Using water responsibly

3-3 | 303-1 | 303-2 | 303-3

The responsible use and conservation of water resources are fundamental guarantees for the protection of natural habitats and for the wellbeing of the people around us who use the ecosystem services provided by these resources, as well as being essential for the success of our own activities, which also depend to a significant extent on the responsible use and conservation of water resources. For this reason, the responsible use of water has been included among the strategic objectives of our environmental policy and is pursued using an integrated management approach.

The preliminary analysis of environmental risks and opportunities, conducted based on the TNFD criteria and reported in the chapter "Identification of impact factors and dependencies on nature and biodiversity", particularly highlighted the materiality, for some energy generation technologies, of impacts linked to the use of water resources, above all fresh water and particularly in areas with high water stress, where competition between natural and human needs is greatest.

Specifically, the main impacts are above all linked to water withdrawal mainly for industrial purposes. Water is largely used in thermal and nuclear generation, for the cooling of thermal cycles and for operating atmospheric emission abatement systems. Overall water requirements for generation are covered, where available, through withdrawals from so-called "non-scarce" sources (mainly including sea water, which is used as-is in open cycle cooling processes and subjected to desalination to obtain industrial water) and, where necessary, from "scarce" sources, represented by surface water, groundwater and water for civilian use. To minimize these withdrawals, as well as maximize the restoration of internal wastewater, Enel uses, where available, treated wastewater supplied by water management consortia.

The main dependencies are instead attributable—in addition to the aforementioned needs of thermal plants—to hydroelectric plants, which, despite having negligible water consumption, depend for their operation on the water cycle which, through rainfall and the melting of snow, constantly replenishes surface watercourses (for further information, see the following paragraph "Responsible and integrated management of water catchment areas").

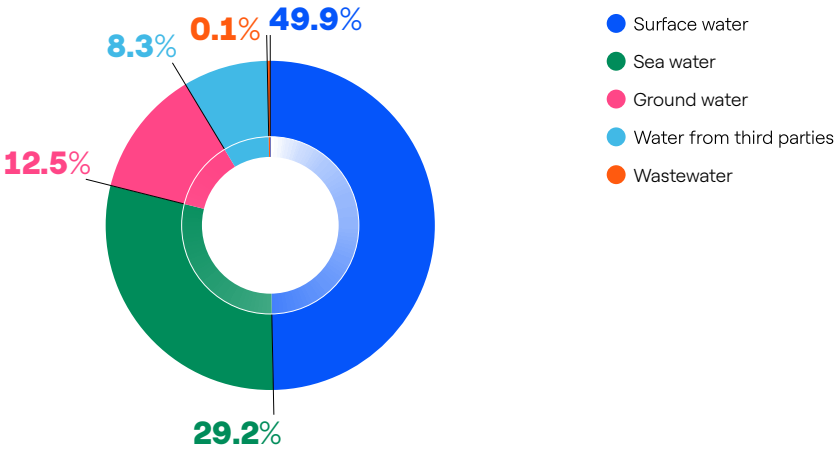
Efficient use of water resources

In 2022 total consumption of process and cooling water in a closed cycle[22] was approximately 76.0 x10^3 ML, a moderate increase compared to the 2021 figure[23] (73.1 x10^3 ML), due to the ongoing international energy contingency and the consequently greater need for electricity generation from coal-fired plants (which are expected to be closed by the end of 2027). As for the specific water requirement,[24] in 2022 it was 0.27 l/kWh, slightly down on 2021[25] (0.29 l/kWh), despite the moderate increase in consumption volumes, thanks to the simultaneous growth of the renewable generation park.

Enel is constantly committed to progressively reducing the specific need for water for its plants and assets, through the efficient use of water in existing thermal plants, the evolution of the energy mix towards renewables, and the progressive reduction of generation from fossil fuels. Among the efficiency measures, particular attention is paid to maximizing the recovery of process wastewater leaving treatment plants and to measures to increase the efficiency of cooling systems and evaporative towers, by upgrading the control and recovery systems of the drains. Other important optimization interventions concerned the use of crystallizers,[26] a technology that allows the complete reuse of waste water in the production cycle, eliminating its discharges (ZLD – Zero Liquid Discharge plants). Finally, great importance is given to the reuse of rainwater collected in plant areas, which cannot be returned as-is to natural receptors as it is potentially contaminated by contact with industrial surfaces. This water is stored in special storage tanks and reused in the generation processes, thus further helping to reduce the environmental footprint of our generation sites.

Measures to improve efficiency in the use of water also make it possible to minimize water effluent as well as total consumption, which are respectively 30.8 x10^3 ML and 45.2 x10^3 ML.

Water withdrawal by source 2022 (76 x10^3 Mega liters)



(22) The waters used for open cycle cooling are reported separately among the environmental indicators. They are not taken into consideration here in assessing the efficient use of the water resource, as they are returned in full to the natural receptors, without substantial changes in quality, apart from a slight increase in temperature, subject to authorization and continuous control in order to guarantee the absence of measurable impacts on exposed ecosystems.

(23) The total value of process and closed-loop cooling water withdrawal for the year 2021 was recalculated following the refinement in 2022 of the way in which water withdrawn for cooling purposes at certain nuclear power plants in Spain was calculated.

(24) Water needs are constituted by all the water withdrawal quotas from surface (including recovered rainwater) and groundwater sources, by third parties, from the sea and from wastewater (quota for third party procurements) used for processes needs and for closed-cycle cooling, except the quota of seawater discharged back into sea after the desalination process (brine). This latter item (brine) contributes to the total quota of withdrawals.

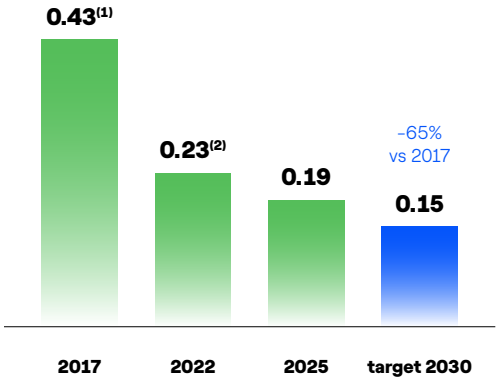
(25) Value also recalculated to take into account the reclassification of the cooling cycles of some nuclear power plants in Spain.

(26) Crystallizers or SEC plants, named after Softening, Evaporation and Crystallization processes.

The new target for reducing specific fresh water withdrawal and the focus on water-stressed areas

Starting this year, Enel has renewed and relaunched its commitment to conserving water resources by adopting a new, even more challenging target aimed at reducing specific withdrawal of fresh water.

Specific fresh water withdrawal (l/kWh)



(1) Value recalculated net of corporate deconsolidations as at December 31, 2022.
(2) The value for the year 2022 recalculated net of previous corporate deconsolidations is 0.22 l/kWh.

The target set by the Group for 2030 is a 65% reduction in specific withdrawal of fresh water compared with the base year 2017.[27] As already stated, both in this case and as regards the Group's GHG emission reduction targets, the baseline value for 2017 was recalculated to take into account the deconsolidations that took place in the reporting period (see the chapter "Zero emissions ambition").
The new target of reducing specific fresh water withdrawals, turning attention to the most valuable and vulnerable water resource, testifies to the even more explicit commitment to the protection of natural habitats and the needs of local communities. The objective takes into account future developments envisaged by the European legislation on sustainability reporting standards (proposed standard EU EFRAG ESRS-E3 "Water and marine resources"), and the results of the risk and priority analysis carried out at Group level in line with the main international standards being defined (TNFD and SBTN).
The commitment is pursued through the definition, at Group level, of common strategies and specific objectives, which are implemented locally through the adoption of Environmental Management Systems on all assets for which the resource is material, as well as through water management plans for hydroelectric plants combined with continuous improvement programs shared with local stakeholders (dam authorities, local administrations, control bodies, citizens' committees and NGOs). The measures of impact mitigation and improvement, defined in the management plans, are linked to the guarantee of minimum vital flow and the protection of habitats (see the specific websites of the Environmental Authorities of the various Countries where the group is present).
During 2022, a total of 52.7 x10^3 ML of fresh water was withdrawn for process and closed-loop cooling uses, a slight decrease compared with 2021 (55.5 x10^3 ML), with the specific fresh water withdrawal value at group level standing at 0.23 l/kWh (down on last year's value of 0.25 l/kWh).
Enel also pays particular attention to the vulnerability of the resource, by mapping and constantly monitoring all generation sites located in areas classified as **water-stressed areas**. Mapping of generation, thermal, nuclear and renewable sites falling within water-stressed areas is done in line with the criteria of GRI 303 (2018) with reference to the conditions of "(baseline) Water Stress" indicated by the World Resources Institute Aqueduct Water Risk Atlas.[28]
Among the sites mapped, those defined as "critical" are those positioned in water-stressed areas and which procure significant volumes[29] of fresh water. For these sites, which are specifically thermoelectric and nuclear plants that use water resources for process and closed-cycle cooling needs, water management methods and process performance are constantly monitored, in order to minimize consumption and favor withdrawals from sources of lower quality or which are non-scarce (wastewater, industrial or sea water).
The percentage of water withdrawn in water-stressed areas was approximately 19.3% of total withdrawals in 2022 (23% in 2021). In particular, fresh water withdrawals in water-stressed areas amounted to 12.4 x10^3 ML, generated by 7 significant plants, with an 18% reduction compared with the 2021 value (15.3 x10^3 ML), thanks to optimization actions and the reduced generation of some gas plants located in areas with high water stress.

(27) The values of which have also in this case been recalculated to take into account the corporate divestitures that have taken place in the intervening years, as was done for CO_2 emissions, waste and other atmospheric emissions.
(28) GRI 303 defines "water stressed" areas as those in which, based on the classification provided by the WRI Aqueduct Water Risk Atlas, the ratio, referred to as "baseline water stress", between total annual surface and groundwater withdrawals for different uses (civil, industrial, agricultural and livestock) and the renewable water supply available annually is high (40-80%) or extremely high (>80%). By way of greater environmental protection, those plants located in areas classified by the WRI as "arid" due to the unavailability of water are also considered as located in water stressed areas.
(29) Plants with withdrawals greater than 100 m^3/year are included.

The specific withdrawal of fresh water in water-stressed areas was 0.12 l/kWh in 2022 (0.16 l/KWh in 2021), lower than the general Group value shown above, demonstrating the Company's priority commitment to adopting, in water-stressed areas, renewable technologies (solar and wind) that do not require significant quantities of fresh water or, in the case of thermoelectric plants, sea water desalination technologies.[30]
The strong expansion of the solar plant fleet, which is naturally intended for installation also in water-stressed areas, has nevertheless highlighted potential criticalities for some of these plants resulting from the need to clean the photovoltaic panels in order to remove dust deposited on their surfaces: although such volumes are insignificant, Enel has adopted innovative solutions for these plants aimed at drastically reducing their water consumption (see the following box on the Roboost project).
In 2020, the Enel Green Power and Thermal Generation division launched the WaVE (Water Value Enhancement) project in order to reduce the use of water resources in all thermoelectric and renewable power generation sites, and to identify improvement actions, particularly in water-stressed areas. The project continued in 2022, refining the mapping of assets and focusing on the effects that climate change may have on the availability of water resources.

Roboost Project – Robotic washing of solar panels

Our solar plants are often installed in arid regions, where they can benefit from high sun exposure. Although the water consumption needed for washing the panels is low compared to that required for thermal generation, it is nevertheless important to aim at further reducing it in consideration of the particular context of water scarcity in these regions. This year, the methods used to wash our photovoltaic panels were subject to a thorough review, which identified automation as one of the key factors for reducing the amount of water needed to keep the systems efficient.
In this area, Enel is developing its own "Roboost" program of new solutions that use autonomous robots to clean the photovoltaic panels in a fully automatic way without using water. The expected water saving is 5 l/MWh. Initial trials were carried out at the Totana plant in the Spanish region of Murcia. Here, robots supplied by an Italian startup have already been used successfully,

helping to reduce the water consumption needed to keep the panels efficient in what is one of Spain's most arid regions. The installation of other robotic systems is being planned, with the participation of other suppliers: one of the first countries involved will be Chile, where all our solar plants are located in desert regions with high water stress, and where saving water resources is therefore of paramount importance. Being completely electric, the autonomous robots also avoid generating any greenhouse gas emissions during the panel cleaning operations.

(30) The quantities of fresh water withdrawn and the energy generated in water-stressed areas are calculated taking into consideration both thermoelectric and renewable plants located in these areas. In the case of renewable plants managed in geographical clusters that include areas with different levels of water stress, the estimates of the previous quantities were made in proportion to their generation capacity.

WaVE Project – Reduction of drinking water use in Peru

Enel pays great attention to the use of drinking water in its industrial processes. Where, due to particular local constraints or contingent situations, its use is absolutely necessary, maximum effort is expended to reduce or eliminate it in the near future.
During 2022, the Malacas gas plant in Peru replaced its old turbine burners with more modern "Dry low NO_x" type burners. These enable nitrogen oxide emissions to be reduced even without the need for injection of demineralized water, which was being produced using water from the municipal aqueduct. The saving obtained from this intervention was approximately 60 thousand m^3/year of drinking water, equivalent to the annual requirement of a small community. The social benefits of reducing competition for the use of civil water infrastructure are therefore significant for the local community, given the scarcity of water resources.

Optimization of liquid wastewater treatment

Downstream of internal recoveries and reuses, wastewater discharged from the plants is returned to the surface water body. Discharge always takes place downstream of a treatment process that removes any pollutants present to a level where they will not have a negative impact on the receiving water body, in compliance with the limits provided for under national regulations and by operating permits. The potentially polluting substances present in our drains mainly consist of metallic species (Fe, Al, Si, Ca, Mg) in solution or, to a lesser extent, suspended solids. There are also no added nutrients (nitrates and phosphates), pesticides or other substances classified as dangerous.

Responsible and integrated management of water catchment areas

The activities of hydroelectric power plants are an important element of water management. These power stations, which do not contribute to the Group's water consumption in that the water withdrawn is completely returned to its source, provide a series of additional services for the Company compared to the sole generation of renewable energies. A variety of power plants, jointly run by government and private stakeholders, manages the water resource for multi-purpose services ranging from flood control, drinking water and irrigation and firefighting services, to the management of river waste held by artificial dams, also including numerous cultural, leisure and nature-based initiatives, made possible thanks to the presence of the power plants. The reservoirs of hydroelectric plants also carry out a vital role in the response to the effects of climate change, increasing the level of protection of the communities subject to increasingly frequent severe flooding and to prolonged periods of drought. Management of the outflows from hydroelectric plants is done through specific programs to ensure the volumes of water required to preserve the ecological state of rivers (minimum vital water flows).