CLIMATE CHANGE, CIRCULAR ECONOMY AND ENVIRONMENT

GREEN CIRCULAR DISTRICT MODEL

GREEN CIRCULAR DISTRICT

THE NEXTCHEM MODEL FOR **RECYCLING** AND **DECARBONIZATION**

DECARBONIZATION

BY

2023 **20% REDUCTION**
SCOPE 1 SCOPE 2

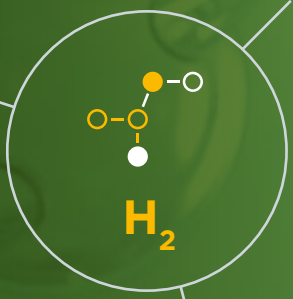
2030 **CARBON NEUTRALITY**
SCOPE 1 SCOPE 2

2050 **CARBON NEUTRALITY**
SCOPE 3

HYDROGEN ECONOMY

GREEN HYDROGEN
FROM WATER ELECTROLYSIS

ELECTRIC BLUE HYDROGEN™
FROM NG WITH ELECTRIFIED SMR



CIRCULAR HYDROGEN™
FROM PLASTIC WASTE CHEMICAL CONVERSION

WATER MANAGEMENT

207,142 m³
TOTAL VOLUME OF WATER WITHDROWN FROM CONSTRUCTION SITES

GHG EMISSIONS

SCOPE 1:
DIRECT EMISSIONS*
42,438
TONS OF CO_2

SCOPE 2:
INDIRECT EMISSIONS*
16,632
TONS OF CO_2

SCOPE 3:
INDIRECT EMISSIONS**
1,601,517
TONS OF CO_2

** Referred to the volume of GHG emissions generated from both in Headquarters and Construction sites.*
*** Referredo to "Purchased Goods & Services", "Upstream Transportation", "Waste generated in Operations", "Business Travel" and "Employee Commuting" categories.*

RECYCLING AND WASTE MANAGEMENT

28,000 TONS
PLASTIC WASTE RECYCLED
IN OUR PLANT

99.8%
RECOVERY OF WASTE
AT HQs

2

MATERIAL TOPICS

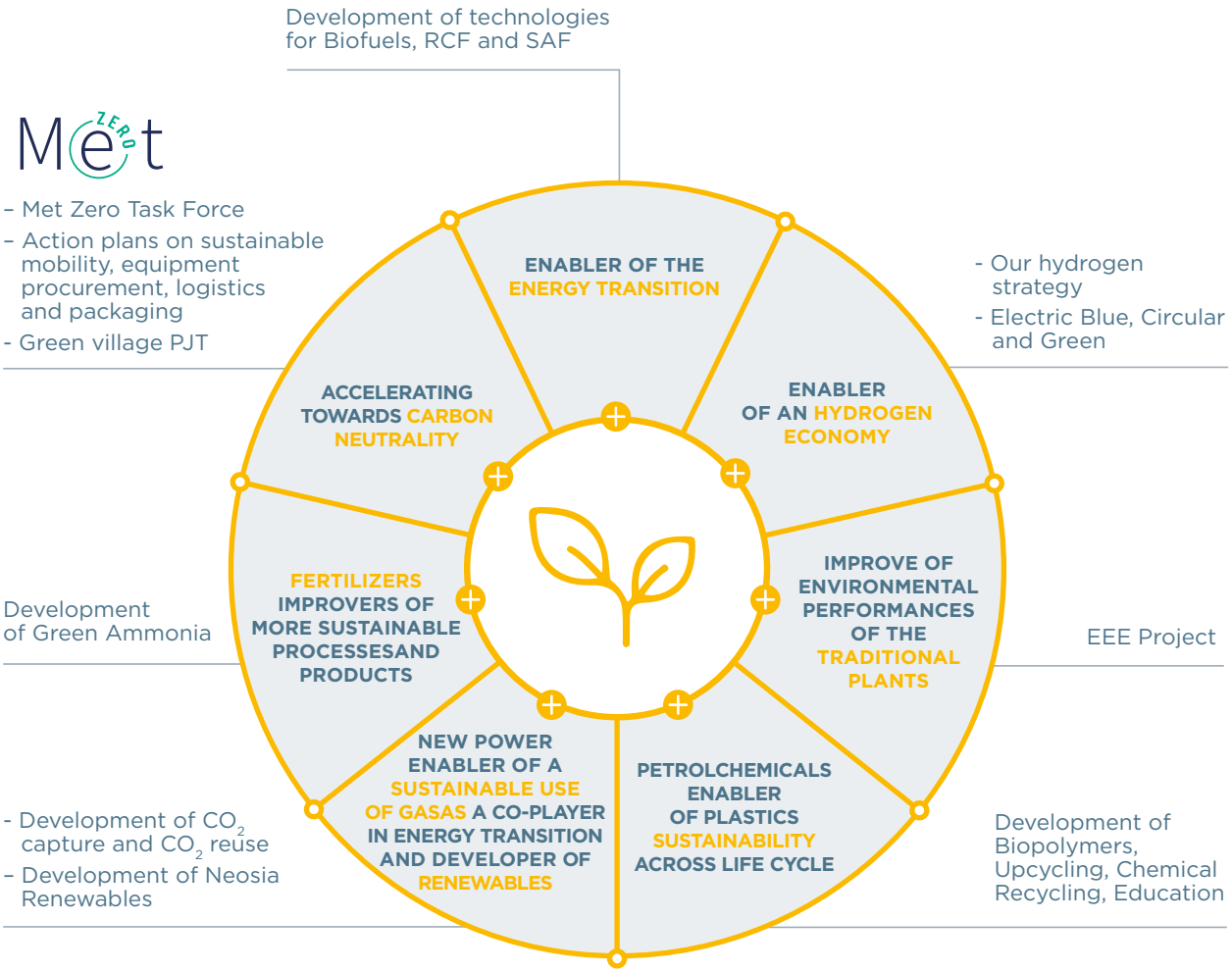
- WATER AND WASTE MANAGEMENT
- CLIMATE CHANGE
- CIRCULAR ECONOMY

2.1 MAIRE TECNIMONT: ENABLING THE ENERGY TRANSITION

In 2021, the Group continued on its quest to reduce the environmental impact and emissions of its traditional plants, and to develop its portfolio of "enabling" technologies for the energy transition. Alongside the area of the circular economy and that of the production of fuels from biogenic rather than fossil sources, 2021 marked significant progress in terms of technologies for the production of low-carbon hydrogen and green ammonia, as well as with regard to the production of biopolymers and the capture of CO_2. The breadth of our activities is broadening, extending to different countries in different continents, with strong new synergies between Group companies and between different business areas, under the banner of sustainability.

PROVIDE THE INTERNATIONAL INDUSTRIAL SYSTEM WITH A PORTFOLIO OF ENABLING TECHNOLOGIES FOR THE ENERGY TRANSITION AND THE CIRCULAR ECONOMY

CLIMATE, CIRCULAR ECONOMY, ENVIRONMENTAL SUSTAINABILITY



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NextChem
Maire Tecnimont for Energy Transition

The Green Circular Districts project saw widespread engagement. A total of twelve project proposals have been developed, all capable of bringing about significant environmental and socio-economic benefits. The studies carried out have led us to broaden the spectrum of potential technologies that could contribute to a green circular district model, as well as enabling us to take a closer look at potential synergies with stakeholders, utilities companies that manage waste, companies in the refining and heavy industry sectors that have sites to be recovered, potential off-takers of circular products, and administrations. Various accolades - such as the inclusion of our model in the 100 best practices report published by the Symbola Foundation for Italian companies and organizations of quality, in the book "What is the Circular Economy" by Emanuele Bompan, and in the technical guides produced by various organizations - serve as evidence of our capacity to innovate in this new sector too.

NextChem's know-how on green technologies has been further bolstered, with the arrival of various specialists and new experts. NextChem is growing in competence within a new territory, indispensable for the green and low carbon economy of the future. Similarly, the capacity of all Maire Tecnimont Group companies to offer technological, process and construction solutions with a lower carbon impact to the Group's traditional clients (and along traditional business lines) is growing, as is their general ability to improve energy efficiency and reduce pollutants. The design, construction and management of construction sites is the focus of a series of work streams for the reduction of emissions and environmental impact.

2.2 REDUCING OUR EMISSIONS: OUR PATH TO CARBON NEUTRALITY BY 2050

The protection and safeguarding of the environment are key factors and essential business objectives for the Maire Tecnimont Group. **The Group is continually committed in the control and mitigation of its impact on the ecosystem** as a result of the projects and activities conducted at its head offices.

The Maire Tecnimont Group's environmental policy is also defined during the engineering phase, and this represents an opportunity to propose technological modifications that could reduce environmental impact, leading to environmental and economic benefits for the client, for stakeholders and for the whole community.

The ISO 14001 Multisite certification is confirmation of our focus and ongoing efforts to implement an environmental management system at Group level. The Maire Tecnimont Group HSE Policy is implemented across all our companies and activities at all construction sites and offices: indeed, we conduct a detailed analysis to assess the importance of the activities that affect the environment, with any negative impact deriving from energy consumption, emissions into the atmosphere, spills into the soil and water, waste production and consumption of resources. The extension of smart working to all our Italian and foreign companies also represents an important factor in improving environmental performance, as it helps to reduce traffic, with all the implications of this in terms of noise and emissions of CO_2 and particulates.

ISO 14001
MULTI-SITE CERTIFICATION

Particular emphasis is placed on the measurement of GHG emissions and on the analysis of sources of emissions.

The quantification of emissions relating to the organization and along the entire value chain enables the Group to measure the positive effects of its investments in climate change mitigation, which aim to achieve carbon neutrality by 2030 on direct emissions[24] (Scope 1) and indirect emissions[25] (Scope 2), and before 2050 for all other indirect emissions (Scope 3).

With this in mind, over the course of last year Maire Tecnimont has continued with the programme to improve its reporting of environmental KPIs, including that in some of the categories most relevant to its business such as "Purchased Goods & Services", "Upstream Transportation", "Waste generated in Operations", "Business Travels" and "Employee Commuting". Maire Tecnimont's emissions calculation methodology is aligned with the leading international standards on the calculation of atmospheric emissions.

The table on the right shows the aggregate volume of direct greenhouse gas emissions in tonnes of CO_2 equivalent generated by Group activities ("Scope 1"), the indirect emissions deriving from the consumption of electricity ("Scope 2") and other indirect emissions ("Scope 3"), which overall make up the basis for comparison with the baseline.

In 2021, with reference to Scope 1 and 2, the Group reduced the intensity of greenhouse gas emissions for construction sites compared to the years 2020 and 2019 (pre-Covid), while for offices the figure is in line with that of 2020.

With regard to the Scope 1 and Scope 2 emissions, the data regarding offices saw benefits derived from smart working, as was the case for 2020. In 2021, the hours worked on construction sites increased, which led to a slight increase in emissions in terms of absolute values, but in terms of unitary hourly values, there was a reduction in environmental impact, which is mainly due to the progress made by the various construction sites and the change in the project phases themselves, as well as greater efficiency in terms of consumption and emissions thanks to the

24 *Produced directly by Maire Tecnimont Group's activities and operations from the use of fossil fuels such as natural gas, diesel and petrol.*
25 *Deriving from Maire Tecnimont Group's direct electricity consumption.*

GHG EMISSIONS

Year	Scope 1 emissions [tonnes of CO_2 eq.]			Scope 2 emissions [tonnes of CO_2 eq.]			Scope 3 emissions Business Travel & Commuting [tonnes of CO_2 eq.]
	HQs	Construction Sites	Total	HQs	Construction Sites	Total	Total
2018 baseline	814	221,262	**222,076**	9,256	22,331	**31,587**	**44,767**
2019	501	168,643	**169,144**	10,089	39,700	**49,789**	**40,303**
2020	327	35,957	**36,284**	6,789	9,456	**16,245**	**9,445**
2021	421	42,017	**42,438**	6,685	9,947	**16,632**	**29,377**

GHG EMISSION INTENSITY [kg CO_2/MAN HOURS WORKED]

Year	HQs	Construction Sites
2019	1.30	1.98
2020	0.85	1.16
2021	0.87	0.98

adoption of new processes and technologies ("Nextplant" project, see para. 4.2).

In addition to the emissions values for the Group as reported above, the values for the MyReplast™ plant are also added. The plant carries out the upcycling of plastic waste - through a process of mechanical recycling and compounding - in order to obtain recycled polymers of a high quality which offer excellent application-related performance, with the capacity to replace virgin plastics in many sectors. In 2019 its emissions were equal to 1,985 tonnes of CO_2 eq., 1,885 tonnes in 2020 and 3,164 tonnes of CO_2 eq. in 2021; the higher emissions compared to 2020 are a result of the implementation of an additional processing line.

The aforementioned trend in reduced emissions (as well as the forecasts for the next few years) are in line with the objectives set for 2023 and 2030. Specifically, for 2023, with a view to bolstering the climate mitigation objectives described above and in line with these, Maire Tecnimont included the 20% CO_2 reduction target in its ESG Agenda last year (Scope 1 + Scope 2 + Scope 3, for the "Business travel & Commuting" area only), calculated on the basis of the 2018 emissions ("baseline"). For 2030, we must remember that the goal is carbon neutrality for Scope 1 and 2 emissions, while by 2050, we aim to achieve carbon neutrality on Scope 3 emissions.

The table below shows the aggregate volume of indirect emissions included in Scope 3 ("Purchased Goods & Services", "Upstream Transportation" and "Waste generated in Operations"):

The increase in Scope 3 emissions observed in 2021 compared to 2020 can be attributed to a greater volume of expenditure and the relative mix of materials purchased, as well as to the different phases of the projects that exert an influence over the mix of waste produced by construction sites

SCOPE 3 EMISSIONS / OTHER EMISSIONS [TONNES OF CO_2 EQ.]

Year	Total
2019	933,746
2020	935,293
2021	1,572,140

during the year. The increase is partially offset by a reduction in emissions related to logistics, courtesy of the implementation of the transport optimization project (the so-called "green logistic plan").

With reference to emissions related to the supply chain, which represent over 90% of the total, **the Group has launched a strategic pathway to ensure that the chain of suppliers and sub-contractors are in line with the decarbonization objectives by 2050**. Specifically, a working group within the MeT Zero Task Force was set up in order to launch a structured process of engaging suppliers, both in terms of measurement methodologies and with regard to the best practices to be adopted in order to direct the supply chain towards the decarbonization objectives set by the United Nations.

THE MET ZERO TASK FORCE

2021 saw the establishment of the Met Zero Task Force, dedicated to the Group's journey towards carbon neutrality. Achieving the objectives of:

- A 20% reduction in Scope 1 and 2 emissions by 2023, with the addition of those related to business travel & commuting (compared to the 2018 baseline)
- Carbon neutrality on Scope 1 and 2 emissions by 2030
- Carbon neutrality on Scope 3 emissions by 2050 will require work in two parallel areas (one short and medium-term, for the Scope 1 and 2 emissions, and one long-term, for the Scope 3 emissions), with foci relating to the sources of emissions.

The Task Force has a joint leadership, with the corporate figures involved in sustainability and

SUSTAINABILITY: AN INCLUSIVE APPROACH

Ilaria Catastini
Group Sustainability Head of Department
MAIRE TECNIMONT

Maire Tecnimont's sustainability strategy was presented last year and has already begun to progress towards the key objectives that were originally established. What is the approach being taken?

The sharing and creation of internal expertise are essential. Equally, the multitude of rich skills that we have within the Group may create a level of widespread know-how within the company that renders it capable of enabling the sustainable transition, both internally and along the value chain. Our Group is a community of high-value professionals, mostly engineers, whose guiding star lies in the excellence of their work. Today it is clear that achieving excellence in our sector also means taking into account the environmental and social impact of our business, mitigating the negative and amplifying the positive one; we are working on this important challenge.

Fantastic. Can you give us an example?

The Met Zero Task Force, which I proposed to establish in order to address the issue of reducing our direct and indirect GHG emissions, as well as in order to draw a roadmap towards carbon neutrality, in accordance with the objectives we set ourselves for 2030 and 2050; in 2021, the Task Force was launched, and began working at great speed. We are not big emitters as far as engineering companies and EPC contractors go, but we still have important work to do. This Task Force is composed of around fifteen colleagues who are further supported by others with their respective areas of expertise, in accordance with the areas which correspond to the various types of emission sources. We are developing precise action plans whilst also refining the methods of data collection and calculation of the indicators.

Any other examples?

The Green Village project, a new model for our construction sites, inspired by energy efficiency, the use of renewables, the reduction and recovery of water and waste and also the well-being of our people, through inclusiveness and multiculturalism. The working group developing this model has accepted the challenge with enthusiasm, intelligence and creativity. The Biolubricants Observatory, a NextChem multi-stakeholder laboratory where we bring together different players from the supply chain, to create shared knowledge and to develop demand for a new green chemical product. Over 600 man-hours of internal training on European regulations to combat climate change.
A modern, horizontal, open, inclusive approach to work, with women well represented in these working groups, which also involve people of a mix of ages and degrees of corporate seniority.

organization on the one hand, and the permanent involvement of around fifteen people delegated by the respective departments - covering the areas of engineering, construction, organization, logistics, general services and sustainability - on the other. The Task Force was then divided into four vertical working groups, created in order to combat the different sources of emissions with action plans which aim to reduce the emissions generated by:

1. Acquisition of goods and services;
2. Logistics and packaging;
3. Energy consumed by offices and by travel (home-work trips and business trips);
4. Activities on construction sites.

The action plans under development foresee a synergistic approach to the work, both between different departments within the company and also with suppliers. In particular, the plans that are currently being finalized are assessing how to achieve:

- The reduction of energy consumption at our places of work, the installation of photovoltaic systems for self-consumption of renewable energy, the purchase of certified renewable energy;
- Greater energy efficiency and the replacement of fossil fuels on our construction sites;
- Changes in the car fleet to increase the number of electric vehicles present, agreements and concessions for the sustainable mobility of employees;
- The engagement of our suppliers, both in terms of the purchase of equipment and with regard to logistics, to support them as they move through the process of reducing emissions and to develop solutions for more sustainable packaging use.

LIFE CYLE ASSESSMENT

The Group is actively involved in the development of "LCA" (Life Cycle Assessment) analyses in order to assess the impact of its plant technologies.

The adoption of LCA tools began in 2020, with NextChem. We have applied the methodology to our proprietary technologies for the production of renewable diesel and for the upcycling of plastics, as well as for projects currently being developed with waste-to-chemical technology.

ENERGY EFFICIENCY

The Maire Tecnimont Group's energy intensity factors are calculated using both direct and indirect energy consumption as a numerator, and hours worked as a denominator. Hours worked are seen as representative of the Group's overall activity.

In 2021, the energy intensity indicator decreased compared to 2020 for all our construction sites, while for our offices, the data is in line with the 2020 values and is affected by the lower use of office due to the Covid-19 pandemic and

THE EEE PROJECT – ENERGY EFFICIENCY ENGINEERING

The pilot project "Energy Efficiency and Carbon Footprint Reduction" consists of a study implemented in order to identify new design solutions - applicable to EPC projects - for the reduction of the Group's carbon footprint and for the improvement of energy efficiency in compliance with the Equator Principles IV: international guidelines adopted by the institutions that finance the construction of infrastructures and industrial plants.

The case analysed in the study is a petrochemical plant designed, built and commissioned by Tecnimont, launched in 2013.

Beginning with the existing project, thirty-two ideas were identified, from which more than forty alternative energy efficiency solutions have been developed. These ideas were then categorized and classified according to their anticipated effectiveness in terms of GHG costs/benefits, and compared the results achieved under the original project. Each solution was quantified and evaluated in terms of energy consumption, cost and Scope 1/ Scope 2 emissions - as defined in the Greenhouse Gas Protocol - using certified software. The solutions were then classified into four categories, on the basis of their reduction/ increase in greenhouse gas emissions and the reduction/increase in costs.

The methodology developed through this study represents a tool that can be used to identify the solutions that enable a reduction in emissions, and which can be applied in the design phase or proposed to clients who are already in the offer phase, adding value to the plants in terms of sustainability and GHG emissions.

the application of smart working. For our offices, it went from 6,785 kJ in 2020 to 7,030 kJ in 2021, while for construction sites it was reduced from 14,203 in 2020 to 12,088 kJ in 2021. This testifies to a percentage reduction in the environmental impact of the Group's activities, attributable in part to the various work phases and to our focus on these issues.

The following main consumptions are monitored for continuous improvement:
- natural gas for heating offices;
- electricity for air conditioning, computer equipment, lighting, etc.;
- fuel for power needed for emergency generators and heating units;
- fuel for private and public transport for employees' journeys to work;
- fuel for the transportation of suppliers' goods or services.

The Maire Tecnimont Group monitors the energy consumption of temporary facilities at its construction sites, including operating and machine power consumption, suppliers' materials and the private vehicles used by sub-contractors[26].

26 *For more details on energy consumption, see the data in Appendix – Sustainability Performance.*

THE "GREEN VILLAGE" PILOT PROJECT

What is the goal of the Green Village project?

The purpose of the Green Village Project is to design support fields for construction sites with a new type of identity, with a focus on the themes of sustainability, energy efficiency and environmental impact. Attention will also be paid to the comfort and liveability of the spaces for the people who will live there. The master plan is established on various key directives and functional areas so that each area is clearly identifiable and organized in a reproducible framework for prefabricated modules. Each module is designed to be reused and potentially reconverted for different purposes, based on the client's needs at the end of its use.

Why is it "sustainable"?

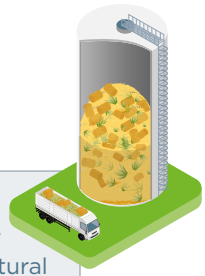
A focus on sustainability includes the application of a series of solutions to the Village and to the facilities, which are designed to:
a) reduce energy consumption through the use of materials with high thermal insulation, limiting consumption from air conditioning;
b) install photovoltaic panels on the roofs of buildings and car parks for the production of electricity from solar sources, reducing emissions from diesel generators;
c) further reduce CO_2 emissions by using electric means of transport and supporting and promoting the planting of trees and green areas to compensate for the CO_2 produced;
d) optimize water consumption through a wastewater purification system to irrigate green areas;
e) encourage the use of recycled and recyclable materials for the construction of the Village and convert food waste into biogas for cooking.

Can the "Green Village" model be applied anywhere?

The modular nature of the project ensures ease of assembly, adaptability and scalability, flexibility and contestability. Each village is divided into three urban macro-areas: a residential area, an area for buildings and public spaces and a sports area for leisure activities.
Public spaces and private spaces will be interspersed with one another in an urban network that will enable greater socialization of the village community. The modular geometry model, initially tested for use on construction sites in hot countries, will also be proposed for construction sites built in geographical areas with different climatic conditions.
With this premise, the Green Village will be a highly distinctive place in terms of the presence of Maire Tecnimont within the territory, through its widely recognized identity and the innovative approach to sustainability issues.

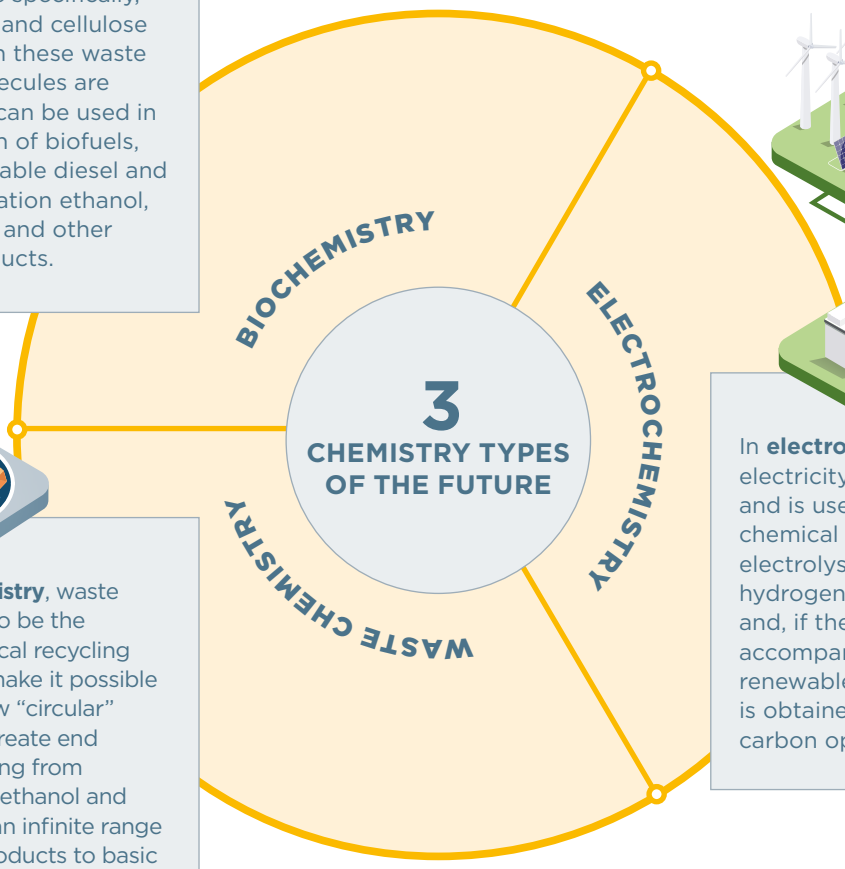
2.3 TECHNOLOGIES FOR THE ENERGY TRANSITION

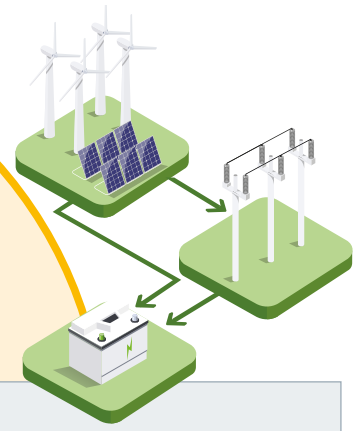
One of the challenges that has the highest priority on the journey towards the energy transition is the **decarbonization of the traditional and hard to abate industrial sectors**. If before the transformation of natural resources always began with oil or gas, the energy transition must start from other sources: renewables to power the process, based on the **three chemistry types of the future**: waste chemistry, biochemistry and electrochemistry.



In **biochemistry**, the new raw materials are agricultural residues: more specifically, vegetable, fat and cellulose residues. From these waste products, molecules are selected that can be used in the production of biofuels, such as renewable diesel and second-generation ethanol, bio-lubricants and other chemical products.

In **waste chemistry**, waste is considered to be the new oil. Chemical recycling technologies make it possible to produce new "circular" molecules to create end products ranging from hydrogen to methanol and ethanol, from an infinite range of chemical products to basic monomers used to produce new plastics, all with a lower carbon impact.





In **electrochemistry**, electricity takes centre stage, and is used to obtain various chemical products. With electrolysis, for example, hydrogen can be produced and, if the process is accompanied by the use of renewables, green hydrogen is obtained - the only zero carbon option!

AN INTEGRATED PORTFOLIO

Valerio Coppini
Business Development Vice President
NEXTCHEM

What have been the distinctive steps in terms of the technologies related to the capture and use of CO_2?

The two contracts signed in 2021 with Eni and with Paul Wurth SMS are linked to the issue of decarbonization in hard to abate industries, one of the areas in which we operate as a business. The first of these pertains to the capture of CO_2, while the second regards an experimental technology based on the replacement of coal with a reducing gas produced from natural gas, with lower overall CO_2 emissions. In the steel sector, the CPO technology for the production of metals through CO_2 capture and the use thereof for the production fertilizers is of particular importance. At present, it is less expensive to release emissions into the atmosphere than to recover them. A rise in taxes will make recovery, rather than release, the "cheapest" option. In the port of Rotterdam, Total and Shell have created the largest hub ("Portos") for the collection of CO_2; this will then be stored in various submarine fields in the North Sea. Eni Ravenna is creating a similar project to store both its own CO_2 and that of other operators.

What is the approach being taking in the plastics sector?

We are thinking about a model in which most of the plastic used comes from recycling, both chemical and physical, and as such, avoids using fossil sources. The delta can consist of bioplastics that are both biodegradable and bio-compostable. In 2021, we focused on PLA. The total plastics produced in the world amount to around 350 M tonnes; bioplastics account for around one million tonnes, of which PLA makes up around 300K tonnes, so today the numbers for the latter are very marginal, although they are growing.

How do the different recycling technologies of the NextChem portfolio integrate with one another?

The various NextChem technologies for recycling are not in competition with one another; rather, they are complementary: Upcycling, for the 10% of plastic waste which is an excellent mechanically recyclable product; pyrolysis, for 30% of plastic waste which consists of flexible packaging (referred to as film), which cannot be subjected to mechanical recycling, and gasification for the remaining 60% of the hard-to-manage waste that would otherwise end up in the incinerator. DEMETO technology may be our leading technology for the recycling of polyesters from textile waste, a market that is still very young.

2.4 MAIRE TECNIMONT FOR THE CIRCULAR ECONOMY

On the path towards the energy transition, **Maire Tecnimont is applying its know-how and process experience to green chemistry**: approaching this challenge as a **transition enabler**, we want to take our identity as transformers of natural resources and apply this in a world which, instead of using hydrocarbons as a starting point, turns to other renewable natural resources, preventing waste and keeping climate-altering emissions to a minimum.

THE GREEN CIRCULAR DISTRICT MODEL

Through its subsidiary NextChem, **the Maire Tecnimont Group has developed a Green Circular District model**, which integrates the technology for upcycling and chemical recycling of plastic and dry waste into syngas and circular chemicals with technologies for the production of hydrogen from renewable sources via electrolysis.

This model integrates proprietary and licensed technologies that are already validated and available, and ready to be implemented on site.

Discover the new website of the Green Circular District

WEBSITE

The Green Circular District aims to convert brownfield industrial sites according to green principles, especially in the petrochemical and steel sectors. The goal of the Green Circular District is to produce recycled polymers to replace virgin plastics, along with low carbon chemicals that can be used in various industrial chains, such as the furniture and chemical industries and the transport sector, through the recovery of waste.

THE BENEFITS OF THE GREEN CIRCULAR DISTRICT

The NextChem model is a **virtuous model for the relaunch of the green economy**: it combines circular economy principles with the decarbonization objectives for the development and recovery of traditional sites dedicated to fossil sources; it is indispensable for a green relaunch of the local economy, with the creation of new jobs and honing of new skills. Finally, the production of chemicals that serve as building blocks for the industry using existing sites and waste as feedstocks reduces the use of virgin raw materials.

In addition to the environmental benefits, **the Green Circular District model would also enable dependence on imports to be reduced for many European countries**: all of the ethanol used in Europe is imported from non-EU countries, such as the United States.

The aim of the model is to enable the synergistic production of high-quality recycled polymers from mechanically recyclable plastics and low-carbon chemicals, and of fuels from non-recyclable waste, while supporting the green conversion of industry (primarily refineries) by reducing their emissions.

THE TECHNOLOGIES OF THE GREEN CIRCULAR DISTRICT UPCYCLING

Upcycling is a technology that allows post-consumer plastic waste to be mechanically recycled, and, through a subsequent chemical compounding treatment of the flakes (i.e. exploitation of the material through a process of improvement of the chemical-physical characteristics and subsequent extrusion into granules), **enables recycled polymers with high added value to be obtained**; these have the same properties as plastic from fossil sources. This serves to bridge the qualitative gap between recycled plastics and virgin plastics by allowing these recycled polymers to be used in a variety of market applications. As such, upcycling technology adds value to the finished product (hence "Up").

Furthermore, upcycling is based on the so-called "reverse approach": thanks to the characteristics of this technology, the polymers can be structured in accordance with the specific needs of the client. Upcycling gives plastic waste a second life as

Upcycling

Upcycling of post-consumer plastics allows for quality products to be obtained by transforming plastic waste into a secondary raw material.

GREEN CIRCULAR DISTRICT

secondary raw materials: MyReplast™ products have obtained EuCertPlast and Plastic Second Life certification. MyReplast™ products are tailor-made on the basis of specific client requests and needs: NextChem not only takes a "catalogue" approach, but also a "client approach", developing the final product together with the client in accordance with the chemical-physical characteristics required.

MyReplast™ upcycling technology is installed in the plant located in Bedizzole, in the province of Brescia, Lombardy, which is managed by the NextChem subsidiary MyReplast Industries. The Bedizzole plant has a capacity of 40,000 tonnes per year and a recycling efficiency of 95%.

MyReplast™

NextChem has registered the MyReplast™ trademark, which covers both the technology and the products deriving from the proprietary process.

WASTE TO CHEMICALS

NextChem has identified a solution that also enables all types of waste that traditional mechanical recycling cannot handle to be exploited, thus preventing these from being incinerated or sent to landfill. This chemical recycling solution, which is called Waste to Chemicals, does not compete with mechanical recycling, but rather integrates with it in a symbiotic way. **MyRechemical is the NextChem company entirely dedicated to Waste to Chemicals technology.**

The waste that can be recovered via chemical recycling includes, for example, the waste from the selection process of plastic packaging from urban waste sorting, RDF (Refuse Derived Fuels) and the so-called "dry fraction" of waste deriving from the mechanical-biological treatment of non-sorted waste. By means of a process of chemical conversion, which recovers the hydrogen and carbon contained within these waste types, a synthesis gas is obtained, from which compounds such as hydrogen, ammonia, methanol and ethanol are produced.

Chemical recycling is a thermal process, but it differs from incineration in that the chemical conversion takes place by means of oxygen, and not by reaching the combustion temperature. The process is defined as "partial oxidation" and uses pure oxygen as an oxidizing agent. The conversion phase is followed by a subsequent purification phase, which prevents pollutants from being emitted into the atmosphere. The gas obtained can be considered "circular", as it is derived from post-consumer materials which are therefore recovered. The low levels of CO_2 emitted during the process are compensated for by the amount saved by avoiding the incineration of the waste, which is recovered instead. The process residues are inert and can be reused in industrial applications, for example in the brick sector.

Circular Gas™

NextChem has registered the Circular Gas™ trademark.

GREEN HYDROGEN FROM ELECTROLYSIS

The Green Circular District model also provides for the application of electrolysis technology, a process that enables the conversion of electrical energy into chemical energy. If electrolysis is powered by renewable energy sources, the hydrogen it produces is called green hydrogen - the most sustainable form. Green hydrogen becomes an energy carrier with very low

Chemical Recycling

Chemical recycling makes it possible to obtain circular chemicals and fuels from non-recyclable municipal waste.

GREEN CIRCULAR DISTRICT

emissions, and it also constitutes a raw material for the production of further chemical products that are characterized by a low level of associated emissions. The splitting reaction of the water molecule into its two constituent elements — hydrogen (H_2) and oxygen (O_2) — takes place thanks to two electrodes, the cathode and the anode; here, hydrogen and oxygen are released respectively. These two gases are separated inside the electrolyser by membranes and diaphragms integrated into the machine, and are then sent to a purification system which uses washing with water and subsequent dehydration, before finally being compressed and made available for the desired use. In the future, renewable hydrogen will represent one of the most flexible carbon-neutral energy carriers with the greatest potential for development and penetration in various sectors, such as energy, mobility, heating and the decarbonization of industrial processes, where it can be used both as a source of thermal energy and as a raw material.

Where electrolysis is integrated within a Green Circular District, the addition of renewable hydrogen to the Waste to Chemicals process increases its yield. Indeed, by assisting in the fixation of CO_2, it improves the conversion of carbon into products with high added value, which can be used to replace products of fossil origin. Furthermore, again with regard to the use of electrolysis technology within the Green Circular District, it is also possible to exploit and recover the oxygen that is co-produced by the electrolyser, using it in the conversion units and further increasing the efficiency of the system, thus obtaining a solution that is 100% circular. **Thanks to the integration of green hydrogen production via electrolysis into Waste to Chemicals technology in the Green Circular District technical platform, the carbon footprint is further reduced, optimizing the entire process.**

Watch the video of the Green Circular District

VIDEO

Green Hydrogen

Green hydrogen is the most sustainable type of hydrogen and is obtained through electrolysis technology from renewable sources.

GREEN CIRCULAR DISTRICT

THE BEDIZZOLE UPCYCLING PLANT

The mechanical recycling plant at Bedizzole enabled approximately 28 thousand tonnes of plastic to be treated in 2021, with a total saving of CO_2 equivalent of almost 40 thousand tonnes.

The purity and quality of the products are constantly tested and monitored in a cutting-edge internal laboratory.

In 2021, the compounding lines were merged with the selection lines, creating a single complex and expanding the structure.

BELUGA: THE FIRST SAILING BOAT IN THE WORLD MADE WITH MYREPLAST™ RECYCLED PLASTIC MATERIAL

NextChem and Caracol produced the first 3D-printed monocoque sailing boat made with MyReplast™ recycled plastic material, and it was presented at Milan Design Week in September 2021.

MyReplast™ is an example of how recycled materials can be successfully used for the production of advanced components that meet high performance requirements.


Forbes

Caracol e NextChem hanno ideato la prima barca vela stampata in 3D con materiale riciclato


24 ORE

Beluga, la barca a vela stampata in 3D con polimeri riciclati


Economy

Beluga, da NextChem e Caracol la barca a vela in materiale riciclato

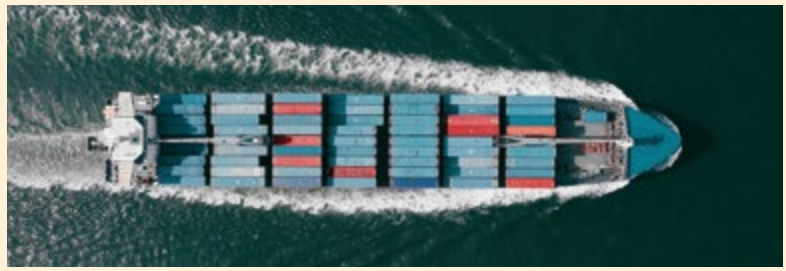
BIOPLASTICS

NextChem is working to increase the availability of sustainable plastics in Europe. In April 2021, NextChem signed an agreement with Total Corbion, a 50% joint venture between Total and Corbion, to create a Front End Engineering Design for a polylactic acid (PLA) plant in Grandpuits, France designed to handle 100,000 tonnes per year.

The plant, which is expected to be operational in 2024, will be the first of its kind in Europe: Maire Tecnimont's experience in the polymerization of traditional plastics together with NextChem's portfolio of innovative solutions for green chemistry will guarantee the expertise required to manage an industrial initiative of this type.

WITH JOHNSON MATTHEY FOR WASTE TO METHANOL

In 2021, NextChem signed an agreement with Johnson Matthey for the commercial development of the Waste to methanol technology on a global scale; this is based on the chemical conversion of non-recyclable municipal waste into a synthesis gas from which methanol is obtained.



CHEMICAL RECYCLING

"Chemical recycling" is a type of chemical treatment of certain types of waste, which allows these to be converted into new substances (liquid, gaseous, solid); these in turn serve as inputs for further industrial processes. Chemical recycling includes different types of processes, for example gasification with partial oxidation and production of synthesis gas, or pyrolysis with production of pyrolysis oil, or finally depolymerization in order to obtain a basic monomer. Each of these processes gives rise to different outputs:

THE AGREEMENT WITH ACCIAIERIE D'ITALIA FOR A FEASIBILITY STUDY ON THE DECARBONIZATION OF THE STEEL INDUSTRY OF TARANTO

NextChem has signed an agreement with Acciaierie d'Italia, Italy's biggest steel group, for a feasibility study on the use of circular gas (syngas) obtained through NextChem's chemical recycling technology in the Taranto steel plant; this would be based on the recovery of carbon and hydrogen contained within plastic and dry waste through a partial oxidation process. NextChem technology enables a circular gas to be obtained, which can then be used both in the refining processes and in the steel production cycle to reduce carbon dioxide emissions.

THE 12 PROJECTS NEXTCHEM WORKED ON IN 2021

In 2021, through its subsidiary MyRechemical, NextChem worked on the hypotheses for the implementation of 12 projects in Italy, with the goal of rolling out and applying the Green Circular District circular economy model on a national scale. The model is aimed at enabling the use of innovative green chemistry technologies in production sites used by traditional and heavy industry. The construction of these plants would represent an investment of 4.8 billion euros, and would provide for the production of 153 thousand tonnes of circular ethanol per year, along with 868 thousand tonnes of circular methanol, 63 thousand tonnes of circular hydrogen and 445 thousand tonnes of synthesis gas per year, against a 2.42 million tonne reduction in carbon dioxide and the recovery of 3.06 million tonnes of waste.

A WORLD OF CIRCULAR MOLECULES

Giacomo Rispoli
Managing Director
MYRECHEMICAL

What is MyRechemical's mission?

MyRechemical is the NextChem company that deals with promoting and developing waste-to-chemical technology, a variation on the concept of circular economy in which waste becomes a new raw material to fuel industrial processes. The carbon and hydrogen contained in the waste form the basis of the circular molecules obtained through this process.

Which molecules might be of interest to the market?

Definitely hydrogen, ethanol and methanol. These are products that can be used for sustainable mobility such as ("biofuel-like") recycled carbon fuels, as low-carbon-footprint components for use in internal combustion engines as well as basic chemicals for the manufacturing industry. Circular methanol, for example, is seen as an alternative to fuel oil for shipping.
Producing ethanol or methanol from waste makes it possible to replace a significant amount of gasoline, and therefore of the oil needed to produce it, with a low-emission product.
If the six million tons of waste currently produced every year in Italy and sent to landfillwere converted into methanol, it could produce 3 million tons of low-emission methanol, which corresponds to about 1.5 million tons of gasoline equivalent. In other words, oil imports would be reduced by a volume of 6-7 million tons.

Where can waste-to-chemical plants be set up?

We have focused mainly on refineries because European refineries, built 50-60 years ago, are unable to compete with the modern mega-complexes built in the Middle East. A crisis of demand and a structural crisis. These refineries embody very significant technical expertise and industrial infrastructures, and with our conceptual waste-to-chemical method we can offer an industrial recovery pathway both in Italy and within Europe. We are also registering great interest from the large Italian and European multi-utility companies that face a future of increasing costs of CO_2 emissions and that now need to adapt to technological progress. We have several projects at an advanced planning stage in Italy and initiatives underway in Europe and North Africa, too.

Discover more about the Green Circular District

WEBSITE

chemicals with low CO_2 emissions which can be used in the plastics supply chain, in the alternative fuel supply chain or in the industrial green chemical or consumer goods supply chains.

Chemical recycling does not conflict or compete with mechanical recycling; indeed, gasification uses certain types of waste as an input that would not be suitable for mechanical recycling, both for economic reasons, legal reasons (as in the case of packaging waste containing dangerous substances), and above all, for technical reasons - examples of this include waste that is a by-product of the same mechanical recycling processes, the dry fraction of unsorted waste or combustible RDF, or waste from the textile chain that has a carbon base. These fractions of waste are currently incinerated, disposed of in landfill sites or sent abroad; each of these methods has a high environmental and economic impact, as well as wasting resources in a way that is incompatible with the principle of circular economy. Gasification makes it possible to obtain circular "products" (in their gaseous or liquid state) that can be used in various industrial chains for the production of durable goods, of chemical substances that are inputs to other industrial processes, or of recycled carbon fuels. This technology makes it possible to reduce the use of incineration/landfill, as required by the EU, and enables the production of fuels that contribute to the achievement of the European transport decarbonization targets - for Italy, this is set at 16% of gross final energy consumption by 2030.

The Waste to Chemicals and Waste to Fuels solutions, which NextChem is working on through its subsidiary MyRechemical, enable waste to be transformed into high quality chemical materials and low-carbon fuels, such as hydrogen, methanol and ethanol. Waste that is no longer recyclable is currently disposed of in landfills or by incineration, but the European Union's guidelines stipulate that the rates of incineration must be greatly reduced in the near future, in line with the European energy development strategies. **The solution proposed by Maire Tecnimont is therefore a valid alternative, which will reduce, and in some cases eliminate, the use of landfills so that Italy can avoid the imposition of sanctions envizaged by the EU.**

PYROLYSIS

We are deeply committed to finding solutions to make plastics more sustainable throughout their entire life cycle, in order to contribute to a new circular and low-carbon economy. NextChem is also investing heavily in pyrolysis, a technology that allows plastic waste to be transformed into low-carbon fuels, which can then be further improved by making them into Sustainable Aviation Fuel.

NextChem has signed with an agreement with Agilyx Corporation - a pioneer in advanced post-consumer plastic recycling - to support the development of advanced chemical recycling facilities worldwide. The agreement integrates Agilyx's advanced pyrolysis technology with the expertise of NextChem, a leader in licensing, development and EPC services for plastic recycling solutions. The objective of the partnership, in this initial phase, is to develop a series of chemical recycling projects for third parties. The initial focus will be on two projects that have already been identified, one in Europe and one in South America. In addition, the agreement would represent an opportunity for co-investments in specific projects, with a view to accelerating the global commercial pipeline.

DEPOLYMERIZATION

NextChem is also involved in depolymerization and has assumed the role of coordinator of the DEMETO project, funded by the European Union. The project aims to provide a response to the age-old problem of recycling plastic

DEMETO demonstration plant by NextChem

materials and, more specifically, of polyethylene terephthalate (PET), a polymer belonging to the polyesters class of plastics. **The goal of the DEMETO project is to develop the chemical recycling technologies for PET and polyester-based textile fibres**; these solutions are based on the alkaline hydrolysis reaction and are assisted by the use of microwaves to significantly reduce reaction times.

NextChem, as coordinator of the consortium of 14 partners which cover the entire PET value chain (3V Tech, SPINDOX, Technical University of Denmark, The European Outdoor Group, EuPC, The Fricke and Mallah GmbH, GR3N, H&M Group, NEOGROUP, NextChem, RECUPRENDA, PETCIA, SUPSI, Synesis), is responsible for the design and construction of the pilot plant. The plant, which is based in Chieti, was completed in 2021, and relies on technologies which use packaging waste and textile material as a starting point, with a view to producing monomers with a very high level of purity.

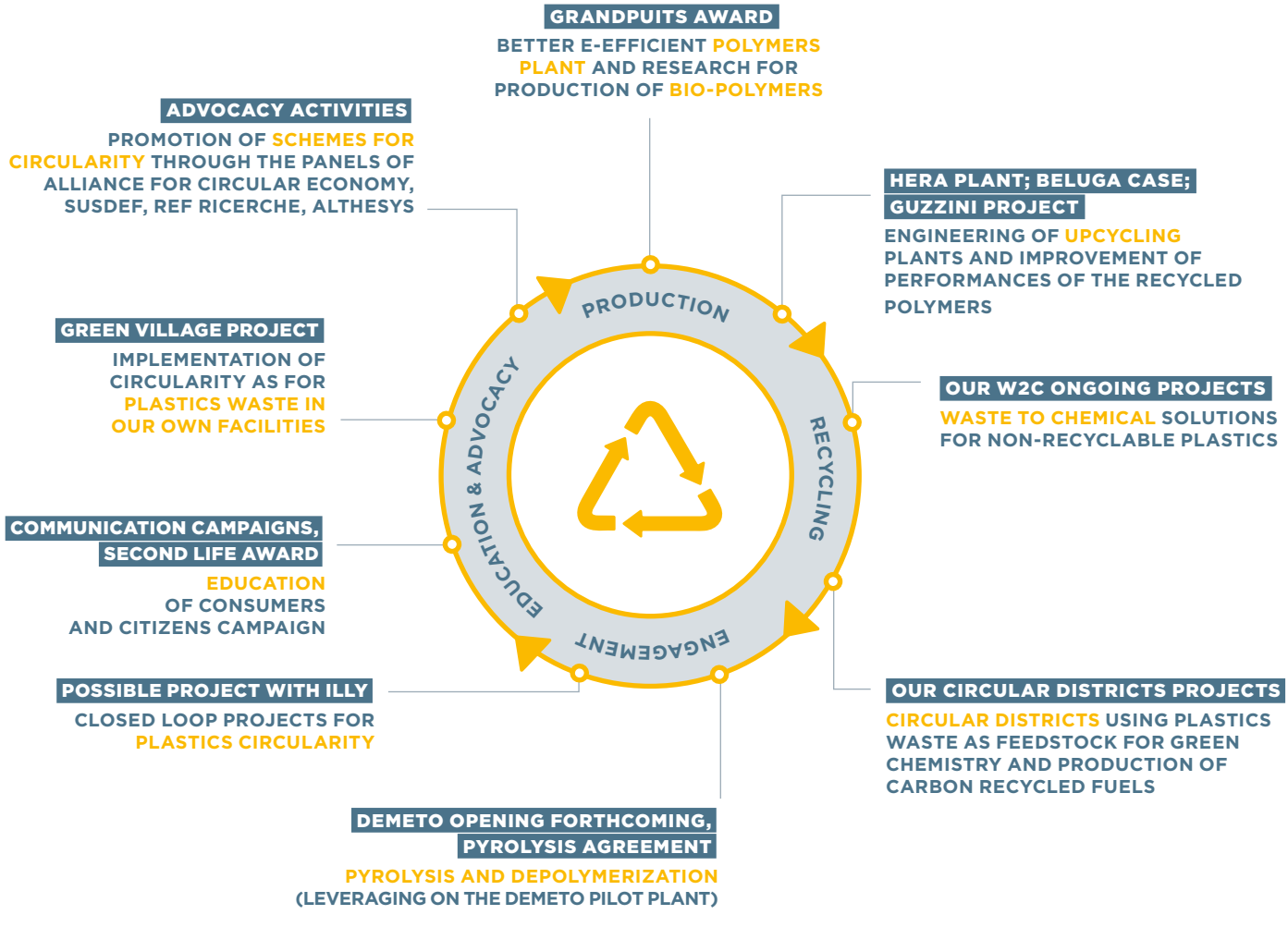
The capacity of the plant is equal to 60 kg/h of incoming material to be recycled. In light of the fact that as of 2025, the separate collection of fibres will be mandatory, the plant and the technology on which it is based are of strategic importance.

Indeed, all incoming PET is recovered, with an estimated 500kg per day of recycled PET outgoing. On the subject of plastics, the range of solutions that Maire Tecnimont is developing to reduce impacts and improve sustainability throughout the various stages of the life cycle is broad, and is being further enriched with new design guidelines and initiatives.

Watch the video of the DEMETO project

VIDEO

ENABLER OF PLASTICS SUSTAINABILITY ACROSS LIFE CYCLE



2.5 WELCOME TO earthH_2: MAIRE TECNIMONT'S STRATEGY FOR HYDROGEN

Hydrogen is emerging as a key element for the energy transition. In fact, hydrogen lies at the heart of the challenges relating to global warming and its characteristics make it a fundamental energy vector, as it can be used as a fuel and as a chemical raw material in many industrial processes and can be stored and transported over long distances.

According to forecasts published in November 2021 by the Hydrogen Council, by 2050 the demand for renewable and low-emission hydrogen could reach about 660 million tons, constituting 22% of final energy demand globally. It will play a key role in the decarbonization process and can be used in the transport sector, as a raw material in various industrial sectors, such as the steel and chemical industries, and as a building block for the production of multiple products, such as fertilizers.

In 2020, the global demand for hydrogen reached 90 Mt and was met almost entirely by production from natural gas reforming, coal gasification and lignite. In the same year, hydrogen production, given the dominant presence of fossil sources, emitted 900 Mt of climate-altering emissions into the atmosphere (IEA, 2021). NextChem has adopted a unique business model capable of responding to the needs of the new developing hydrogen market in order to meet the global challenges of using hydrogen to decarbonize the industry. Leveraging the capabilities of the Maire Tecnimont group, **NextChem positions itself both as a project developer and co-investor in the development phases of projects, as an industrializer and integrator of innovative technologies and, finally, as an EPC contractor in the implementation phases.**

Thanks to the technical skills of a leading engineering company in the energy, petrochemical and fertilizer sectors, Maire Tecnimont represents the ideal link between the world of renewables and the world of process industry and is positioned, via NextChem, as the best possible partner for any type of end-to-end project linked to the decarbonization of industrial processes.

Discover more about the low carbon hydrogen

WEBSITE

The Group's structure, which incorporates various companies with specific areas of expertise, means that Maire Tecnimont, via NextChem, is able to develop, engineer and implement renewable hydrogen-based solutions that span the entire value chain. In fact, NextChem's offering ranges from the construction of renewable energy production plants (solar and wind power, via Neosia Renewables) to production plants for high-added-value chemical compounds that use renewable or low-emission hydrogen such as feedstock.

THE THREE LOW-EMISSION HYDROGEN TECHNOLOGIES IN THE PORTFOLIO

NextChem has developed three technologies for the production of three different types of low-carbon hydrogen from renewable sources, which allow for a significant reduction in emissions:

ELECTRICBLUE HYDROGEN™

The first is ElectricBlue Hydrogen™, based on traditional know-how but involving the use of electricity to power the endothermic reactions of steam methane reforming. The architecture of ElectricBlue Hydrogen™ is very similar to that of the steam reformer but the innovation, in addition to the capturing of CO_2, lies in the electrification of the process, which also now makes it possible to use feedstock from renewable sources to supply the reaction heat. ElectricBlue Hydrogen™ significantly reduces the amount of CO_2 emitted compared to the traditional system. Furthermore, thanks to an effective CO_2 capturing process involving a higher partial pressure, it is possible to obtain a further reduction in the CO_2 emitted and the process requires less energy.

This technology makes it possible to do the following:

- achieve zero NOX, CO, SOx and particulate matter emissions;
- reduce CO_2 emissions by 45%;
- produce volumes of hydrogen that are four times greater than with an electrolyser using the same quantity of feedstock;
- reduce energy waste.

GREEN HYDROGEN

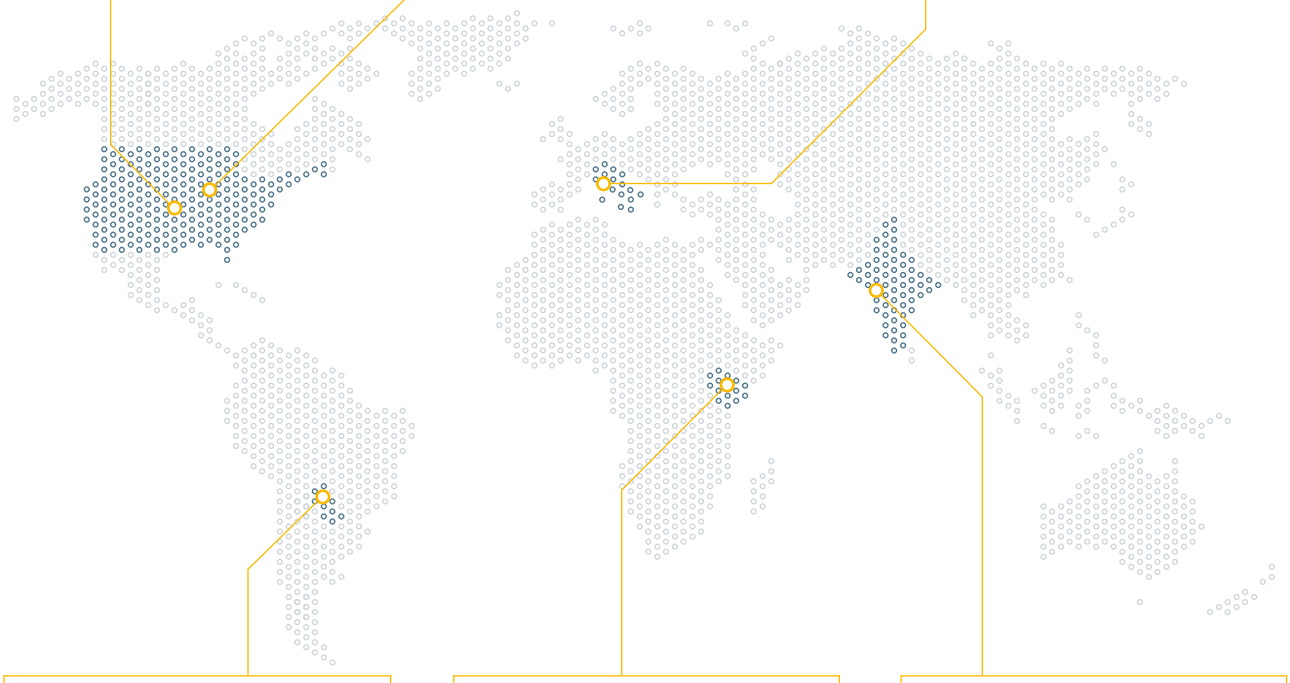
NextChem's portfolio also includes the **production of hydrogen from electrolysis powered by energy from renewable sources, known as green hydrogen**. Water electrolysis is an electrochemical process that makes it possible to transform electricity into chemical energy. It is the most sustainable form of hydrogen production, for which the costs of energy supply from RES and of the electricity generator are decreasing over time, even if the use of energy from RES and the corresponding discontinuity of energy supply have a direct impact on production costs, which are still too high in relation to the production costs associated with grey hydrogen. Despite this, interest in the technology is growing, and green hydrogen is competing with both fossil fuels and other shades of hydrogen because it is the only zero-carbon option. For a widespread application of hydrogen, it is necessary to produce a volume that will meet the demands of industrial processes, exploiting sectoral synergies, investing in the cost aspect and making the energy system more flexible. It is important that the main players be the EPC contractors, as they are familiar with each phase of the individual processes and the technologies that play a functional role in production.

MAIN GREEN HYDROGEN INITIATIVES IN 2020 & 2021

GREEN H_2 PRODUCTION AND STORAGE, US
Client: ENEL Green Power
Contract: MoU
Capacity: Confidential
Year: 2020

GREEN H_2 PRODUCTION FOR GREEN AMMONIA
Client: Greenfield Nitrogen
Contract: FS
Capacity: 240 mtpd
Year: 2021

GREEN H_2 PRODUCTION PLANT
Client: Mytilineos
Contract: FS
Capacity: Confidential
Year: 2021



GREEN H_2 PRODUCTION FOR GREEN AMMONIA
Client: FerSam
Contract: FS
Capacity: Undisclosed
Year: 2021

GREEN H_2 PRODUCTION FOR GREEN FERTILIZERS
Client: Confidential
Contract: FS
Capacity: 70 MW
Year: 2021

GREEN H_2 PRODUCTION FOR GREEN CHEMICALS
Client: Adani Group
Contract: MoU
Year: 2021

THE PROJECTS

NextChem is developing several projects for producing green hydrogen and integrating it into decarbonized chemical processes, including the construction of a plant in the United States with Enel Green Power North America, Inc. (EGPNA). The project in question involves the provision of renewable energy from EGPNA's solar plant in America for the production of green hydrogen to be supplied to a bio-refinery. In 2021, NextChem and MYTILINEOS signed an agreement for engineering work on the development of a plant for producing green hydrogen by means of electrolysis in Italy. The plant will provide local buyers with a carbon-neutral energy carrier alternative that could enable the actual decarbonization of hard to abate sectors.

NextChem, together with many other major players in the sector, also took part in the Joint Industry Project (JIP) aimed at ensuring reliable, safe and cost-effective hydrogen production systems that use electrolysers for green hydrogen growth. The Joint Industry Project recognises the importance of green hydrogen in the journey to the energy transition and will develop a certification scheme applicable to projects using electrolysers.

CIRCULAR HYDROGEN™

Circular Hydrogen™ is a complementary avenue that NextChem is developing in light of the need for low-carbon hydrogen production. Circular hydrogen is produced from syngas, which is obtained from the chemical conversion of the carbon and hydrogen contained in waste (in Secondary Solid Fuel, in the dry fraction of municipal solid waste, in non-recyclable plastic materials and in waste materials from recycling operations).

Circular Hydrogen™

Circular Hydrogen™ offers significant environmental advantages as it can be one of the solutions to the problem of non-recyclable waste, which is currently sent for incineration or disposed of in landfill. Production costs are competitive in relation to traditional hydrogen. The synergy between the two sectors, that of waste management and disposal and that of the chemicals industry, results in a very promising technology that is well suited to the principles of the circular economy and that allows for an overall reduction in high environmental impact when compared with the traditional approach of waste incineration and the conventional synthesis of chemical substances from fossil raw materials. Circular hydrogen production plants could be located at traditional energy-intensive industrial sites, such as refineries, thus contributing to their decarbonization, or near waste sorting plants, optimizing logistical processes with a view to reducing the carbon footprint of transportation.

WELCOME TO earthH_2

What role does hydrogen play in the energy transition?

With regard to the energy transition, hydrogen is experiencing a particularly dynamic phase as it represents a fundamental vector for accelerating and achieving the energy transition we need to make in order to achieve our climate goals. When it comes to hydrogen for the energy transition, it is important to consider it together with electrification through renewables. The current system was designed based on assumptions such as constant energy and base load to support consistent economic development; renewables, however, are decentralized and fluctuate. The growing goals for the penetration of renewables create an imbalance when it comes to managing the electricity system: hydrogen represents a means of storage for renewable electrons and also a vector of electricity where it is not possible to electrify through renewables.

What does the development of "end to end" projects mean in the hydrogen segment?

Hydrogen is the link between the world of renewables and that of molecules (oil/gas). These two worlds, which have never interacted with one another, can, in fact, create a new and unique market. Our business model sees us as an end-to-end partner, from the conception phase right through to the implementation phase. We can therefore play the role of co-developers to define the configuration and size of the plants and structure their financial engineering, in terms of both equity and debt. We can then structure the engineering side of things and play our historical role as EPC Contractor when it comes to the implementation phase.

What technologies does the low-emission hydrogen sector have in its portfolio?

We are working to promote three types of renewable, low-emission hydrogen, namely Electric Blue, circular and green hydrogen. Unlike other industrial companies (which only carry out EPC projects if they incorporate their own technology), we make our technologies available by agreeing to integrate third-party technologies as well. Our added value lies in applying hydrogen to a process thanks to our ability to manage complexity and the contribution we make in terms of skills.

2.6 OUR COMMITMENT TO SUSTAINABLE MOBILITY AND BIOFUEL AVAILABILITY

The objectives of reducing emissions in the transport sector mean that **we have to take action through more sustainable forms of mobility**.

Since the adoption of the PNIEC (Integrated National Plan for Energy and Climate, 2019), Italy has had its sights set on the ambitious scenario of covering 22% of gross consumption in the transport sector with renewable energy by 2030, while Legislative Decree no. 199/2021 on the implementation of RED II introduced the legal constraint of 16% of renewables in the transport sector, to be increased in line with the trajectories illustrated by the PNIEC itself.

The most urgent actions to achieve these targets are primarily aimed at increasing efficiency, promoting measures to reduce motorized mobility where possible. These initiatives are accompanied by measures to reduce CO_2 emissions linked to the production of sustainable fuels. In fact, the implementation of RED II in Italy aims to combine the production of biofuels from biomass with the production of synthetic fuels (such as recycled carbon fuels and renewable fuels of non-biological origin). In the case of synthetic fuels, unlike biofuels deriving from biomass, the issue of conflict with food or feed products does not present itself, nor is there a change in the use of agricultural land, as these are fuels produced through technological processes based on the hydrogen or chemical-based treatment of liquid or solid waste of non-renewable origin.

The implementation of innovative technologies to produce 2G low-carbon biofuels is one of the core businesses of NextChem. **NextChem has developed various biofuel technologies, to produce renewable diesel (HVO) and second-generation ethanol (2G).**

RENEWABLE DIESEL

Renewable diesel, one of the fastest growing segments in the biofuel sector, is **a fuel that is chemically identical to refinery diesel and is capable of powering all diesel engines without any mixture limits or infrastructural changes**. The technology is based on hydrotreatment (which eliminates pollutants) and uses vegetable oils and residual fats as feedstock. It is a flexible technology that can be modulated both in terms of scale and based on the feedstock available. NextChem's offer is economically attractive, and

NextChem is working with Saola Energy to license a technology for the production of renewable diesel from residual vegetable oils and fats, and which is suitable for small plants to integrate with existing sites, and also for large production sites. NextChem and Saola Energy have combined their know-how and experience to develop a solution for the turnkey market. NextChem is the licensor of the combined technology, and provides clients with engineering, procurement, construction and training services to ensure full success in the use of this technology.

The technology patented by Saola Energy consists of a hydro-treatment phase followed by isomerization to produce high-quality renewable diesel made from residual oils and greases. The technology can process a wide range of raw materials and is ideal for realizing the full economic value of low-carbon fuels, considering the incentives currently available under the various regulations. The integration of our technology with existing plants (bio-refineries) allows economic optimization by exploiting by-products.

allows these industrial players to participate in the second-generation renewable fuel market. For example, co-housing our technology at ethanol plants used to process non-edible residual oil in order to obtain renewable diesel makes these operations more profitable, and diversifies the business.

ETHANOL 2G

NextChem is also working on the re-use of waste from forestry and farming, and of ligneocellulosic feedstock in general. All too often, unfortunately, agricultural residues such as straw, palm, sugarcane, soft and hard wood, corn or sorghum are left on the fields and burned, when in fact they make excellent green feedstock for biofuels. **2G ethanol is a low-carbon product that comes from these types of feedstock**, it does not compete with food and is used in the blending of gasoline; it is already on the market, mainly in the United States and Latin America.

GranBio

NextChem is the only company in the world to have validated industrial technology that uses agricultural and forestry waste as feedstock for 2G Ethanol. NextChem has signed a partnership with GranBio to license the GranBio 2G Ethanol technology for the production of cellulosic-based ethanol worldwide. GranBio's technology for 2G ethanol is able to convert biomass not destined for the food sector into renewable and low-carbon biofuels, with innovative solutions to reduce water waste and to re-use waste from the production process.

The technology developed by GranBio to produce 2G Ethanol has already been implemented at the site in São Miguel dos Campos, Alagoas, Brazil, which is the first in the southern hemisphere dedicated to cellulosic ethanol.

THE PROJECTS

NextChem and Essential Energy USA Corp. have signed a Front-End Engineering Design contract and a joint Memorandum of Understanding for the construction of a new bio-refinery in South America for the production of renewable diesel. The bio-refinery will have the capacity to produce 200,000 tons per year of high-quality renewable diesel from second-generation organic feedstocks (non-food-competitive). NextChem will be the exclusive EPC contractor.

Furthermore, NextChem has been awarded a contract by TotalEnergies to develop front-end engineering design activities and lend its technological expertise to building a SAF (Sustainable Aviation Fuel) production plant in Grandpuits, in France, with the capacity to produce 400,000 tons per year. The project is part of the plan to convert the Grandpuits refinery into a "zero-crude" platform which also includes a bio-refinery, where NextChem has already started engineering the first plant in Europe to produce biodegradable and compostable plastics, from 100,000 tons per year. Technological expertise in the field of SAF (or Biojet) is one of the key components of the portfolio of green technologies that make the Maire Tecnimont Group such an enabling force in the energy transition. Contributing to sustainable mobility through a wide range of solutions for the production of green and low-carbon fuels is one of the Group's objectives for 2025, as part of its sustainability strategy.

Con Fersam Uruguay S.A. NextChem will develop projects in Latin America for producing green ammonia from renewable sources and second-generation bioethanol from non-food biomass.

GREEN INNOVATION IN FERTILIZERS

How does Stamicarbon intend to contribute to the decarbonization objectives?

Stamicarbon is focusing on two programmes that centre on the sustainable intensification of agriculture,

- firstly, using renewable energy to produce green fertilizers, and
- secondly, how to make fertilizers much more efficient and effective in terms of reducing their environmental impact.

What are the green technologies you are developing?

As part of the first programme, we have developed our Green Ammonia and Nitric Acid technologies, which make it possible to produce "green" ammonia and fertilizers using green hydrogen and other renewable resources. This is an area in which Maire Tecnimont has, internally, all of the components required to act as a system integrator for projects.

Through MET Development and in collaboration with NextChem and KT, we are already developing several projects to build green ammonia and green fertilizer production facilities.

In May 2021, we announced the availability of Stamicarbon's Green Ammonia technology, which has a lower CAPEX than rival technologies for small-scale green ammonia plants and has already received several expressions of interest from our clients. We are currently carrying out two feasibility studies with clients for two plants based on this technology.

What projects are underway?

The first green ammonia plant will be for Greenfield Nitrogen LLC in the United States, producing green ammonia for corn production in the Mid-West. The second is the Green Fertilizer Project in Kenya, which will produce green ammonia, nitric acid and green calcium ammonium nitrate for the local market.

Stamicarbon's Nitric Acid technology has the best OPEX in relation to rival technologies and can be used in conjunction with its Green Ammonia technology to produce green nitrogen fertilizers. Last year we signed a licensing agreement with a leading operator for a new nitric acid plant based on this technology to be built in the United States.

NextChem and KT are providing engineering and EPC services to integrate the Stamicarbon green ammonia plant design with water electrolysis and air separation units, in order to build a plant for producing green ammonia and green nitrogen-based fertilizers.

SUSTAINABLE AVIATION FUELS

Maire Tecnimont, via NextChem, has lent its engineering experience and expertise to the decarbonization of the air transport industry. In the context of aviation, NextChem has the dual objective of providing plant solutions for so-called Best Available Technologies, BAT, such as HEFA for the production of renewable diesel (HVO) and biojet (HEFA-SPK), and developing in-house those that will be the leading businesses of tomorrow, which, in the SAF context, are undoubtedly the combination of gasification and Fischer-Tropsch synthesis (G+FT) and Power-to-Liquid (PtL). HVO and HEFA-SPK are both produced by hydrotreating oils and fats, an alternative process to the traditional esterification used to produce diesel from biomass. The substantial difference between HVO and HEFA-SPK lies in the length of the hydrocarbons of which they are composed. The first, in fact, does not require any "shortening" of the length of the fatty acid molecule, like those coming from used cooking oils (UCO), which is equal to that of fossil diesel; it only requires it to be saturated (by means of hydrotreatment) and the molecular form mutated to ensure that it has the appropriate properties to be used even at low temperatures (isomerization). When it comes to producing HEFA-SPK it is necessary to add a step that involves "cutting the molecules" in order to obtain a product that is chemically equivalent to fossil kerosene. In the case of the SPK-HEFA process, starting with waste fats, the NextChem technology results in a biojet fuel that boasts greenhouse gas reductions of between 85 and 95% compared to the fossil equivalent.

Looking to the future, NextChem is also positioning itself in the G+FT and PtL fields, which are basically nothing more than the construction of fuel through the recombination of basic elements such as carbon and hydrogen. The G+FT process involves the use of biomass waste from which the basic elements ae obtained, while the PtL technology exploits the captured CO_2 and green hydrogen to form a synthetic kerosene.

RECYCLED CARBON FUELS

The RED II directive (2018/2001) introduced recycled carbon fuels into the regulation on renewables in transport for the first time, giving Member States the option of including them for the purposes of achieving sector-specific decarbonization objectives, with the sole condition of achieving certain thresholds for the reduction of greenhouse gas emissions, calculated using a methodology specially developed by the European Commission.

Europe defines recycled carbon fuels as liquid and gaseous fuels that are produced from liquid or solid waste streams of non-renewable origin that are not suitable for the recovery of materials or from the gas deriving from waste treatment and from non-renewable exhaust gas, both of which are produced as an unavoidable and unintended consequence of the production process in industrial plants. This being the case, recycled carbon fuels are not biofuels as they are not produced from biomass and they are not renewable fuels or advanced biofuels; however, they can be included among the fuels that make it possible to achieve the decarbonization objectives of the transport sector.

The Waste to Chemicals technology developed by NextChem - MyRechemical makes it possible to obtain circular synthesis gas, methanol, ethanol and hydrogen from the chemical conversion process.

CO_2 CAPTURE AND USE

The capturing of CO_2, its valorization and its reuse constitute a fundamental factor in reducing greenhouse gases and therefore achieving the climate objectives for limiting the rise in the planet's temperature. The contribution of CO_2 capture, valorization and sequestration technologies will be fundamental if we are to achieve climate neutrality by 2050. Like Maire Tecnimont, we are strongly committed to this technological segment of the energy transition. The use of CO_2 involves the reaction of a highly energetic reducing substance, since CO_2 is a largely inert molecule. Hydrogen, both as it is and in the form of ammonia, is the perfect candidate. CO_2 storage can take either of two paths: that of storing CO_2 in the liquid or supercritical phase or that of mineralization. In the case of the former, CO_2 can be stored in exhaust gas fields or in underground caves with specific geological characteristics. The mineralization process, as an alternative method, is still at the industrial experimentation stage. This process involves the reaction of CO_2 with silicates, from which carbonates, a solid material that can be reused in the production of cement, thus reducing the

ESAF

ESAF is an association that involves a series of European operators all involved in the sustainable aviation fuel (SAF) production chain. The ability to compare stakeholders from different EU countries makes it possible to draw a credible and authoritative comparison with the European institutions. NextChem plays an active role in the association.

emissions associated with its production, are obtained. Furthermore, the CO_2 can be reused for the production of green fertilizers, to produce methanol, synthetic methane and biofuels.

THE NATIONAL OBSERVATORY ON BIOLUBRICANTS, FOUNDED AT THE INITIATIVE OF NEXTCHEM AND FONDAZIONE ECOSISTEMI, PUBLISHES THE FIRST DOSSIER ON BIOLUBRICANTS

NextChem supported the production of the First Report on Biolubricants by the Observatory on Biolubricants. The dossier presents figures relating to the potential market for biolubricants and the environmental and social advantages, the prospects linked to green public procurement and the technical characteristics (feedstock, technologies and performances) that encourage the adoption thereof.

In 2016, the global biolubricant market exceeded $2 billion and it is expected to grow to $3.98 billion by the end of 2025. In Europe, they represent approximately 5% of total lubricants and are used in industrial applications as an environmentally-friendly alternative to petroleum-based lubricants.

The Observatory on Biolubricants, supported by NextChem and Fondazione Ecosistemi, is a voluntary working group made up of several stakeholders that aims to gather technical and market data, identify best practices and analyse the environmental benefits deriving from the use of biolubricants instead of similar fossil products. Members include Brembo, Terna and Fincantieri.

Read our points of view

WEBSITE

THE AGREEMENT WITH ENI FOR ENGINEERING WORKS ON A CO_2 CAPTURING PLANT IN ITALY

ENI has entrusted NextChem with the task of undertaking the engineering works, with a potential conversion to EPC (Engineering, Procurement and Construction) once certain conditions are met, for a plant aimed at capturing the CO_2 generated by the Casalborsetti natural gas plant, in the province of Ravenna. The plant would allow CO_2 to be captured from the fumes coming out of the plant's turbo compressor, before purifying and compressing it, thus allowing the capture of about 25 thousand tons of carbon dioxide per year, which would otherwise be emitted into the atmosphere.

The technology that will be used for the project boasts a high level of efficiency and reduced consumption in the capturing of CO_2 from fumes, even at low concentrations, and has already been widely used around the world to capture the emissions of hard-to-abate industrial sectors.

THE PARTNERSHIP WITH THE SMS GROUP FOR AN EP PROJECT IN SUPPORT OF THE DECARBONIZATION OF A STEELWORKS IN THE RUSSIAN FEDERATION

NextChem has been awarded an Engineering and Procurement subcontract on a lump sum basis by Paul Wurth, a company belonging to the SMS group, for the construction of two units of a partial catalytic oxidation (PCO) reactor. NextChem will act as a technology partner to implement natural gas-fired syngas production for a blast furnace, thus replacing coal with the production of 140,000Nm³/h of syngas through the proprietary CPO technology. The scope of the project includes the provision of the proprietary technology, the basic design and detailed engineering, the supply of proprietary equipment and a catalyst. NextChem will also be responsible for supervising the CPO reactor unit testing and start-up phases. The SMS group chose NextChem for its knowledge and expertise as a technology provider and for its leadership in the field of natural gas syngas production.

OUR NETWORK FOR ENERGY TRANSITION

NextChem is a partner to the **Alliance for the Circular Economy**, along with 16 other companies, and aims to lead the transition to the circular economy through a joint commitment. In 2021, NextChem participated in the production of four publications by the Alliance aimed at offering further insight into the theme of circularity, including the following:

- An initial study on "Measuring circularity"
- A second study, on "Circular economy and finance"
- A third study, on "Circular economy and climate change mitigation"
- A fourth study, on "The circular economy in territories and cities"

NextChem is a member of the **think tank promoted by Althesys**, a company specializing in **waste consultancy in the environmental and energy sectors**.

During the Ecomondo international environmental technologies fair, NextChem organized a talk on circular economy and industrial convergence together with WAS, reflecting upon strategies for the multi-industry evolution of the sector.

NextChem is a member of the **board promoted by REF Ricerche**, an independent company that supports companies, institutions and government bodies in **cognitive and decision-making processes**.

NextChem is one of the founder members of **Sustainable Development Foundation, an authoritative research center for the sectors and actors of green economy**. The Foundation is strongly committed to a constant update, to the dissemination of publications, studies and research, to information and discussion events, to the involvement of institutions and stakeholders, as well as to network to advance strategic green economy themes: circular economy, climate and energy, green cities, sustainable mobility, natural capital and green infrastructures.

NextChem is a partner to **Symbola, a foundation that promotes Italian quality and brings together those who embody it**, showcasing companies, associations and institutions that focus on innovation, beauty, human capital and territory, generating a more resilient and competitive economy on a human scale through research, events and projects.

Thanks to our technologies for the energy transition and our commitment to circularity, in 2021 we became one of the 100 most virtuous companies featured in the Symbola report on the circular economy.

NEXTCHEM ACTIVITIES IN 2021

In 2021, NextChem participated in:

- 53 events, presenting its technologies for the energy transition: waste to chemicals, MyReplast™ Upcycling, technologies for producing low-emission hydrogen, and biofuels.

- At **World Ethanol & Biofuels in Brussels** we presented our technology for second-generation ethanol and renewable diesel.

- At the **World Hydrogen Congress in Amsterdam** we talked about the three technologies in our portfolio for producing Circular HydrogenTM, Electric Blue™ and green hydrogen and the role that hydrogen will play as a low-carbon fuel in the energy transition.

- We took part in the eighth **Polish Chemistry Congress** with talks on the sustainable chemistry of the future and on the European Green Deal.

- At **Milan Design Fashion Week** we presented the Beluga boat, the first hull printed in 3D using MyReplast™ recycled plastic in collaboration with Caracol.

- 3 fairs, with its own stand.

- For the second consecutive year we took part in **Ecomondo**, with a stand of over 100m², where 3 talks on the theme of the energy transition were organized with important partners and stakeholders on the national scene.

- We also participated in the **Plastics Recycling World Expo in Amsterdam** and **Compounding World Expo in Essen**, the most important recycling exhibitions in Europe.

2.7 ENVIRONMENT WATER AND WASTE MANAGEMENT

The sources of water for sanitation and civil purposes (canteen, toilets, etc.) used by the companies located at the Maire Tecnimont Group's head office in Milan, are provided via public supply network and via the rainwater collection systems on the roof.

The facilities of the complex use, without chemical changes, ground water to feed the Heating Ventilation Air Conditioning (HVAC) systems, both for heating and air conditioning.

Waste water is discharged into the urban sewerage network, for which no discharge authorization is needed under the current local law.

THE **SAFEGUARDING OF WATER RESOURCES** IS ONE OF THE TOPICS HIGHLIGHTED DURING **TRAINING AND ENVIRONMENTAL AWARENESS CAMPAIGNS**

Over the last three years, the total water withdrawn from municipal water supplies or other public or private water utilities was: 47,544 m^3 in 2019; 30,766 m^3 in 2020; and 41,762 m^3 in 2021. The same quantity of water was discharged into sewers over the last three years. Of the 41,762 m^3, only 13,766 m^3 was withdrawn off and then discharged in areas considered to be under water stress[27].

In 2019, 1,436,860 m^3 of ground water was withdrawn and then discharged, while in 2020, 1,121,802 m^3 was withdrawn. The figure was 1,071,580 m^3 in 2021. These quantities do not fall into areas considered as being under "water stress".

During construction, the safeguarding of water resources is one of the topics highlighted during training and environmental awareness campaigns.

In accordance with client rules and the local laws, no water can be discharged into the public sewer or directly into seas and rivers. Water consumption, in particular, is influenced by the phases of construction on the construction site during the year. In 2021 there was an increase in water consumption compared to 2020, going from 159,021 m^3 in 2020 to 207,142 m^3 in 2021 due to the different mix of project phases. Some of these were at the peak stage in 2021.

Water consumption on construction sites over the last three years is presented in detail in "Appendix – Sustainability Performance.

The Maire Tecnimont Group takes great care with the collection, transport and processing of waste, and uses licensed, qualified external providers.

The Group has provided several locations with segregated collection bins for paper waste, plastic and toners, promotes the "reduce – reuse – recycle" message, and provides specific temporary storage areas, avoiding the mixing of

PROTECTING BIODIVERSITY

Our Group has always considered the issue of biodiversity: although it is in some ways far removed from pure engineering activities, biodiversity must be duly taken into account when designing construction sites and plants, due to the effects that the setting up of sites and the running of plants can have on the local plant and animal ecosystem. The Group has launched an internal analysis with a view to mapping all the points of impact with biodiversity for the purposes of determining guidelines, initiatives and specific projects.

27 *By water stress we mean the ability or inability to meet the demand for water, both human and ecological (see GRI 303). The Aqueduct Water Risk Atlas tool created by the World Resources Institute was used to assess areas subject to water stress. Those classified as being subject to "High" and "Extremely high" levels were considered to be water stress areas.*

hazardous waste (electronic computer parts, lead-acid batteries or neon lamps) with non-hazardous waste (paper, toner, electronic components, alkaline batteries, furniture, plastic packaging, mixed metals, insulating materials and wood).

Paper represents the highest percentage of all waste produced; **the digitalization of documents assists a paperless approach, which helps to reduce paper supplies and consequently the volume of paper waste**. The Maire Tecnimont Group has started also to increase its purchases of recycled paper, to further encourage a culture of recycling.

WE TAKE GREAT CARE WITH THE **COLLECTION, TRANSPORT AND PROCESSING OF WASTE**

In 2021, more waste was generated by the offices due to renovations and the creation of positions for smart working.

In line with Group Policy, **daily checks are conducted on waste management and subcontractors' behaviours at construction sites**, in cooperation with specialized waste companies and in accordance with local laws.

The production of waste is also influenced by the work phase of the construction sites during the year and by the mix of countries in which the various construction sites are located. In 2021 there was an increase in waste due to the fact that some of these were in the initial stages, with activities that, in accordance with local laws, involved a greater production of waste (e.g. excavated earth).

The production of waste at the Maire Tecnimont Group's offices and construction sites is presented in detail in "Appendix – Sustainability Performance".