

Carbon Neutrality by 2050



Eni Rewind supports Eni's new strategy of a short-, medium- and long-term evolutionary pathway to achieve carbon neutrality by 2050, including direct and indirect GHG emissions throughout the life cycle of activities, assets and products. In this direction, we have adopted a business model that involves the development of projects based on circularity and the valorisation of recoverable resources.

The transition will require both the decommissioning of obsolete plants and the remediation of brownfield sites that will be able to accommodate new infrastructure, such as renewable energy and waste management plants, while reducing the use of new land. Added to the current challenges are the issues of water scarcity and increasing waste production for which we now consider it imperative to implement sustainable, forward-looking management aimed at maximising their reuse and valorisation.

Energy transition and circular economy



WHY IS IT IMPORTANT TO ENI REWIND?

The current economic and energy transition requires a new development model that shifts the focus to the scarcity of resources available in nature and the consequent need to recover, renew and reuse them beyond the end of their first life cycle. Eni Rewind, in line with Eni's mission, aims to contribute to the shift towards this more circular and responsible economy through soil regeneration and efficient water and waste management activities. A goal for which we have already put in place collaborations and partnership agreements, in Italy and abroad: the more sharing and cooperation there is between the various parties involved, the quicker we will all be in implementing long-term sustainable development.

Francesco Misuraca

Environmental, Technical & Sites Activities Manager

POLICIES AND OTHER REGULATORY INSTRUMENTS

HSE management process integrated into a Management System Guideline; Eni Rewind Health, Safety, Environment, Public Safety and Quality Policy. Eni Rewind's Integrated HSEQ Policy enhances the Company's circularity aspects and processes.

KPI PROGRESS IN 2021

- ▶ +200 ha of areas freed up after remediation (hectares intended for reuse)
- ▶ +3 million m³ of water recovered (9.06 million m³ vs 6.1 million m³ in 2020)
- ▶ Recovered 73% of recoverable waste
- ▶ Optimisation of consumption in plant management
- ▶ Reduction of weighted average Km/ton travelled for waste management
- ▶ Implementation of the project for the digitalisation of environmental logistics
- ▶ Signing of cooperation agreements with major players to investigate the deficiencies of waste treatment systems and realise potential initiatives of collective interest

TARGETS

- ▶ Increase land regenerated and made available to the community
- ▶ Optimise/Increase the efficiency of water treatment
- ▶ Increase volumes of treated water destined for reuse
- ▶ Maximise the recovered/recoverable waste ratio
- ▶ Development of new waste treatment and recovery plants, giving priority to reclaimed land in synergy with the industrial reconversion of Eni sites

CIRCULAR OUTPUT

Generate value from waste: developing technologies and constructing plants for the revaluation of secondary raw materials. Ravenna Bioremediation plant; solutions for sewage sludge recovery.

REUSE, RECYCLING AND RECOVERY

Minimising waste, maximising recovery: water management and treatment in order to optimise reuse and reduce the use of water from nature; promoting waste recovery and the use of in-situ and on-site reclamation technologies. Reuse of treated water for the production of demi water for industrial use; Blue Water technology; research and development of bioremediation technologies.

ECODESIGN AND EXTENSION OF SERVICE LIFE

Planning interventions and management of resources and assets in order to reduce waste and extend service life: planning of remediation interventions with a view to future reuse of land, development of innovative and efficient remediation and resource management solutions; remediation projects by lots; productive redevelopment project 'Ponticelle Project'; use of remediated land for the development of energy from renewable sources; application of e-hyrec® technology, e-limina® method, passive sampling.

INDUSTRIAL SYMBIOSIS

Researching and promoting existing industrial, environmental and socio-economic synergies in host territories. Establishment of new joint venture company Eni Rewind Herambiente: HEA 'Ponticelle Project': signing of main player collaboration agreements in the waste sector; other local partnerships.



Remediation



~600,000

h/year for
environmental
engineering

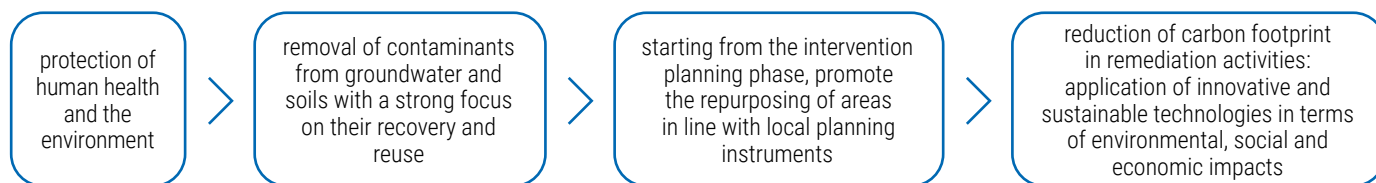
Remediation activities can generate development opportunities for territories. To achieve this, it is essential that the future reuse of areas is planned from the initial stages of the remediation process, in agreement with local institutions and stakeholders.

Today, thanks to the experience and expertise gained from operating at over 100 sites, 17 of which within 13 Sites of National Priority, Eni Rewind is able to oversee every phase of the remediation process for the future valorisation of land and assets, an

opportunity both for the environmental recovery of former industrial sites and for the relaunch of the local economy. From the preliminary characterisation surveys to final certification, the aim is to maximise the effectiveness and efficiency of interventions and adopt increasingly innovative and environmentally friendly solutions for every new project, working in conjunction with universities and Eni research centres. With constant commitment, Eni Rewind favours, in compliance with the relevant regulations in force, the ap-

plication of in-situ technologies that allow for environmental matrices to be remediated in their natural location, without resorting to excavation and disposal operations, minimising waste and the carbon footprint of environmental activities.

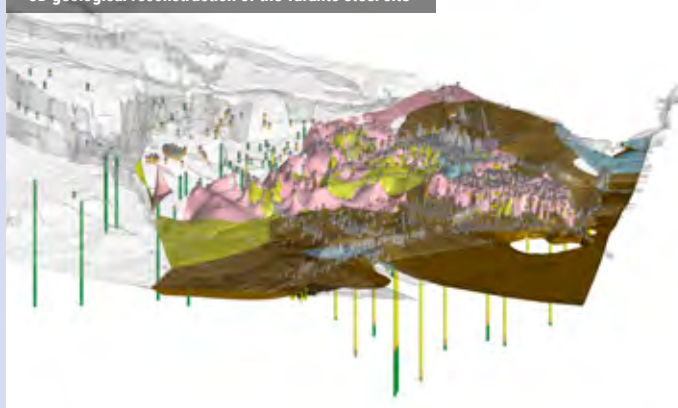
Eni Rewind pursues a Programme for Sustainability in Reclamation with the aim of incorporating the concept of sustainability into environmental remediation activities. Operationally, the application of sustainability principles to remediation results in:



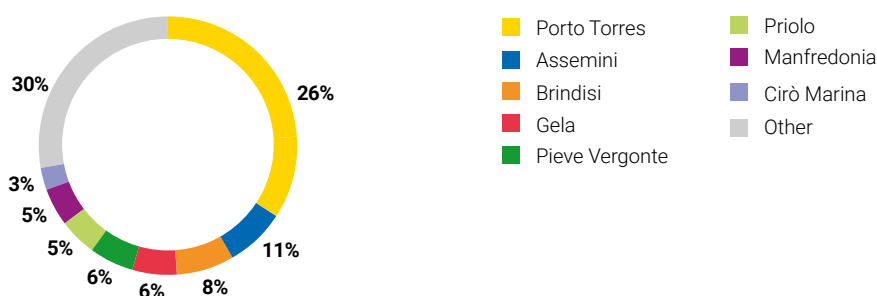
Environmental engineering: hydrogeological modelling

At Eni Rewind, integrated, multidisciplinary teams operate with skills consolidated through direct experience in the field and are able to design and offer innovative and sustainable solutions, also taking into account the specific characteristics of a remediation site. In particular, in the field of hydrogeological modelling, our specialists work with hardware and software instruments on the numerical modelling of groundwater flow, a strategic activity for the sizing and management of numerous hydraulic containment systems, which in the last year has also been implemented in Pieve Vergonte, Crotone, Porto Torres, Cesano Maderno, Cengio (Merlo area), Ponte Galeria, Brindisi and Avenza. In addition, on behalf of Acciaierie d'Italia, hydrogeological and 3D modelling of the state of the subsoil was developed in Taranto, a fundamental starting point for the design of the necessary environmental interventions that allowed the impact on operations to be minimised.

3D geological reconstruction of the Taranto steel site



Proprietary sites - Main remediation projects (cost breakdown in %)



Operations on service stations and the pipeline network

Since 2016, based on a mandate from Eni GTR&M, Eni Rewind has been carrying out environmental remediation activities at disused and operating service stations in Italy, and in 2018 added soil and aquifer reclamation following oil pipeline break-ins.

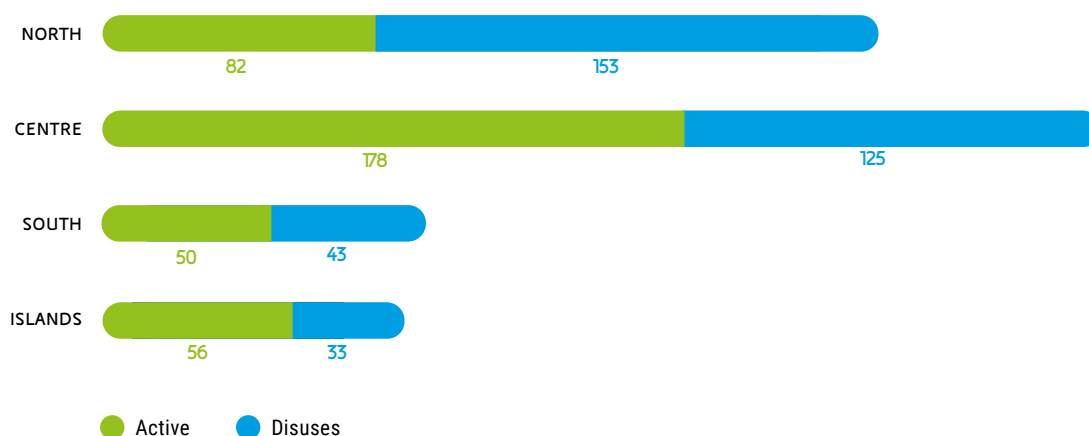
The activities carried out in 2021 on over 700 Eni service stations (366 operating and 354 disused) involved remediation, decommissioning and asbestos removal activities,

as well as a preliminary environmental Due Diligence for the regeneration of existing assets. With a view to increasing the sustainability of operations, also in 2021 Eni Rewind reduced the use of Pump & Stock plants for the external treatment and disposal of groundwater by around 30%, replacing them with on-site treatment plants (Pump & Treat) or shutting down the systems once the water has met legal limits. Furthermore, it brought from 60% to around 90% the recovery of contaminated soil after treatment. With regard to cases of malicious

break-ins on Eni's oil pipelines, the Company is managing about 70 soil and aquifer remediation projects in North-West and Central Italy, 3 of which have been completed.

At some remediation sites under Eni's mandate GTR&M continued the implementation of sustainable remediation technologies such as phytoremediation - or other innovative techniques for contaminant biodegradation - and absorbent barriers with micrometer-sized or colloidal activated carbon injection for groundwater remediation without generating wastewater.

Environmental activities management at Eni service stations



Porto Torres

The Nuraghe Project is a major soil remediation project that Eni Rewind is carrying out in Porto Torres for the treatment and removal of about 800,000 cubic metres of contaminated materials mainly from the former Minciareda landfill. The area affected by the Nuraghe Project covers about 30 hectares out of a total of 1,200 owned by Eni Rewind in the Site of National Priority. To deal with the complexity of the environmental intervention, Eni Rewind adopted, in agreement with the local authorities and the territory, a solution that is unique in its kind in Italy in terms of innovation and sustainability, i.e. the construction of an on-site multifunctional platform equipped with various types of soil contamination plants, such as screening systems, biological treatment, soil washing, thermal desorption and inertisation. The multifunctional platform, which was commissioned in December 2021, can process up to approximately 1,000 cubic metres of excavated soil per day. In addition, the water used in the remediation processes will be treated in special auxiliary systems adjacent to the platform.

After treatment, the soils that comply with the remediation objectives will be reused to backfill the excavations from which they derive, while those that do not comply will be deposited in a permanent repository on site. Contaminated soil will therefore be almost entirely managed, reused or reallocated on site, maximising

Nuraghe Project - Multifunctional Platform



material recovery and, at the same time, minimising the impact in economic terms and on the environment of handling waste off-site, sometimes even sent thousands of kilometres away. For this reason, the Nuraghe Project represents a virtuous example of km 0 remediation.

Avenza - Batch remediation

At Avenza, in the Massa Carrara Site of National Priority, Eni Rewind, attentive to the territory in which it operates, has planned, in coordination with the governing bodies, a land remediation project by lots that will allow the progressive liberation, redevelopment and valorisation of the areas once they have been reclaimed for possible new investments. Due to its geographical location, adjacent to an intermodal hub, and its facilities, the site areas are of particular interest for reindustrialisation.

The remediation project includes the removal of contaminated soil with excavation and recovery/disposal and the subsequent morphological restoration of the areas. Approximately 100,000m³ of soil is expected to be handled. As of the end of 2020, having obtained local authorisations, the activities of Lots 1 and 2 started.

Avenza - Excavation in lots



Brindisi

The Micorosa Area, outside the multi-company plant in Brindisi, was used between the 1960s and 1980s for the dumping of industrial waste from the production cycle of Montedison, which owned it. In March 2014, Eni Rewind and the Municipality of Brindisi, together with the Region of Puglia, signed a programme agreement for the permanent safety measures - of the Micorosa area and other areas outside the plant. The remediation project, approved in 2018, aims to contain the primary source of contamination, the former landfill, and return the areas through environmental redevelopment. In particular, the interventions include the construction of a physical perimeter confinement, the application of jet grouting technology and surface waterproofing, the installation of a system of ground water extraction pumping wells and a groundwater treatment plant, as well as the relocation of the Pandi Canal bed. Forest engineering works will also be carried out to control certain hydro-geological phenomena, using native water-dependent tree species.

In 2021, in the Eni Rewind areas, the composite diaphragm wall for physical confinement, the ground water extraction pumping wells, and the shifting of the canal with subsequent construction of the new river bed were completed. Furthermore, in order to minimise waste production, a Protocol for the management of Excavation Earth and Rocks deriving from the construction of the plastic diaphragm wall and the displacement of the Pandi Canal has been signed, which

Excavation of the composite diaphragm using the Casagrande grab bucket



envisages their reuse for the capping of the landfill and the filling of the original river bed.

Micorosa area at the Brindisi site



DECOMMISSIONING

The process of environmental redevelopment requires, in many cases, the decommissioning of existing production facilities, normally decommissioned or to be decommissioned, understood as the remediation of circuits and plant equipment, the subsequent demolition of structures and the management of the resulting waste. These interventions are therefore of great importance, not only for their management and engineering complexity, in strict compliance with

environmental and safety regulations, but also for their role as a fundamental and preliminary step to the regeneration of industrial areas and their return to future use.

For the decommissioning of complex production plants, Eni Rewind possesses a unique know-how, made up of technical skills and specific knowledge, coordinated through a multidisciplinary approach, which has led to the creation of a dedicated corporate function with teams involved in the design and execution of this type of

intervention, to be carried out in our own areas or those of Eni's businesses, or even for third-party customers. All decommissioning activities comply with the founding principles of the circular economy: the experience gained at numerous sites of different plant types has enabled the development of design standards, optimised according to objectives and aimed at reducing the environmental footprint, maximising the recovery of materials and minimising the sending of waste to landfills.

The most important decommissioning operations carried out in 2021 include:

In Cìrò Marina, the completion of the demolition of the 300-metre-long Punta Alice jetty. The removal of the structures was carried out through a structural deconstruction of the various sections of the conveyor belt system, using equipped floating pontoons, and the cutting of piles on the seabed by a team of divers.

In Gela, at the station 6 area owned by Eni Rewind, the demolition site for the 3 parabolic sheds that were once used for storing fertilisers (with a length of 190 metres, width 35 and height 19) has begun. Due to the presence of friable asbestos in the waterproofing sheathing of the roofing of the sheds and the structural decay of the sheds, which does not allow for the preventive removal of the asbestos, the demolition of each shed takes place within a confined structure maintained under vacuum, to prevent the possible dispersion of the pollutant.

Also in 2021, the Gela Refinery mandated Eni Rewind to proceed with the demolition of the SNOX chimney, the thermoelectric power plant, including the G100, G200 and G300 thermal units as well as the related storage park, the Coking 1 and 2 drill structures used in the past for shredding pet coke, and the D-D1 flare. The activities were mainly performed by removal to avoid interference with other operational plant units.

Demolition activities



For all decommissioning work carried out in 2021, Eni Rewind has ensured the recovery and fu-

ture reuse of materials, sending so far over 9,000 tonnes of scrap metal (mainly iron and steel) for

recovery, which will be able to find a second life in the civil and industrial sectors.

Gela - ISAF Decommissioning

Eni Rewind is managing the decommissioning project of the former ISAF (Industria Siciliana Acido Fosforico - Sicilian Phosphoric Acid Industry) phosphoric acid plant, decanter and tank farm at the Gela site, one of the most challenging sites for the company from a planning and economic point of view, made possible by the synergy with local institutions. The programme includes the demolition and subsequent transfer of the waste material to a new on-site landfill, as well as the remediation of soil, subsoil and groundwater. The intervention is divided into four phases, each subject to prefectural authorisation under the former Legislative Decree 230/1995, and now the Consolidated Law on Radiation Protection Legislative Decree 101/2020:

- emptying the decanter and treating the extracted sludge in an authorised mobile plant;
- emptying the tank farm and treating the liquid phase;
- the demolition of the phosphoric acid plant, decanter and tanks;
- the construction, cultivation and closure of a 140,000 cubic metre special purpose landfill, designed and built to receive waste from the construction site that cannot be delivered to any other facility due to the presence of radiometrically active materials (TENORM).

All interventions are scheduled for completion by 2025. The activities of phases 1 and 2 are ongoing and the construction of the special purpose landfill within the perimeter of the former ISAF phosphogypsum landfill (phase 4) is being completed.

Construction of the landfill site



INTERVIEW



Interview with
Chairman
Valerio Scanu
*Industrial Consortium
Province of Sassari
(CIPS)*

Chairman Scanu, with the ongoing remediation of the Porto Torres Site of National Priority, a vast geographic area will be available for new economic development initiatives. What are the expectations of the Consortium that you represent, also in terms of stimulating companies and production supply chains in the area as well as the employment spin-offs?

The completion of remediation and decommissioning operations is a key factor in achieving a reindustrialisation process. Obsolete and dilapidated structures, old tanks and abandoned plants disfigure the landscape and limit the availability of land, particularly back-port land, thus mortifying the initiatives undertaken in favour of the attractiveness of the Porto Torres industrial area.

With environmental remediation, the great hitherto unexploited potential of a strategically located site will emerge. In fact, recent energy provisions foresee the arrival of methane, which will allow a gradual energy transition by aligning the costs of companies and citizens in Sardinia with those in the peninsula.

CIPS is committed to fostering the

emergence of a hydrogen district in Porto Torres, a pioneering prospect to date, but one that will be a component of interest and development in the future.

What are - in your opinion - the most promising new projects and infrastructures for the revitalisation of the areas affected by the Porto Torres Industrial Complex Crisis Area Reconversion and Re-development Project?

Green chemistry, agro-industry, circular economy and blue economy represent the target production supply chains for the economic development of North West Sardinia. I therefore believe that investments in green chemistry must be increased and the entire production supply chain must be activated, including local so-called no-food agricultural production.

As CIPS, we are determined to promote the reconversion of the industrial port, now almost totally unused, with enormous potential due to its extension and high depths that make it one of the most competitive in Italy. It is a gateway to the Mediterranean capable of hosting international logistics hubs and modern facilities for shipbuild-

ing and the maritime economy in general. Special Economic Zones (SEZs) will provide tax and administrative concessions to companies and structural investments in port and back-port areas.

In such a scenario, what synergies and collaborations do you see with Eni Rewind, considering both the availability of areas for third-party investors and the planning in the waste sector, given the lack of infrastructure on the island?

Developing partnerships with industry groups is part of the institutional mission of CIPS, which is oriented towards an industry that is different from the past, which produces and at the same time ensures environmental sustainability. In this scenario, synergetic actions will also be possible with Eni Rewind in the area of environmental services, for instance with a partnership for the management of the multifunctional platform of the Nuraghe project, which was created for the treatment of contaminated soil and can be used for different types of waste produced in Sardinia that now have to be transferred to the mainland.

Porto Torres site



Remediation and redevelopment of industrial areas

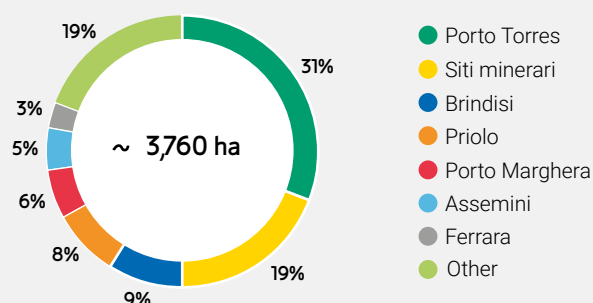


Land is a limited resource because it is not reproducible. Industrial sites that are disused or no longer usable are as critical environmentally as they are economically and socially if not

regenerated. Eni Rewind's challenge is to give them a new lease of life through remediation designed with reuse and productive redevelopment in mind. This approach offers numerous advantages as the areas are located in already highly developed and serviced industrial zones that, once

rehabilitated, lend themselves well to the development of new initiatives, such as the construction of plants for the production of energy from renewable sources or for the treatment and recycling of waste, while at the same time avoiding the consumption of additional 'virgin' land.

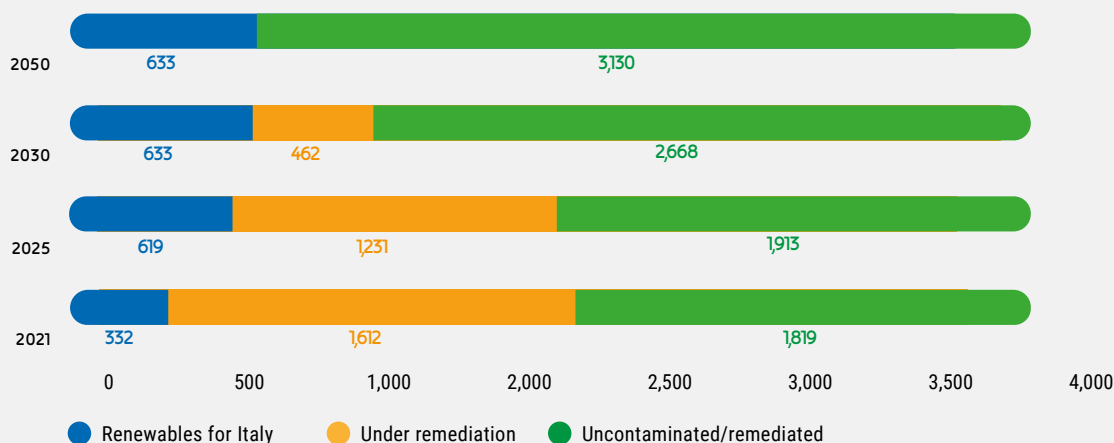
Total Eni Rewind areas



Site of National Priority at Porto Marghera.



State of Eni Rewind owned land (hectares)



The histograms represent the foreseeable evolution of remediations on the approximately 3,760 ha owned by Eni Rewind. During 2021, 43% was in the remediation phase, 48% was free from contamination and 9% had been allocated to the Renew-

ables for Italy project, committed to the installation of plants for the production of electricity from renewable sources (16% by the end of 2025). By 2025, a further 10% of the areas are expected to be remediated and made available.

In particular, this time frame envisages the completion of remediation, certification and the freeing up of additional areas at the Sa Piramide (47 ha), Cengio (25 ha) and Manfredonia (17 ha) sites, as well as Avenza, Ferrara and other minor sites.

54.7MWtotal installed
photovoltaic capacity
in 2021 on 91 ha**11.8MW**total authorised
capacity in 2021 on
27.3 ha**38.6MW**total capacity under
authorisation on
186 ha**Eni Rewind's contribution
to the development
of renewables**

The development of renewable energies is central to Eni's strategy of progressive decarbonisation. The consolidated synergy between Eni Rewind and Eni New Energy, a Plenitude company dedicated to the development of renewable energy, is a concrete example of a circular economy. Proprietary areas that have been decommissioned and are no longer productive are used to house renewable electricity production plants, after the environmental intervention by Eni Rewind. The energy produced is used for the energy needs of Eni's industrial assets and the remaining part is fed into the grid. In this context,

of significance are the photovoltaic power stations already constructed, extending over 100 ha (power of about 55MWp) at Eni Rewind sites in Assemini, Porto Torres and Gela as well as those authorised in Porto Marghera and Ravenna (Ponticelle Project).

The Porto Torres project is a virtuous project that has seen the redevelopment of the areas of a Site of National Priority through the construction of a photovoltaic park, with an installed capacity of 31 MW. About 70 per cent of the annual production of the plant, inaugurated in early 2020, is destined for the companies present on the industrial site, saving a total of more than 25,000 tonnes of carbon dioxide emitted per year.

In addition, a wind farm with a capacity of 34 MW, awaiting authorisation, has been designed by Eni New Energy in Porto Torres, and will be able to power new sustainable development initiatives in the area.

In order to make a further contribution to this collaboration between Group companies, a further 200 Eni Rewind hectares have been identified as suitable, once the remediation interventions have been completed, for the installation of photovoltaic and wind power stations, and which will allow Eni New Energy to reach an installed capacity of around 300 MW on about 600 hectares and a reduction of about 250 thousand tonnes of carbon dioxide per year.

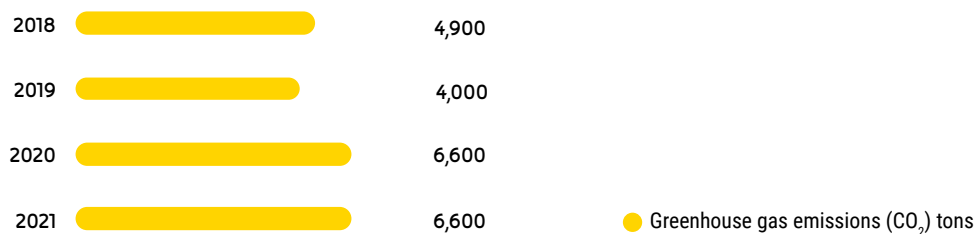
Gela photovoltaic parks





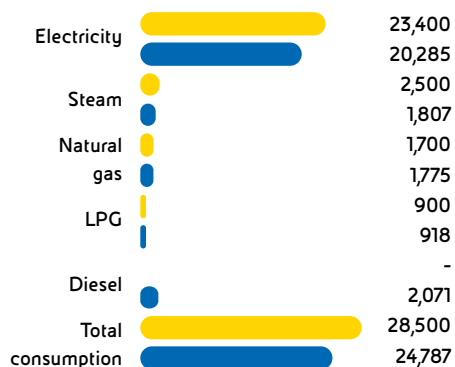
Decarbonisation: Eni Rewind's performance

Value of CO₂ emissions

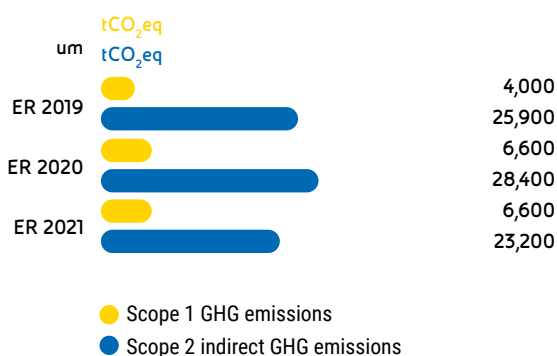


The increase in 2019-2020 is mainly due to the installation of new boilers to produce steam for the GTP plant in Porto Torres, an energy vector that was previously supplied by the Versalis plant.

Energy consumption



GHG emissions



Eni Rewind Fire (tep)

Consumption in tons of oil equivalent (tep). Communication to FIRE

- 2020
- 2021

Water Management



Eni Rewind water management system:

42

| Water treatment plants

1,200

| pumping wells

over
4,900

| monitoring wells

~36
million m³

| treated water

~9
million m³

| recovered water

Pieve Vergonte GTP plants



Eni Rewind is engaged in carrying out major aquifer remediation at 22 sites through an integrated hydraulic barrier and water treatment plant (GTP) system, and in the management of municipal and industrial biological plants at the Gela, Cengio and Manfredonia sites.

All assets are aligned with the BAT (Best Available Technologies) and BATNEEC (Best Available Technologies Not Entailing Excessive Cost) and are subjected on a cyclic basis to SWOT Analysis to identify the optimal remediation interventions. Water treatment processes include strict monitoring plans that ensure full compliance with water

discharge quality and atmospheric emissions.

With a view to continuous improvement, Eni Rewind explores all opportunities to optimise sections and/or processes that have the greatest impact on the environmental and economic sustainability of systems, including through partnerships with energy service companies.

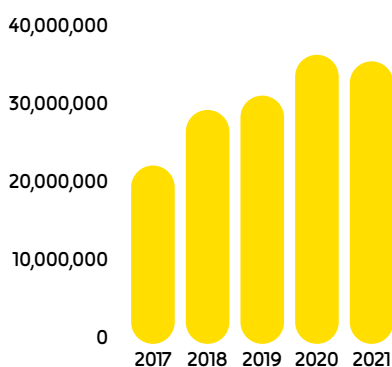
In 2021, several energy efficiency initiatives were launched in synergy with Plenitude and Servizi Energia Ambiente.

To facilitate the recovery and valorisation of water resources, the Company promotes and supports research into sustainable and effi-

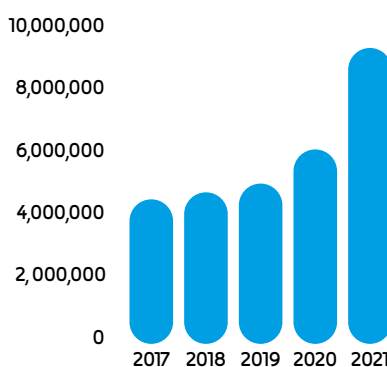
cient management solutions, with the aim of maximising reuse and reducing the withdrawal of water from the environment. This objective has led to the installation and activation of special demineralised water production sections at GTP plants at Priolo, Gela, Porto Torres, Assemini and Brindisi, intended for reuse within the industrial sites. In other cases, such as in Manfredonia, the treated water is re-injected into the aquifer to restore its natural conditions.

In 2021, Eni Rewind treated about 36 million cubic metres of water, recovering about 9 million for industrial and environmental use.

TREATED WATER (m³)



RECOVERED WATER (m³)



Solutions for optimising water management

In the water treatment plants, Eni Rewind uses ad hoc technologies depending on the contaminants present and possible salinity with chemical-physical (metals), stripping (organic chlorides), activated carbon filtration (organic), biological treatment (ammonia compounds), osmosis (salinity) and potabilization sections for the reintroduction of water into the aquifer or for its recovery and reuse at Eni sites.

In accordance with its mission, Eni Rewind promotes the optimisation of water treatment processes to reduce water consumption by conducting research into new technical solutions and the continuous process of renewal of the plants. In fact, greater production efficiency corresponds to greater respect for the environment. For example, a project to automate and digitise the hydraulic barrier was completed in Crotona based on an instrument that controls the

flow rate of the wells in order to extract only the amount of water from the aquifer that is required for remediation operations. Furthermore, the new Dynamic Control System is operational in Priolo, based on refining experience and ensuring real-time monitoring of the pressure, flow rate and pH of the treated water resource. Its adoption has reduced energy and reagent consumption and has resulted in an increase in the production of osmotized water.

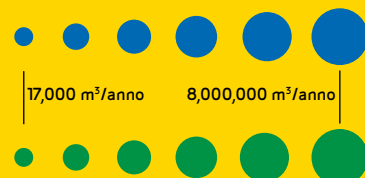
In 2021, research in the field of water management will continue in the development of further innovative solutions:

- **Wet Oxidation** high temperature and pressure oxidation technology to treat liquid streams characterised by high organic contamination refractory to common biological treatments;
- **Boron Recovery** a process to recover boron from certain liquid streams and significantly reduce the production of sludge in strata water purification processes through a series of membrane separations and final crystallisation. In 2022, the technology will be tested in a laboratory pilot plant;
- **Electroflotation**: electrolytic treatment of aqueous solutions with the presence of metals and complex organic substances that, through a series of electrochemical, chemical and physical reactions (production of hydrogen microbubbles, electric field, coagulation in the presence of aluminium ions), promotes the transformation and subsequent removal of contaminants. The process was tested with a pilot plant, yielding encouraging results in the removal of heavy metals. In 2022, further tests will be carried out for the abatement of arsenic and manganese, and the feasibility of the technology as water pre-treatment directly at the wellhead will be assessed.

WATER TREATMENT SYSTEMS (volumes 2021)

● Groundwater Treatment

● Groundwater and Surface Water Treatment



Manfredonia

The solution adopted in Manfredonia for the remediation of the aquifer is linked to the need to manage the saline intrusion and at the same time compensate for the groundwater extraction from the aquifer by injecting fresh water, so as not to alter the hydrogeological balance of the area. This is done through an inlet barrier along the site boundary that for the first fifteen years was fed by both treated groundwater and fresh water from the Capitanata pipeline. With the variant to the aquifer remediation project, approved in 2019, Eni Rewind planned a revision of the water extraction and re-injection systems in order to reduce the withdrawal of water resources in nature to zero. Thanks to the work completed in 2021, which included additional wells and piezometers as well as the upgrading of the GTP plant from 120 to 240 m³/h, reinjection into the aquifer is now carried out exclusively with water treated at the site. In addition, in 2021 Eni Rewind started the construction of wells with Groundwater Circulation Wells technology, in collaboration with Sapienza University of Rome, which will accelerate the remediation of the aquifer in station 5. These latter interventions complement the action of the traditional ground water extraction pumping wells active on the site and limit the typical drawbacks of extraction actions close to the coastline.

Manfredonia site



Blue water

Leveraging its know-how and experience in water management, Eni Rewind, together with Eni's research laboratories, has developed Blue Water technology for the treatment and recovery of production water from crude oil extraction activities. Its application will make it possible to regenerate reservoir water, as is the case in traditional purifier plants, either for industrial

use or by returning it to the surface water body. This has two important advantages in terms of environmental sustainability: it reduces the disposal of outgoing residues, i.e. salt solutions and sludge, and at the same time minimises the withdrawal of water from other virgin sources in nature.

The first industrial scale plant is being designed for the Val d'Agri Oil Unit in Viggiano, Basilicata, which

will treat part of the production water, making it available to satisfy the water requirements. The volume treated translates into a reduction in the amount of water now transported for disposal to third-party plants - up to 1,000 km from Viggiano - decreasing the carbon footprint of the waste management process. The process of obtaining authorisations from the local authorities is currently underway.

Waste Management



The recovery of waste and industrial effluents is an important goal of the circular economy that we intend to pursue to support their more sustainable management, in line with the principles of zero consumption and zero waste. In this direction, we have signed partnerships with major players in the sector, with the will to provide a joint response to a market characterised by infrastructural deficiencies. The goal for the coming years will be to minimise the disposal and transport of waste out of the region of production, promoting new plants appropriately located and generating important benefits in terms of environmental and economic sustainability in favour of communities.

Michele Troni
The Water & Waste Management Manager for

Eni Rewind, as Eni's global contractor, manages the cycle of waste produced by Eni's industrial activities or coming from environmental remediation and decommissioning, guaranteeing the constant control of the entire supply chain on a daily basis in compliance with the regulations in force. In line with industry best practices, the Company adopts technological and logistical solutions to increase the proportion of waste sent for recovery, as an alternative to other disposal choices, and to minimise the distance travelled between the production site and the delivery facilities, with a consequent reduc-

tion in costs and the effects on the environment. In particular, it ensures the environmental sustainability of remediation interventions thanks to consolidated in situ / on-site technologies such as biopiles and soil washing, which minimise the generation of waste, as they do not involve the excavation and disposal of contaminated soils. Approximately 2 million tonnes of waste were handled in 2021, of which about 88% was handled within the 400 km range. In addition, approximately 73% of recoverable waste was sent for recovery. The reduction in the recovery rate compared to 2020, which

stood at 78%, is due to the qualitative (e.g. presence of asbestos and arsenic) and granulometric (presence of clays and silt) characteristics of the waste managed, which limited the treatment possibilities. This factor was compounded by a lower availability of final recovery facilities in some regions of Italy. With regard to activities carried out for third party customers, Eni Rewind was awarded contracts for the industrial waste management service of Edison's thermoelectric power plant in Altomonte (Cosenza) and Società Chimica Assemini at its operational site in the province of Cagliari.

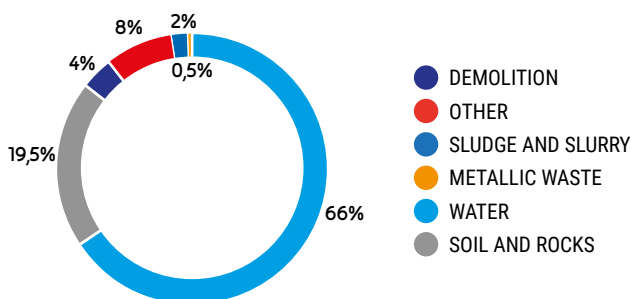
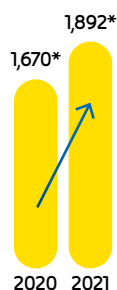
~2 million tons
of waste managed in 2021, of which 81% on behalf of Eni

+70%
recovered vs. recoverable waste 2021

13%
hazardous waste vs. total managed

WASTE MANAGEMENT (kton)

TYPE OF WASTE MANAGEMENT



RECOVERED WASTE

2020	2021	Δ vs. '20	WASTE RECOVERED	WASTE FROM DEMOLITION	METALLIC WASTE	SOIL & ROCKS	SLUDGE
78%	73%	-5%	% Waste recovered	73%	100%	72%	98%

* This includes waste from the management of the environmental activities of the service stations network.

Ravenna Ponticelle

The Ponticelle project in Ravenna is an initiative for the productive redevelopment of a disused industrial area on the border of the petrochemical plant, which, following environmental remediation, will become a hub for sustainable remediation, waste valorisation and green energy production.

The initiative represents a concrete example of how land remediation can bring added value to the territories and their communities thanks to the synergy between important realities such as Eni and Hera, without resorting to the consumption of new land, but rather by reusing and valorising that which has already been anthropised.

Eni Rewind, owner of the former industrial area, has planned and completed the permanent safety measures (MISP) with capping implemented on 18 of the total 26 hectares. The environmental intervention, certified by Arpa Emilia-Romagna in August 2021, is preliminary to the area's development plan, which envisages the application of innovative, sustainable and recovery technologies, as well as urbanisation works.

The works envisaged in the Ponticelle Project:



- Photovoltaic power station with storage lab

The construction of the plant, authorised in January 2021, will be carried out by Eni New Energy, a Plenitude company dedicated to the development of renewable energy, in a portion of the area covered by the MISP (11 hectares). The project involves the construction of a solar tracking photovoltaic power station with a capacity of 5.6 MWp and an energy storage lab with a capacity of 1 MW.

- Land Bioremediation Platform

The plant, with a treatment capacity of 80,000 tonnes per year, is dedicated to the aerobic biodegradation and recovery of hydrocarbon-contaminated soils, primarily from the remediation of service stations, through the use of indigenous microorganisms, i.e. bacteria. The aim is to return the post-treatment land to the service stations themselves, according to a circular scheme of recovery and reuse. The platform, which will cover 3 hectares, also includes a bio-laboratory capable of conducting preventive analytical checks on the conformity of waste entering the plant and periodic monitoring surveys of bioremediation processes.

- HEA Multifunctional Platform

HEA (Hera and Eni per l'ambiente), a joint venture set up in March 2021 by Eni Rewind and Herambiente, will build a state-of-the-art environmental platform for the management of industrial waste on a portion of the area amounting to approximately 3 hectares. An important synergy desired by the two companies to minimise waste disposal, favouring energy and material recovery. The plant, which will replace the current HASI (Herambiente Servizi Industriali) platform, will manage up to 60,000 tonnes per year of special waste from environmental and production activities, with particular attention to those in the area, in line with the European directives of the Circular Economy Package. The aim is to make a concrete contribution to the structural lack of plants in Italy and also in Emilia-Romagna for the management of special waste and to maximise the recovery of materials and energy from collected industrial waste.

In October 2021, the joint PAUR (Regional Single Authorising Provision) application was submitted for the construction of the bioremediation platform and the multifunctional platform.

How has the synergy between Herambiente and Eni Rewind for the construction of the environmental platform in the Ponticelle area been received by the Ravenna area?

The synergy and the technological and corporate partnership (with the establishment of HEA S.p.A) between two important companies, leaders at national level, and at the same time strongly rooted and present at territorial level, certainly represents a guarantee of seriousness and reliability that the territory is able to perceive. The municipal administration immediately grasped the importance of the overall intervention, and also the economic-entrepreneurial system, thanks also to the progressive increase in knowledge of the project, has become aware of the importance of the initiative, both in terms of infrastructuring qualified services dedicated also to local businesses, and in terms of spin-offs on the territory, which are expected to be significant, with investments amounting to many millions of euro over the next few years. Furthermore, since October the start of the authorisation process has also entailed moments of public visibility for the productive redevelopment project in the area, without registering any particular stance by citizens or specific stakeholders. Even though it is never easy to develop projects for waste plants (particularly if it is of industrial origin), I believe there is ultimately a perception of the need for these facilities and a chance to raise awareness that the multifunctional platform, as part of the overall project, is perfectly in line with the objectives of the circular economy.

What scenario made this industrial symbiosis, now considered an Italian best practice, possible in brownfield valorisation projects? Can this virtuous experience be replicated in other terri-

tories and how?

The elements favourable to the realisation of this industrial symbiosis are manifold. First of all, the skills of the two partners favour an important synergy to optimise the management of waste, both related to the Eni Group's activities and deriving from the market, favouring the recovery of energy and materials with industrial efficiencies and economies of scale. The multifunctional platform project then fits into the virtuous process of recovering the *brownfield* Ponticelle of 26 hectares, which envisages, following the environmental remediation project, its overall productive redevelopment and the construction of a photovoltaic park and a bioremediation platform independently promoted by Eni Rewind. The projects, although autonomous and independent, are interconnected in the overall infrastructure of the area with a view to rationality. The synergy between the two platforms, in particular, is evident; although they will be completely independent in terms of waste treatment activities, they will use some utilities in a shared manner, avoiding unnecessary duplication. In addition, the new HEA platform, which will adopt the best available technologies, will replace the current HASI (Herambiente Servizi Industriali) owned platform located in the Via Romea area, with an important plant optimisation. Another relevant element for the success of similar initiatives is the attitude of the public administration in allowing, also through town planning, the possibility of realising certain facilities under the right conditions. As a whole, these situations are not easily reproducible, although replicability in other territorial contexts would be highly desirable.

What waste management and logistical needs does the construction of the environmental platform meet

in the local and Italian landscape?

Without going into detailed numbers, the plant deficit in Italy (also) for the special/industrial waste cycle, which is often a commodity exported abroad, despite transport costs, is evident. It should also be borne in mind that the production of special waste is 4/5 times greater than that of municipal waste, with all that this implies in terms of plant requirements for this supply chain.

The Emilia-Romagna region boasts a strong establishment of manufacturing and industrial activities and is experiencing higher growth rates than other Italian regions. With this in mind, the recently adopted Regional Waste Management Plan (PRRB 2022-2027), with regard to the management of special waste, assumes the principles of self-sufficiency for the disposal of non-hazardous waste in the regional context, and generally of plant proximity. The province of Ravenna is one of the largest producers of special waste in the region. By optimising flows for disposal and maximising material/energy recovery with pre-treatment operations, the platform is fully consistent with planning objectives at every level and at the service of the territory in particular. It will also be able to address, in a versatile manner, the needs of local companies in the management of industrial waste, offering treatment solutions for, among others, various outflows from the plants of the Eni Group and other companies in the petrochemical sector.

The platform will be equipped with advanced waste traceability systems and environmental certifications to guarantee total transparency in waste management, ideally fitting into an area that boasts consolidated policies of environmental protection and control with the direct commitment of companies (monitoring networks, certifications, EMAS of companies and district).

INTERVIEW



Interview with
Carlo Pezzi
Managing Director HEA
(Hera and Eni for the Environment)