

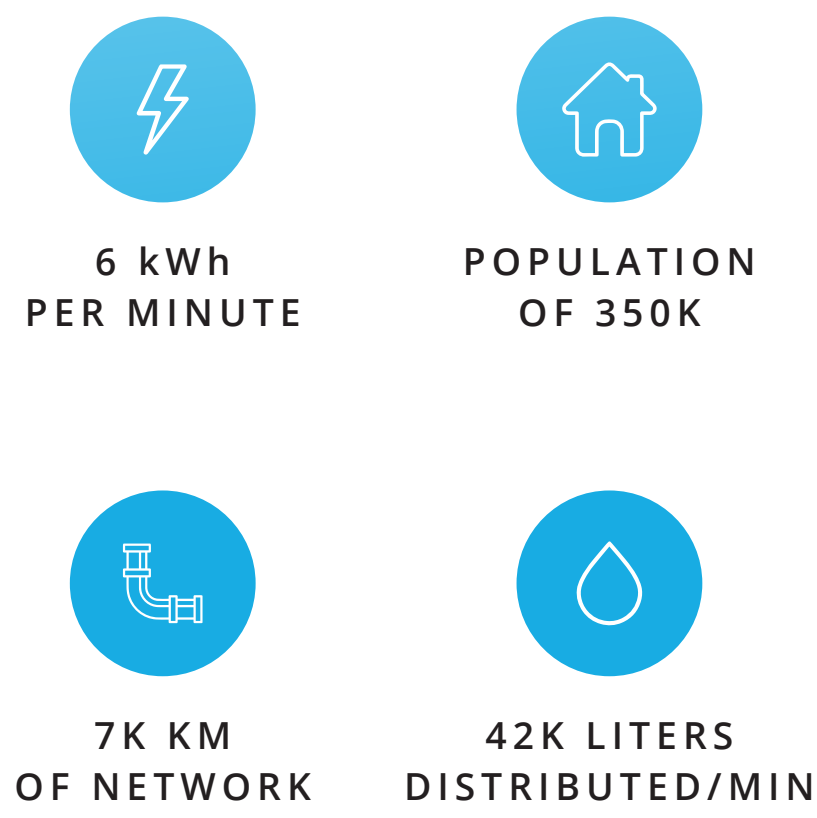
Optimization of Electrical Energy Consumption and Reduction of Carbon Footprint in Water Supply – AdRA’s Case Study

Mário Duarte | AdRA, mario.duarte@adp.pt
Paulo Elísio Sousa | AdRA, paulo.e.sousa@adp.pt
Mafalda Tavares | AdRA, mafalda.tavares@adp.pt
Carlos Póvoa | AdRA, c.povoa@adp.pt

1. ABOUT AdRA

AdRA – Águas da Região de Aveiro, S.A. is a water and wastewater utility that has started its activity in 2010. Since then, it serves a geographical area of 1 500km², and provides its services to 350 thousand inhabitants (about 160 thousand connections).

The company is a public-public partnership that brings together a government owned company (AdP – Águas de Portugal, SGPS, S.A.) with several public local operators (municipalities).

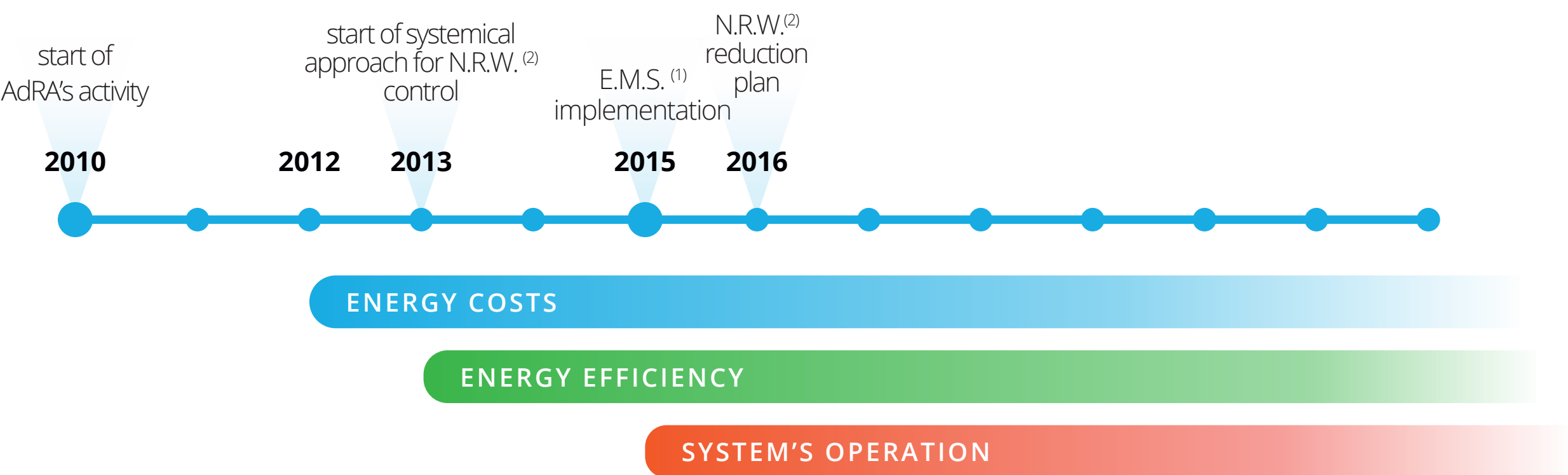


By merging several municipal infrastructures into a regional system, AdRA boosted scale and scope economies, enhancing process optimization and increasing resilience. One of the key areas for optimization was energy management for financial and environmental reasons. AdRA's water supply operations started with nearly 200 facilities connected to the electricity grid, including water treatment plants and pumping stations. By 2020, there were 300 facilities.

2. FRAMEWORK FOR ACTION

From 2012 onwards, optimization of electrical energy consumption of water supply was addressed systematically.

For that purpose, a plan was defined, with three key groups of actions:



ENERGY COSTS

- Energy contracts adjusted to consumption needs;
- Negotiation of energy tariff for more favorable options according to AdRA's needs;
- Modification of pumping schedules to benefit from off-peak electricity tariffs and power factor compensation.

Reactive power compensation, in VGS - Floresta

ENERGY EFFICIENCY

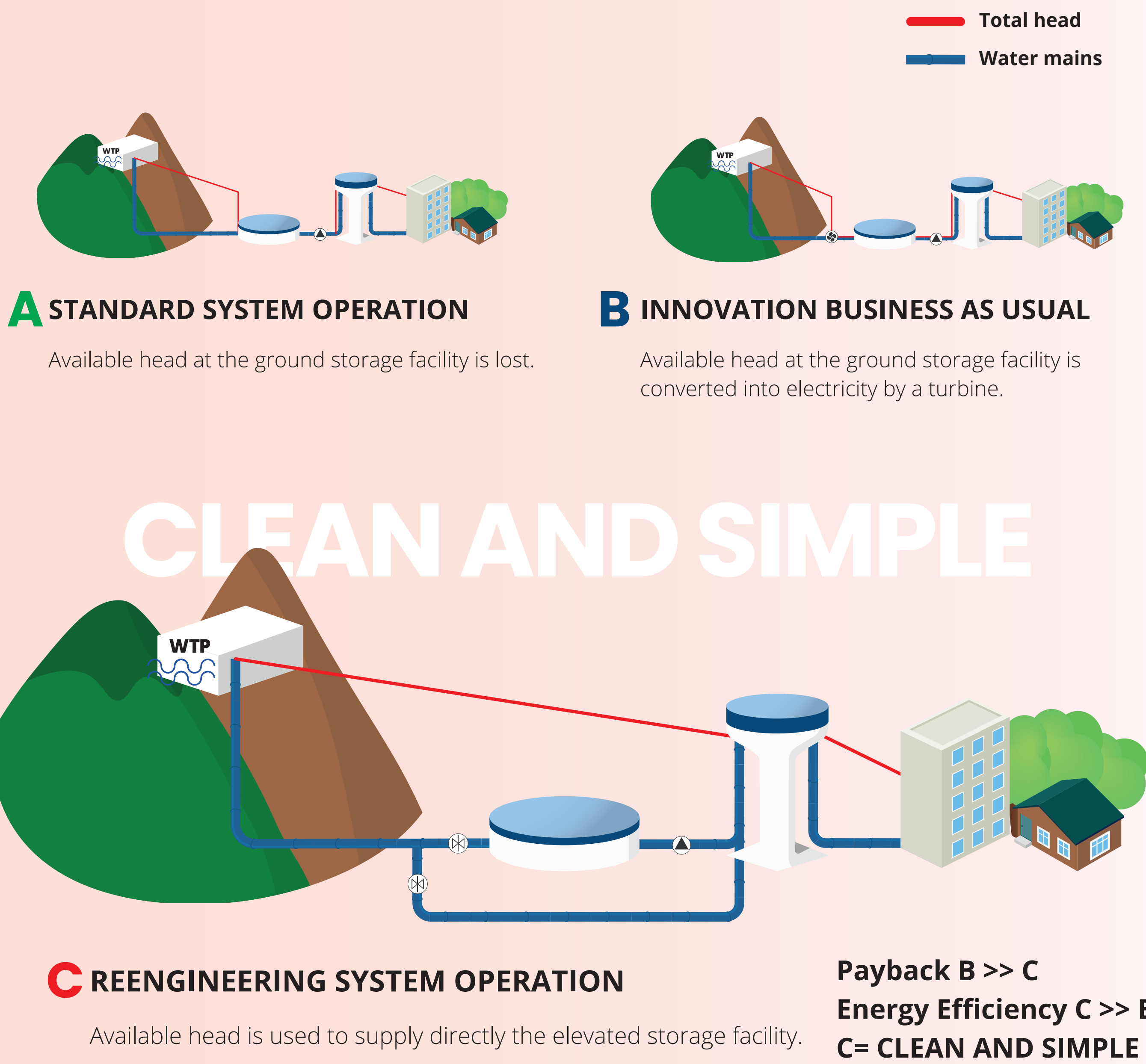
Implementing customized actions by facility, considering their particular needs and energy demands - includes replacing obsolete and inefficient equipment, adapted to the infrastructure's size, location and the water consumption profile of the served area.

Replacement of pumping equipment for better energy performance, in AVR - Cidade

Upgrade of lighting for better energy performance, in AdRA's head office

SYSTEM'S OPERATION

Considering each system as a whole, and looking for opportunities to improve its energy performance - reviewing processes, adapting the existing infrastructures to the new paradigm, balancing investment with benefits in terms of energy consumption, carbon footprint, and keeping excellent service conditions.



3. RESULTS

-48%
of electrical energy consumption per m³

1314 t
of Carbon Footprint (2012 vs 2020)

Between 2012 and 2020, the specific energy consumption dropped by 48%. Carbon Footprint reduced 1314 Tons/year in 2020, when compared with 2012.

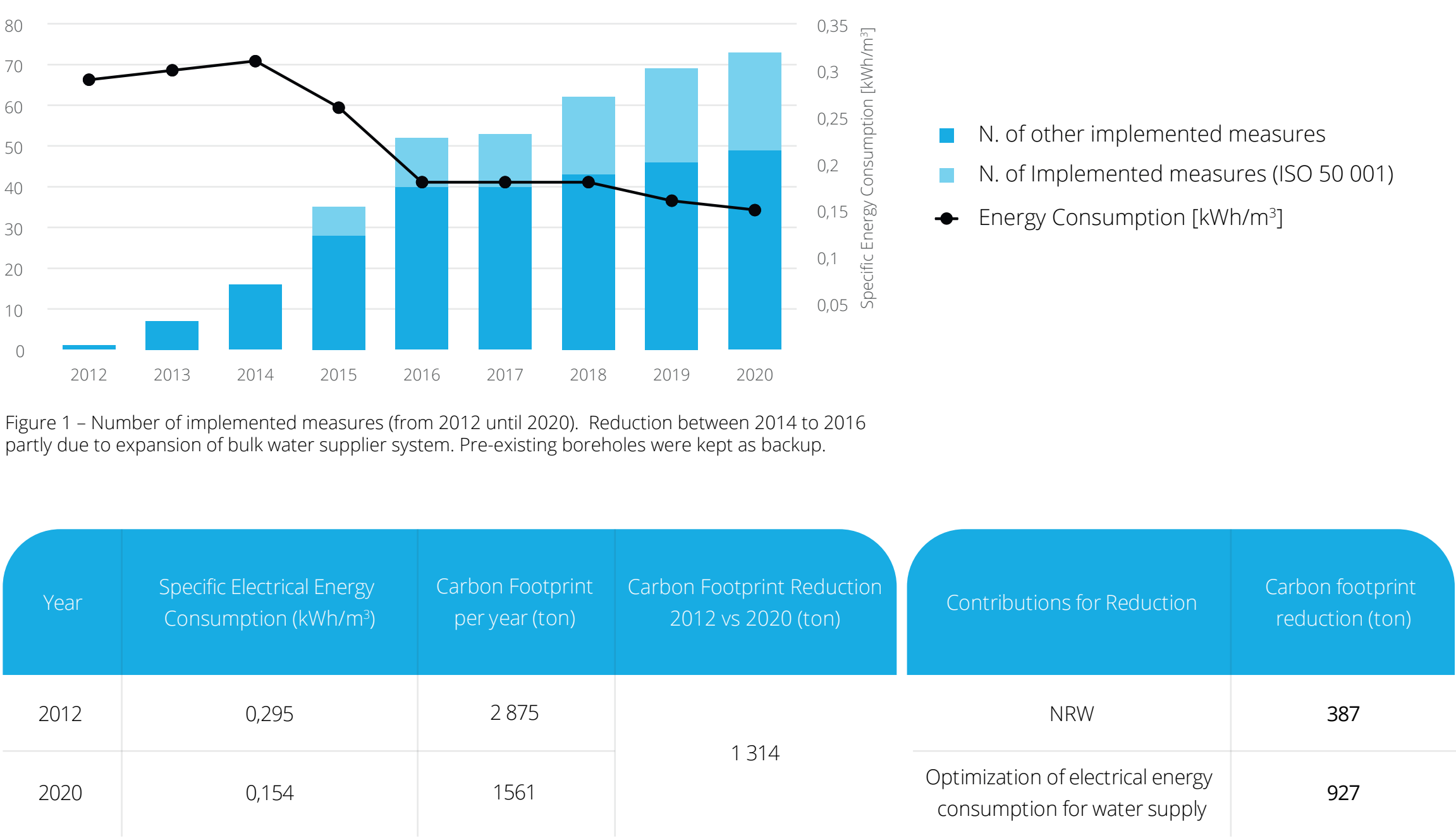


Table 1 – Contribution of the optimization of electrical energy consumption for water supply to the reduction of AdRA's carbon footprint (with 40% of plan accomplished).

These improvements are the result of the systematic implementation of actions related with the three key groups of action.

Furthermore a quality management system brought AdRA a more systematic and broader approach, with top management commitment, continuously improving through conducting energy audits, survey of key indicators, monitoring methodologies, boosting the identification of potential improvements in the facilities and fast definition of action plans.

4. CONCLUSIONS

In 2012, when AdRA started to systematically address energy management, specific electrical energy consumption was 0,295 kWh/m³. In 2020, that consumption came down to 0,154 kWh/m³. This represents a 48% decrease in specific electrical energy consumption, derived from groups of actions 2 and 3. Group 1 actions lead to a decrease in the power bill estimated at 6%. The reduction of the Carbon Footprint per year in 2020, when comparing with 2012, was of more than 1314 tons. Moreover, the effort in recent years to improve energy management has been recognized by the award of an EMS⁽¹⁾ certificate.

Perspective: Extend the Energy Management System to all of AdRA's facilities. The digitalization benefits, such as online monitorization in real time of the facilities, will be fundamental to assure the success of AdRA's energy consumption goals.

Furthermore, a new energy plan is being prepared (2022-2030), to contribute to carbon neutrality by 2030. This plan will be based on the former three groups of action, to which a new one will be added: Renewable Energy Production.

⁽¹⁾ While working on the key areas, AdRA implemented an **Energy Management System in compliance with ISO 50 001**.

⁽²⁾ Non Revenue Water