UNIVERSITÀ DI PARMA

Water resource management plan

2025/2027

2025

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1. INTRODUCTION

This document illustrates the University of Parma's strategies for water saving, efficient use and reuse of water within the University. These actions are part of the broader context of the environmental sustainability policies pursued by the University of Parma, in line with the Sustainable Development Goals (SDGs) of the 2030 Agenda, in particular n. 6 “Clean water and sanitation” and n. 13 “Fight against climate change”. The optimal management of water resources represents a priority for the University, as an essential component of a resilient, efficient and responsible university system.

Given the growing trend in water consumption in the three-year period 2022-2024 (Tab. 2.1), the strategic objective S2 (Contribute effectively and efficiently to the realization of the territorial path towards climate neutrality) has been included in the new strategic plan of the University, 2025-2030, which contains a strategic action dedicated to their reduction (Progressively reduce the environmental and climate impact of the University, reducing energy and water consumption, climate-altering emissions and waste production, encouraging recycling and reuse), monitored through the IS22 indicator - number of interventions implemented to reduce drinking water consumption through recovery and use, which refers to the RUS RR_3 indicator.

In compliance with this political direction, this **water resource management plan** has been drawn up, which represents an operational and strategic tool, to be updated and perfected over time, in order to guide the University's design, management and training choices towards increasingly sustainable and circular management of the water resource. It aims not only to reduce consumption, but also to promote a conscious, participatory and proactive water culture. To this end, the document is not limited to listing individual technical actions, but proposes an integrated approach that includes: the systematic collection of consumption data, the adoption of low impact technologies, the reuse of rainwater, the prevention of losses and a strong cultural action aimed at the entire university community.

The plan constitutes a reference document for the evaluation of the University of Parma, with regards to water resources, in international sustainability rankings, such as the GreenMetric World University Ranking.

2. UNIVERSITY WATER CONSUMPTION IN THE THREE-YEAR PERIOD 2022-24

Water consumption data is collected at the main measurement points installed in the water networks of the various university campuses, both via meters installed in collaboration with the utility IREN and from measurement devices in some buildings on the Science and Technology Campus. The Science and Technology Campus, the University Hospital, and the historic buildings in the city center have substantial differences in their plumbing systems, due to their different building types.

The data for the three-year period 2022-24, shown in Table 2.1, were collected on a monthly basis and aggregated annually for the various University sites, in order to identify the main consumption areas and plan targeted interventions.

Overall, there was an increase in water consumption in the three-year period 2022-24, although this increase was lower than the 2018 baseline consumption, the starting point for the Concession contract for the Management of Energy and Multi-Technological Services at the University of Parma's buildings through an "EPC" - Public-Private Partnership (PPP) Proposal (Part IV - Article 183, Paragraph 15 of Legislative Decree No. 50/2016), which included monitoring and efficiency objectives.

The 2022 data are estimated based on the data reported in the invoices issued by the supplier, obtained as a projection of consumption data for 2021, a year still impacted by the Covid-19 pandemic and the resulting low utilization of facilities (this consideration applies to all sites, with the exception of the hospital complex, due to obvious occupancy reasons during the pandemic). This is particularly

true for the Biotechnology complex on Via Volturno, where the years 2023, 2024, and 2025 are consistent with each other and, in any case, show consumption approximately 17% lower than the 2018 baseline.

The distributor is gradually replacing metering units with remote-readable devices that allow real-time readings, including by the supplier.

At some locations, primarily in the historic center, there is a downward trend, the result of progressive redevelopment projects; noteworthy is the 27% drop recorded at the University Headquarters building, attributable to optimization efforts.

The buildings with the highest consumption are the Science and Technology Campus and the University Hospital, where the buildings primarily used for applications and research are located. In the former, where the largest energy, seismic, and fire prevention upgrades are concentrated, water consumption increased by 39% in the three-year period under review (though still approximately 20% lower than the rif_2018 baseline). During the same period, the hospital recorded a 6% decrease.

The third largest sector, in terms of consumption, is the "D'Azeglio-Kennedy" facility, with values increasing by 34% in 2024 compared to 2022, the year in which energy and fire prevention upgrades were carried out, including water-consuming construction and plant engineering works.

The doubling of consumption observed at the Veterinaria facility (+99% in the three-year period) is attributable, in addition to the significant ongoing construction work, to checks and implementations on the distribution and supply side (a malfunction was detected in one of the three metering units present in 2022, which has now been replaced with a single metering unit and a complete overhaul of the facility's internal distribution network). The years 2023 and 2024 are consistent.

	Annual consumption m^3			Difference compared to 2022			% difference compared to 2022		
	2022	2023	2024	2022	2023	2024	2022	2023	2024
01 - Headquarters - Via Universitità 12	3.672	3.611	2.675	-	- 61	- 997	0%	-2%	-27%
06 - D'Azeglio-Kennedy Complex	6.541	7.904	8.796	-	1.363	2.255	0%	21%	34%
07 - San Michele Complex	1.542	997	1.131	-	- 545	- 411	0%	-35%	-27%
09 - Borgo Carissimi Complex	1.694	1.570	1.741	-	- 124	47	0%	-7%	3%
10 - Polyclinic - University Hospital	23.144	14.801	21.721	-	- 8.343	- 1.423	0%	-36%	-6%
13 - Science Campus	54.558	60.430	76.030	-	5.872	21.472	0%	11%	39%
14 - Department of Veterinary Medical Sciences	3.925	7.197	7.801	-	3.272	3.876	0%	83%	99%
16 - Pilotta Complex	92	88	86	-	- 4	- 6	0%	-4%	-7%
18 - Botanical Garden Complex	138	229	202	-	91	64	0%	66%	46%
19 - Former San Francesco Prison Complex	1.404	1.071	933	-	- 333	- 471	0%	-24%	-34%
21 - Integrated Biotechnology Center - Via Volturno	840	3.398	3.836	-	2.558	2.996	0%	305%	357%
24 - Valserena Abbey Monumental Complex	854	426	287	-	- 428	- 567	0%	-50%	-66%
Totale	**98.404**	**101.722**	**125.239**	**-**	**3.318**	**26.835**	**0%**	**3%**	**27%**

Table 2.1 University water consumption

3. ADVANCED MONITORING SYSTEM

A fundamental requirement for any plan to improve the University's water system is the availability of consistent data, collected on a regular and frequent basis. This data allows for the proper assessment of the impact of network improvements, aimed at proactive and sustainable management of water resources within the University, with positive impacts also in terms of cost reduction, management transparency, and resource optimization. Consequently, starting January 1, 2025, the installation of an advanced, centralized water consumption monitoring system began with the installation of new

meters for real-time measurement on all main distribution lines. The new tools enable the automated collection of data at a high frequency, the transmission of readings to dedicated platforms, predictive consumption analysis, and early identification of any leaks or anomalous use. The new monitoring system is expected to be completed within the current year.

4. WATER SAVING AND EFFICIENT WATER USE

Mitigating the University's environmental impact in terms of water consumption requires, as a first and essential measure, reducing consumption. This can be achieved technically through interventions on water dispensers and toilet cisterns, and through the rapid identification and repair of leaks in the network.

4.1 Installation of new water dispensers

In the second half of 2024, the University conducted a technical assessment of the installation of low-flow water dispensers or timed faucets in public restrooms across the University's various facilities. These faucets automatically shut off the flow after a predefined time, thus preventing waste due to forgetfulness or mechanical malfunctions. For the first solution, the market analysis did not identify suppliers capable of guaranteeing the necessary certifications regarding legionella prevention and the absence of long-term clogging risks. Therefore, the decision was made to gradually install timed faucets, which will begin in January 2026, one year after the implementation of the new automatic consumption monitoring system. This will allow the actual effectiveness of the measure to be assessed through a comparative analysis of the pre- and post-installation values of the new faucets, with precise estimates of the achieved savings.

4.2 Double flush toilet bowls

Starting in 2021, the facility manager (SIRAM) began a campaign to replace existing cisterns with dual-flush models. This solution allows for an average reduction of 30–50% in water volume per flush, depending on the frequency of use of the "economy" mode. By July 2025, the percentage of dual-flush cisterns had reached 30% of the total number of toilet cisterns at the University. This percentage will progressively increase over the coming years until the replacements are completed.

4.3 Network Loss Management

Since 2017, through analysis of hourly consumption curves and targeted inspections, 13 hidden water leaks have been identified in the internal distribution networks of university buildings. Timely repairs have generated estimated water savings of over 80,000 liters per year, corresponding to an overall economic benefit (based on 2024 rates) of approximately €300,000. Starting in 2026, with the completion of the new integrated real-time monitoring system, prevention can be extended through a structured predictive maintenance program, based on automatic notifications of abnormal consumption from sensors distributed throughout the systems. This approach will further reduce waste, improve network resilience, and ensure more sustainable management of water resources.

5. WATER REUSE

As part of sustainable water resource management, the University of Parma has conducted a series of planning studies for the reuse of rainwater from building roofs for irrigation and toilet flushing, including with the involvement of students through degree theses (Terzi, 2022). Following these studies, a design review of the seismic improvement interventions currently underway for the "Engineering Teaching Office" and "Earth Sciences" buildings was conducted, incorporating rainwater

collection capacity. Specifically, in the first case, the construction of two underground storage tanks, each with a capacity of 40 m3, was planned for rainwater collection. These tanks will be integrated into a reuse system for irrigation of the green wall planned for the south façade, the surrounding green areas, and potentially for toilet flushing. In the second case, the construction of one underground tank with a capacity of 16 m3 was planned for irrigation of the green walls planned for the façade. Furthermore, an intervention is being planned at the Department of Veterinary Medical Sciences, building 14.05, former surgery and radiology site: 1 underground tank with a capacity of 9 m3 for irrigation of green areas and toilet flushing.

6. COMMUNICATION AND AWARENESS RAISING

Alongside technical interventions, communication, environmental education, and active involvement of the university community are key pillars for the effectiveness of sustainable water management strategies. User awareness is crucial for achieving concrete and lasting results in reducing consumption and preventing waste. To ensure the success of the planned technical measures and promote virtuous behavior among the university community, an integrated communications strategy will be implemented starting in 2026, including the actions listed below.

i. Information campaigns

Creation of a graphic identity and common slogans for water-saving initiatives. Production of simple and accessible visual materials (posters, stickers, infographics) to be installed in restrooms, laboratories, and common areas, with messages on:

- the importance of water resources,
- behaviors to avoid (leaving taps open, excessive flushing),
- ongoing actions by the University.

ii. Web pages and digital communication

Activation of a dedicated section on the "Sustainable University" website, with updated data on water consumption, maps of ongoing interventions, best practices, and reports. In parallel, short content will be produced for the University's social media (posts, reels, animated infographics) to publicize the University's water collection and reuse systems.

These actions, in synergy with the technical interventions envisaged in the plan, are essential for developing a widespread culture of sustainability, promoting responsible behavior among the entire academic community, and enhancing the University's commitment in international rankings.

7. SHORT, MEDIUM AND LONG TERM OBJECTIVES

The implementation of the strategic action "*Progressively reduce the University's environmental and climate impact by reducing energy and water consumption, climate-altering emissions and waste production, promoting recycling and reuse*", envisaged in the strategic objective S2 (*Contribute effectively and efficiently to the implementation of the territorial path towards climate neutrality*) of the University's strategic plan, 2025-2030, presupposes the implementation of a challenging set of interventions, which can be summarised as follows:

- short term
  - completion of the advanced monitoring system;
  - completion of the rainwater collection systems in the Engineering Education and Earth Sciences buildings;
  - launch of the communications campaign.
- medium term

- completion of the installation of timed faucets;
- implementation of the rainwater collection system at the Department of Veterinary Medical Sciences, building 14.05, formerly the surgery and radiology department;
- creation of a dedicated section on the "Sustainable University" website, containing updated data on water consumption, maps of ongoing projects, best practices, and reports;
- planning of additional rainwater collection projects from roofs and reuse for irrigation of green walls and/or gardens, and toilet flushing, in University buildings where this is possible, giving priority to those where new construction sites will be opened for seismic retrofitting.

- lungo termine
  - realizzazione degli ulteriori interventi di raccolta acque piovane provenienti dalle coperture degli edifici e loro riuso a scopi irrigui e per gli scarichi dei WC;
  - progettazione e realizzazione di ulteriori sistemi di accumulo acque piovane provenienti dalle coperture fotovoltaiche che saranno istallate nelle aree adibite a parcheggio.
- long-term
  - implementation of additional rainwater collection systems from building roofs and reuse for irrigation and toilet flushing;
  - design and construction of additional rainwater collection systems from photovoltaic roofs that will be installed in parking areas.

8. MONITORING INDICATORS

To objectively assess the effectiveness of the actions outlined in the Water Management Plan and ensure transparent and continuous measurement of the results achieved against the objectives, the indicator set out in the University Strategic Plan will be integrated with the following set of additional monitoring indicators:

- total water consumption, calculated on an annual basis and broken down by University location;
- percentage of buildings equipped with water-saving devices (timed faucets, dual-flush tanks, etc.);
- number and volume of available rainwater collection systems, broken down by University location;
- number of water leaks detected through the monitoring system and repaired;
- number of businesses and users involved in training, information, or participatory activities on sustainable water management;
- UI GreenMetric score in the "Water" section, with the goal of progressive improvement;
- percentage reduction in consumption compared to 2022, the year used as the baseline.

9. BIBLIOGRAPHICAL REFERENCES

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The University Water Resources Management Plan 2025-2027, for the year 2025, was prepared by the Sustainable University Group, Climate Change and Water Resources subgroup.

The **Board of Directors approved** it with resolution dated **30.10.2025**, with the favorable opinion of the **Academic Senate** expressed with resolution no. **121** dated **28.10.2025**.

Università di Parma
Via Università 12 - 43121 Parma
Tel. +39.0521.902111
www.unipr.it