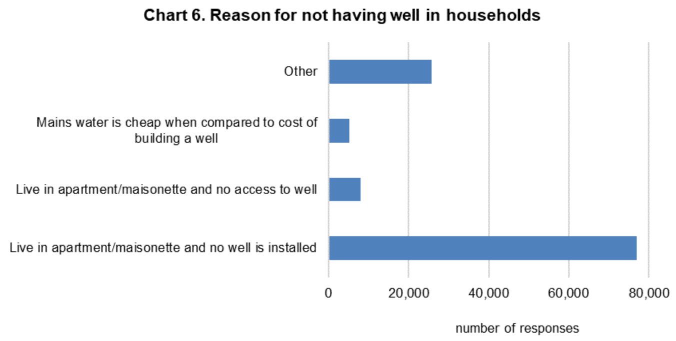
Emphasis that "your contribution" counts.

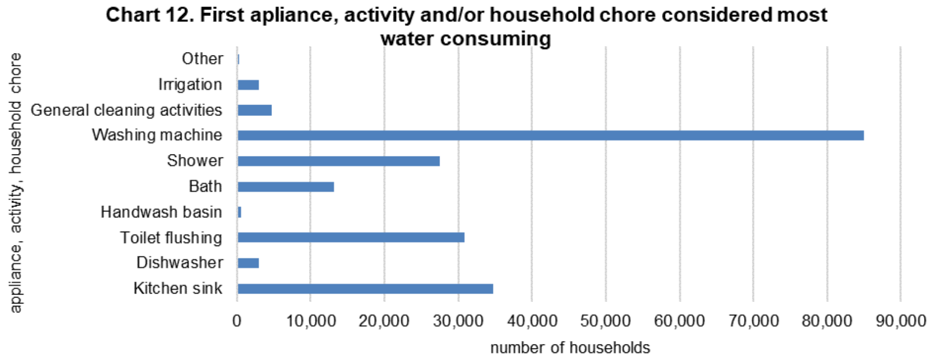


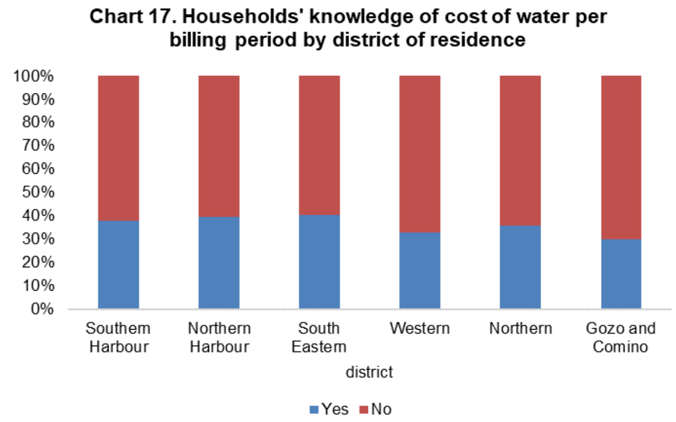
BUT

We need to better understand concerns and expectations of water users – knowing your customer!!





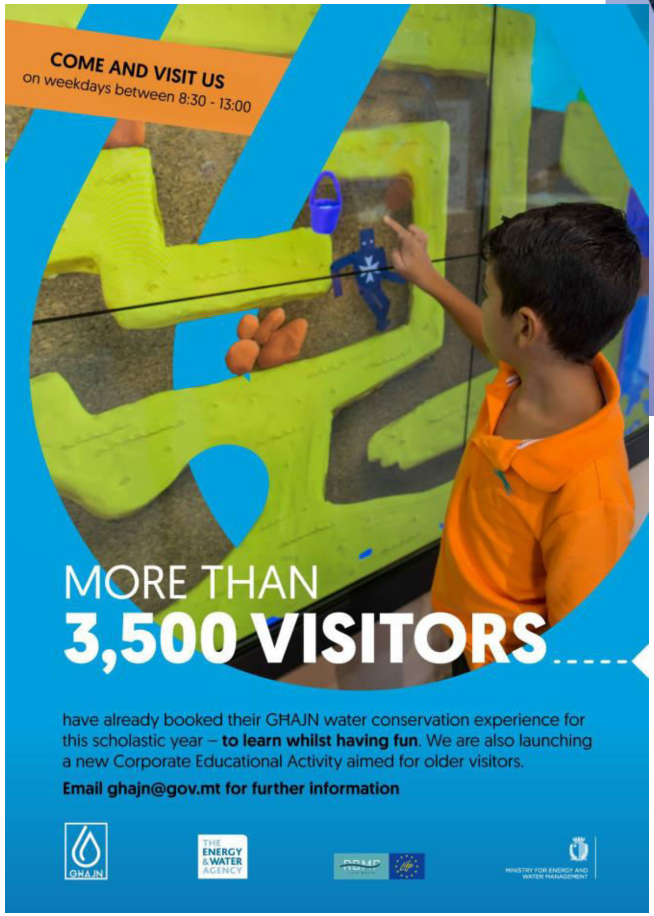




AND

A National Stakeholder Water Table was established bring together the public and the private water sector to discuss issues of concern to water management. Direct and regular engagement with stakeholders.

Establishment of the National Water Conservation Awareness Centre – GHAJN. Educational activities on water (and energy) conservation – interactive and fun.



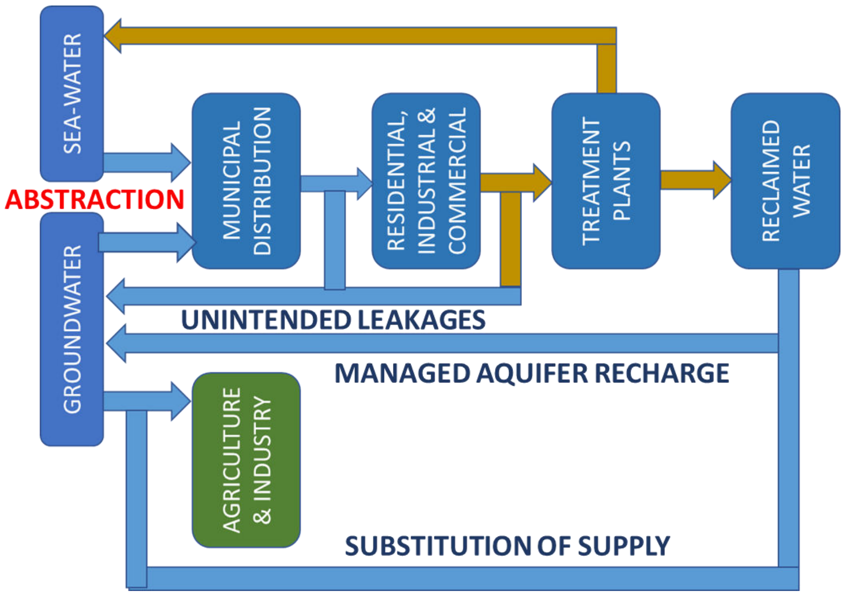
NET ZERO IMPACT

A deep transformation of the role of a water utility, primarily through the inclusion of water reuse in its service portfolio.

(i) Ensuring Security of Supply (so effectively meeting demand)
But
(ii) With the least impact on the water environment by giving back at least an equivalent volume to that abstraction from the aquifer systems

How:

- Intended recharge (MAR)
- Unintended recharge (Leakages)
- Substitution of Supply (Water Reuse)

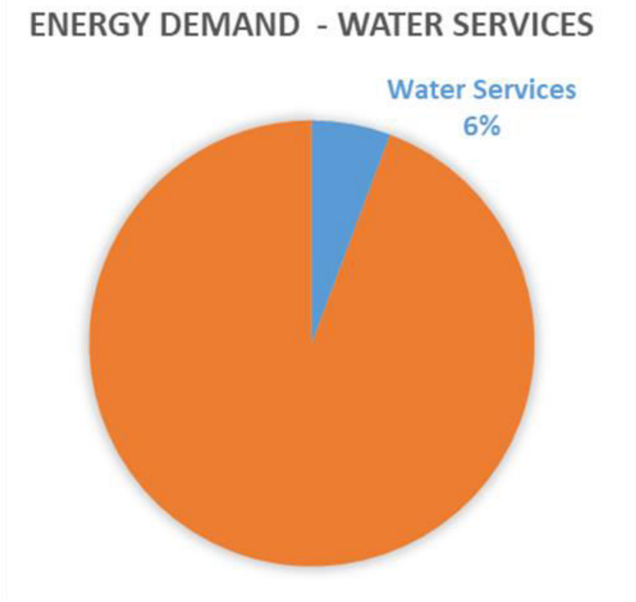


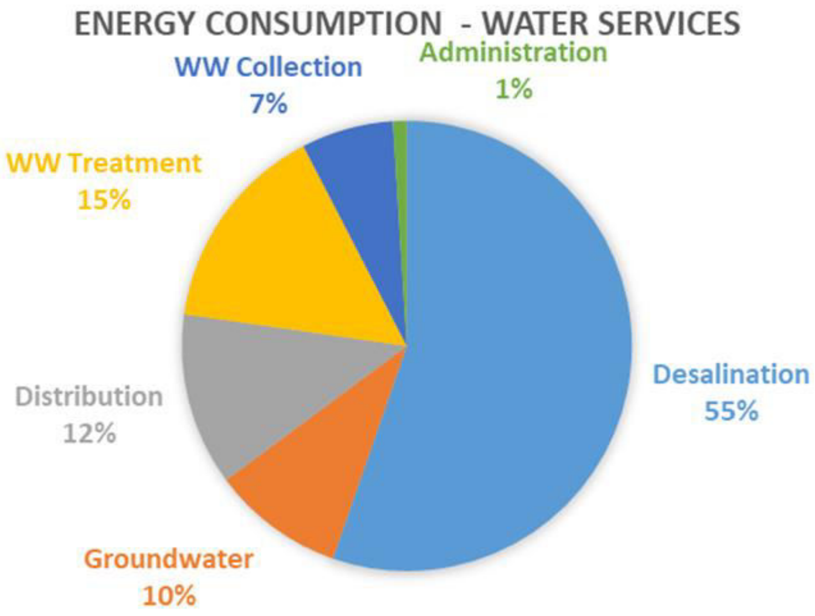
NET ZERO IMPACT

(iii) Increasing consideration of energy use within the whole water services cycle:

- Optimising energy use in water production (sea-water desalination)
- Leakage management (energy savings from lower production needs)
- Reduction of frictional losses in distribution networks
- Avoiding sea-water infiltration in sewers
- Protection of the quality of wastewaters
- Optimising energy use in wastewater treatment

The energy needed for any increase in desalinated water production to address water quality optimization or increases in water demand are to be sourced from savings achieved in the current distribution network.





NET ZERO IMPACT

Main Objectives:

- Reducing the environmental impact of water services provision on the water environment
- Providing consumers with a better quality (including taste) water supply

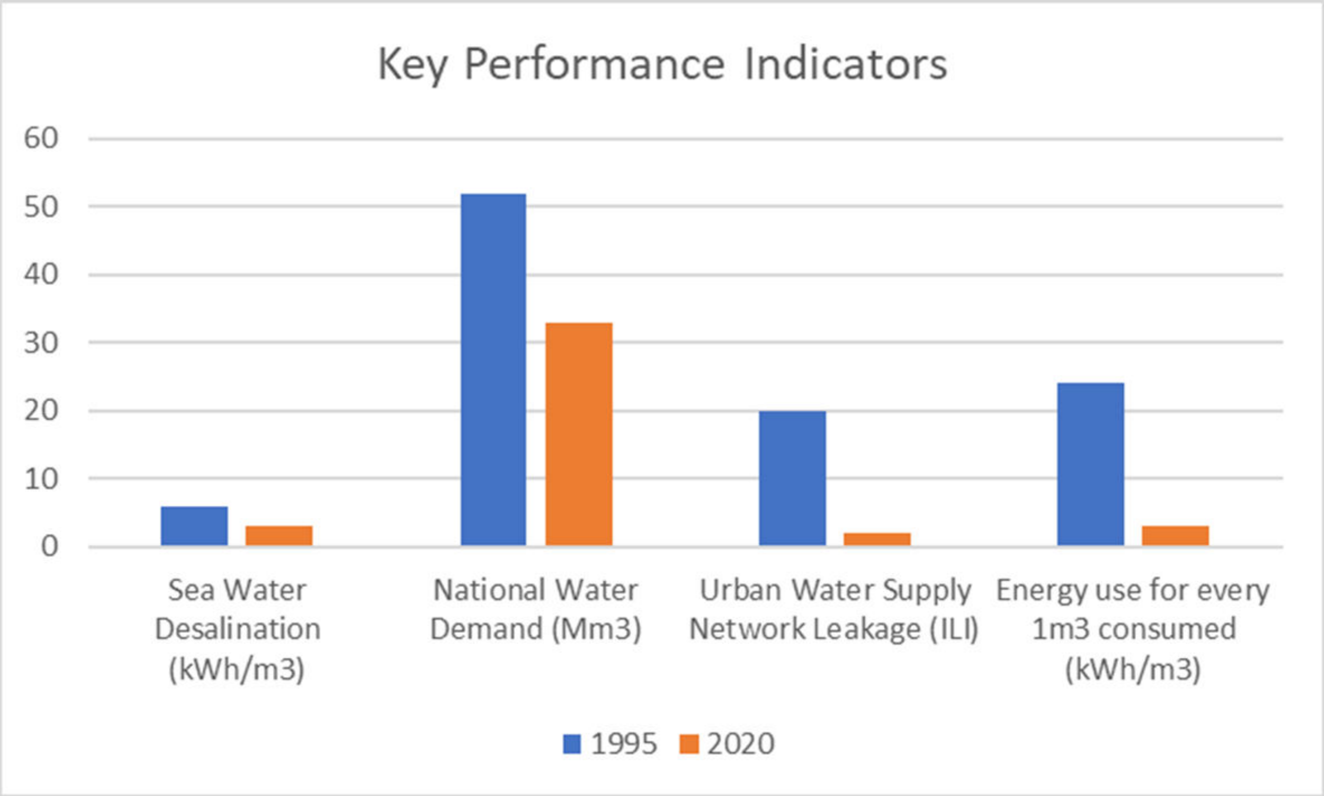
And

Giving the top spot for energy consumption in the home to the fridge!!

KEY PERFORMANCE INDICATORS

Significant reduction in the national water demand through increased efficiency in water use.

Improved operations leading to a significant reduction in the energy requirements for water services provision.



CONCLUSION

Important results have been achieved – but this has to remain an ongoing process.

Key initiatives include:

(i) Improved understanding of the natural water environment – upgrading of hydrological monitoring networks

(ii) Awareness of emerging technologies – desalination, wastewater treatment and reuse

(iii) Optimising engagement with stakeholders – increased relevance to social sciences in hydrology

(iv) Sharing of experiences with islands and coastal regions facing similar challenges to ours

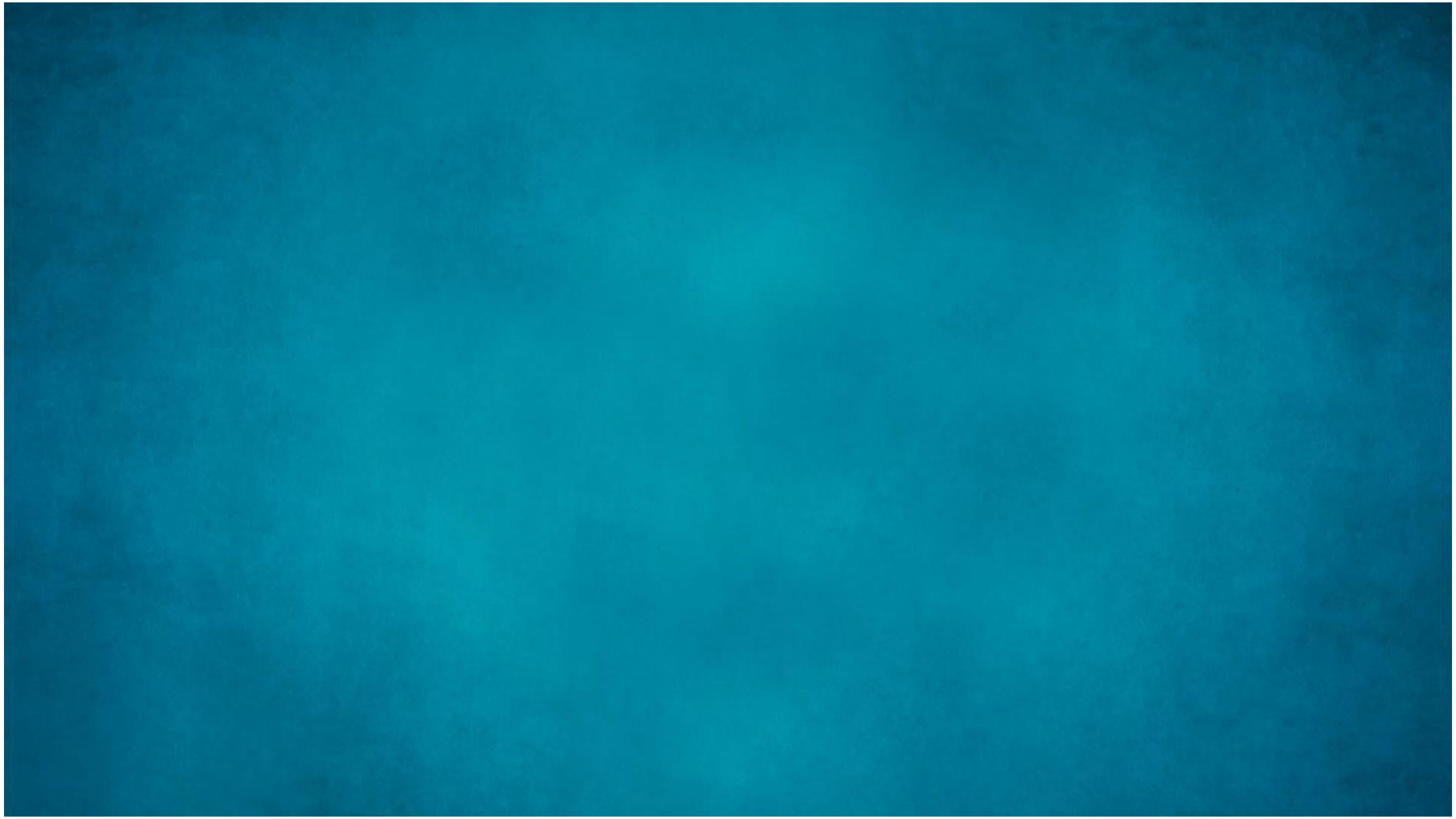
CONCLUSION – UN SDGs

Importance of ensuring that our approach is comprehensive and sustainable.

The Sustainable Development Goals present an opportunity for the development of a tool to assess the cross-sectoral nature of policies.

Important to note that the role of water in the SDGs is not limited to SDG6.

CONCLUSION - SDG Label



CONCLUSIONS

Suggestions:

LIFE RBMP Malta https://www.rbmplife.org.mt/

GHAJN https://www.energywateragency.gov.mt/ghajn/

Chadwick Lakes https://chadwicklakes.mt/

THE ENERGY & WATER AGENCY

https://www.energywateragency.gov.mt/water/