

# EVOLVE

**TAKE THE CHALLENGE!**

Catching the wind of the energy transition



# EVOLVE

N° 3 - March 2019

[www.mairetecnimont.com](http://www.mairetecnimont.com)



THE MAIRE TECNIMONT GROUP MAGAZINE

**EDITED BY**

Department of Institutional Relations and Communication

Court of Milan registration - N. 338 on the 06/12/2017

**EDITOR IN CHIEF**

Carlo Nicolais

**EDITORIAL COORDINATOR**

Massimo Dapoto

**PROJECT AND DESIGN**

Cultur-e

[www.cultur-e.it](http://www.cultur-e.it)

**EDITOR**

Maire Tecnimont Spa

Registered Office

Viale Castello della Magliana, 27 - 00148 Roma - Italia

Operative Headquarters

Via Gaetano De Castillia, 6A - 20124 Milano - Italia

**PRINTER**

Gam Edit Srl

Via Aldo Moro, 8 - 24035 Curno BG

[www.gamedit.it](http://www.gamedit.it)

Issue completed: 30/03/19

The rights due for published texts are available for all parties that we were not able to contact.



X

E

D

Z

I

## 02 EDITORIAL

---

### The new golden age of chemistry

Editorial by Pierroberto Folgiero, Maire Tecnimont Group CEO and Managing Director, and Giovanni Sale, Group Corporate Strategy SVP, Americas Region VP.

## 06 STRATEGIES

---

### It's blue economy

"Nature can help us solve our sustainability problems".  
Word of Gunter Pauli.

### Green chemistry 2.0

The interview of Carlo Nicolais to Guido Saracco, Rector of Politecnico di Torino.

## 12 SPECIAL

---

### The Green Acceleration Challenge

The Group CEO Pierroberto Folgiero presents the new economic model for the energy transition.

### The contribution of NextChem

The new company for technological initiatives in the field of green acceleration.

### A future to be invented

Innovation as an ecosystem in the center of a debate.

### An agreement for sustainability

A contract between Maire Tecnimont and Enea signed to jointly develop technological innovations.

## 30 RESULTS

---

### The challenge of numbers

Profits and revenues up in 2018 for the Maire Tecnimont Group. Thanks also to the success of its business model.

## 32 REPORTAGE

---

### Behind the scenes of innovation

A journey to discover the Group's technologies.

## 42 SUSTAINABILITY

---

### The Ocean Cleanup

The Dutch non-profit project to clean up the Pacific from plastic waste.

## 46 HISTORY

---

### An ingenuity heritage

The historical archives of Maire Tecnimont to give life to the first engineering experience center.

## 48 TERRITORIES

---

### The new frontier overseas

Maire Tecnimont in the United States is among the key actors of the new petrochemical revolution.

## 52 MOTTOS

---

### From great challenges to small decisions

The Group's growth is made of micro-responsibilities.

# THE NEW CHEMISTRY GOLDEN ERA

**C**arbon, the “C” of our life with or without hydrocarbons. Thanks to this element, positioned as number “6” in the Periodic Table of Elements, we would have never had life on our Planet, as well as the present development of society.

The atomic structure of Carbon grants us the capability of forming long chains and rings, thanks to its particularly stable space configuration in binding to each other, and, at the same time, opens up the possibilities for creating infinite kinds of molecules to bind with other elements. This extraordinary and unique characteristic allowed the formation of amino-acids on our planet millions of years ago, the future building blocks of DNA, as well as the entire range of products we are using daily today: fuel, steel, plastic materials, including fibers and rubbers, paint, medicine and beauty products.

Without Carbon, human beings could have never started producing metal at the beginning of civilization, and, later on, steel, which was the basis for the second Industrial Revolution (1870), becoming the cradle for the development of Industrial Organic Chemistry, specifically the Chemical Industry of Carbon. At the beginning, the Organic Chemical Industry was fed by Carbon extracted from German and English coal mines, and later, by hydrocarbons coming from Oil fractionated in the Refinery; Oil then became the easiest source of building blocks for Organic Chemistry compared to the very basic Carbon structure of coal.

The Petrochemical industry was born alongside the biggest European and North American Oil industries.



*How the World can ideologically fight greenhouse gasses and plastics while that same World is industrially compelled to make large investments in Petchem infrastructure?*



From the end of World War II, the Oil Industry experienced a period of massive development driven by the constant growth of fuel demand coming from the boom in automobile and aviation transportation, while at the same time fostering the development of the adjacent Petrochemical Industry, also experiencing a golden era thanks to the growth of the production of polyolefins (PE, PP, Rubber). This was also thanks to the discovery of methylaluminoxane catalysts (let us use the name of a molecule at least once) to produce Polypropylene, developed by the Nobel prize winner Giulio Natta, part of our Tecnimont Family.



Since then, bigger and bigger Refineries have been being built all over the world to feed the growing demand of energy. A barrel of Oil was, as it is now, processed with 85% produced as fuel products (Gasoline, Diesel, Fuel Jet) and the remaining 15% as feedstock for the Petrochemical Industry (ethane, propane, butane, naphtha).

Let us say that burning precious hydrocarbon that was formed millions of years ago just to operate internal

combustion engines with a very low efficiency is not the best choice for our society; aside from the waste of such a precious source of building blocks for the chemical Industry, it increases the CO<sub>2</sub> content in the atmosphere of our planet, changing its composition after millions of years and causing global warming due to the greenhouse effect. The world is increasingly envisioning a new Era driven by an ambitious “CO<sub>2</sub> free” and “plastic free” vision. Thanks to the discovery of new materials and the amazing pace of development of electronics and digitalization science, the energy sector has been moving toward renewable sources.

3





The demand for oil for the fuel needed by the transportation sectors is set to decline as result of electric/hybrid vehicle development, higher fuel efficiency and, last but not the least, a new concept of mobility being adopted by the new generation (shared economy).

All of a sudden, Carbon, the heart of our fragile Earth's ecosystem, appears to be both an old friend, and at the same time, an alleged enemy of the planet. Starting from the Kyoto Protocol and most importantly after the Paris Agreement (COP21) of 2015, public opinion has been mobilized, rightly so, in the direction of increasing the awareness of CO<sub>2</sub> and NO<sub>x</sub> emissions as well as the enormous environmental implications of plastic waste to the greatest possible extent. On the other hand, the sentiment of public opinion has to cope with, and live in, an industrial world in which a growth of 4% per annum in the demand of Petrochemical products is projected, driven by population increase and the improvement of living standards, particularly in Asia and Africa. This means

that in the next 20 years the Petrochemical demand is paradoxically expected to double, opening the door to the new Petrochemical Golden Era.

In the near future, the Petrochemical industries will be the main driver of all the Oil Companies' investments which are capping their expenditure in Up-stream projects and/or decreasing oil refining capacities on the back of an accentuated drop in the demand of diesel fuel. All the Major and National Oil Companies are, in fact, announcing giant projects to enhance Petrochemical Production from existing assets as well as to set up brand new plants in line with the expected demand for oil derivatives. In fact, they are channeling huge downstream investments into the Petrochemical segment to maximize the implicit value of every barrel of crude which is produced or expected to be produced out of their large reservoirs. It also important to highlight that Petrochemical Plants are always key in bringing Industrialization processes, meaning employment and social/technological development, to countries and local communities that are, on the one hand "hydrocarbon rich", and on the other, still economically developing. This was the case of Europe and North America in the old times, the Middle East and North Africa twenty years ago, and Southeast Asia and Sub-Saharan Africa today. In such a landscape, the overwhelming question is how the World can ideologically fight greenhouse gasses and plastics while that same World is industrially compelled to make large investments in Petchem infrastructure to cope with an incessant demand driven by demography and an increasingly middleclass lifestyle. How to reconcile this apparent schizophrenia?



*We rather believe that a revolution has to take place in the responsible use of Plastic, starting from single-use and invisible plastic.*



The only reasonable answer is to be found by envisioning a mature view of a new Industrial Economy driven by an Energy Transition Roadmap which is being developed by the best minds on the Planet. No doubt that Renewable Energy is the name of the game, but none can deny the extreme volatility of a Future Energy Mix which is at the same time both environmentally sustainable and economically/industrially viable. Whatever the level of speed of such an Energy Transition Public Opinion and the Regulators are ready to accept, whether more or less aggressive, now is the time for Energy Engineers such as Maire Tecnimont to genuinely mobilize towards Innovation.

The first set of Maire Tecnimont ideas has been called GREENING THE BROWN, meaning those innovations which apply to traditional Petchem solutions, and is aimed at limiting or eliminating CO<sub>2</sub> and other greenhouse gas emissions released from existing plants. Zero emissions desulfurization technologies or chemical fertilizer coating to avoid ammonia dispersions are good examples.

The second cluster of ideas is focused on CIRCULAR ECONOMY as a way to regenerate existing plastic, thus avoiding environmental impacts: from the mechanical and chemical recycling of plastic materials to regenerate polymers up to the waste-to-chemicals technologies which could produce renewable gas, hydrogen or any traditional chemical from the gasification of wastes.

The third domain of Maire Tecnimont efforts towards the Energy Transition is named GREEN GREEN. As we said, Carbon is the source of vital energy and can be found not only in Hydrocarbons, but also in sugar and cellulose for example. Chemistry and Biology will cooperate in this respect, leveraging bacteria and enzymes. It is the time for Biofuels and Bioplastics from Biomasses. The ocean emergency will urge the application of biodegradable plastic to kill the issue of invisible plastic in the sea. Single use plastic will be

heavily tackled and under regulatory pressure. Hydrogen is the most “admirable” molecule in Nature and will play a pivotal role. Electrochemistry will drive the production of Hydrogen from Solar/Wind Renewable Energy through Electrolysis, and more in general, a stream of new ideas will follow to produce chemicals. CO<sub>2</sub>, which is the most “inert” molecule in Nature, could be energized by renewable Hydrogen, producing Polyolefins (and plastics) in a brand-new sustainable way. All these initiatives are the backbone of Maire Tecnimont’s new company named NextChem, which was launched last November during a dedicated event at our Milan Headquarters. Despite a massive world scale mobilization, it will take time; the next decade will be key. The colossal worldwide production of energy and chemicals will continue to be driven by traditional hydrocarbon technologies whose environmental impacts will be continuously scrutinized and optimized.

While we believe in the immense value of a courageous transition towards a New Energy paradigm, re-thought for the sake of the Planet, we don’t believe in the ideology of a Plastic free World. We rather believe that a revolution has to take place in the responsible use of Plastic, starting from single-use and invisible plastic. Plastic, properly re-used and re-cycled, will remain an integral part of our life as the best molecule in which the valuable “C” of Carbon is entrapped and utilized in the most durable manner – and not burnt and wasted as in diesel fuels – conveying incredible characteristics to a material which represents one of the best discoveries of Modern Man.

**Pierroberto Folgiero**

*Maire Tecnimont Group CEO and Managing Director*

**Giovanni Sale**

*Group Corporate Strategy SVP, Americas Region VP*

# IT'S BLUE ECONOMY

**"W**hat I propose and put into practice is very simple: use what you have, don't expect the earth to produce more. Do more with what the earth produces, respond to people's needs". Dubbed as Steve Jobs of sustainability for having theorized the Blue Economy model, for about thirty years Gunter Pauli is an economist who leads by example. In 1994 he founded *Zero Emissions Research and Initiatives*, an international network of three thousand technologists and economics experts, committed to developing a sustainable ecosystem by transforming previously wasted substances into profitable merchandise.

The fundamental step comes with the publication of his most famous book (**"The Blue Economy** - 10 years, 100 innovations, 100 million jobs") printed in 2010 and then reprinted in 2015 (**"Blue economy 2.0** - 200 projects implemented, 4 billion dollars invested, 3 million new jobs created"). Book in which the Belgian scientist explains how his ideas represent a development of the green economy: "Copying nature to save the environment and create millions of jobs is possible. The future belongs to entrepreneurs who can rediscover circularity, learning to extract value from materials that today are considered waste. We've talked enough over the years, now we need to act!" Thanks to the professional esteem for **Aurelio Peccei** (manager of Fiat, CEO of Olivetti and one of the founders of the Club of Rome), Pauli has a special relationship with Italy, where he also collaborated for the degree course in Systemic Design of the Polytechnic of Turin. "The development achieved through linear processes, in which natural resources that are being depleted are extracted to produce consumer articles destined to end up in the garbage, has made us unlearn the circular processes of nature that always reuses everything with extreme efficiency, without losing anything on the road".

In his book, Gunter Pauli explains that using disposable razors we throw away hundreds of tons of titanium each year, mined on the other side of the world and worked at very high temperatures with enormous energy and environmental costs. When we drink coffee, we give value only to a minimal fraction of the biomass from which it was produced: the rest is thrown as garbage which generates greenhouse gases and damages the soils. To purify water, we often discharge chemicals that are harmful to aquatic life into rivers

**NATURE CAN HELP US SOLVE OUR SUSTAINABILITY PROBLEMS. THE ECONOMIST GUNTER PAULI IS CONVINCED OF THIS AND IN HIS BEST-SELLER "BLUE ECONOMY 2.0" PRESENTS A NEW MODEL OF GLOBAL ECONOMY INSPIRED BY SUSTAINABLE ECOSYSTEMS. TO REDISCOVER CIRCULARITY AND LEARN TO EXTRACT VALUE FROM MATERIALS THAT TODAY ARE CONSIDERED WASTE.**

and the sea. We cut millions of trees to meet our paper demands, and when we use it, we recycle only a minimum fraction. "The examples could continue," he says, "but humanity is wasting too much energy and materials, and in doing so it emits too much greenhouse gases. The main culprit is the dominant economic model, based on a linear logic of increasing consumption. We need a breakthrough, and this can come from the Blue Economy".

As in previous issues of EVOLVE, we read and summarized the work published by Gunter Pauli. These are issues to think about, opportunities to be seized immediately, working together. As the author claims, we are responsible for **educating the generations of the 21st century** to live on a planet in which it will become increasingly important to know how to effectively manage natural resources.

## BEYOND SUSTAINABILITY

We do not want to limit ourselves to waste reduction or endangered species protection. We need to eliminate the concept of “waste”, understood as something that is wasted. Natural ecosystems do not need electricity to feed, nor do they produce waste: everything remains in the flow of nutrients. In nature, waste produced by one is always a nutrient, a material or a source of energy for others.



## FROM COFFEE TO EGGS

Everything is based on an approach to systems, on how to connect things. Food, nutrition and energy are cascaded. Like the coffee waste that turns into a substrate for the mushrooms, and the leftovers of the mushrooms (which in turn were coffee waste) are transformed into food for hens. Hens that produce eggs today! We must inspire people.

## A MODEL WITH MODERATE COSTS

How can an economy where good things for us and for Nature are expensive work? We need a model in which everything that is good is cheap! Otherwise, health and sustainability are only for the rich.

## VIRTUOUS CIRCLE

It is about triggering a virtuous circle where the scraps of one become the raw material for the other. Building bridges to stimulate synergies between different operators and thus creating enormous savings on costs and on energy bills.

## 8 IMPROVE THE INTERIOR OF BUILDINGS

To make the interior spaces comfortable, one can take inspiration from the physics of the movement of water and air, as well as from the simple and elegant ways developed by various species such as termites, zebras and darkling beetles of the Namib desert and mussels. By following this model, we can achieve more with less energy, and have better health conditions than we could have ever imagined.

## INNOVATIONS INSPIRED BY THE LAWS OF PHYSICS

Observing the laws of physics, we understand how tiny variations of pressure, temperature and humidity create excellent products and processes. Instead of manipulating the biology of life, we can draw inspiration from the ways in which nature uses physics. There are dozens of innovations that could be applied in homes, offices and factories.

## FRESH WATER, RAINFOREST AND BIOGAS

The Blue Economy has over 200 cases. It is fundamental to know that there are opportunities all over the world. We are able to transform tomato agriculture into fresh water production, we can turn savannahs back into the rain forest of the past and it is possible to produce all the biogas needed in the world from three-dimensional crops at sea.

## FROM MANUFACTURE TO ECO-FACTURE

The opportunity to generate jobs in the new economy will not be based on the efficiency studies that led to labor productivity in the 19th and 20th centuries. It will be the eco-factory and not the manufacture to generate new jobs. Emerging industries will conform to the laws of physics followed by nature.

## RESOURCES FOR THE NEW GENERATIONS

Parents think that their children live in a fantasy world made up of imaginary characters. We ourselves live in a world that does not exist! We consume more than what is sustainably possible, we are robbing the world of resources that do not belong only to our generation, we fill it with garbage, we contaminate the seas with plastic materials that will never disappear.

## PRODUCING PAPER FROM MINERALS

We support the option of producing stone paper. In China it is already made by exploiting the mineral residues mixed with small percentages of plastic. The process does not consume water or cellulose and is infinitely recyclable, without the need for ink removal procedures. On the one hand, the pressure on landfills is reduced, reducing stone waste. On the other hand, it frees millions of hectares of land, previously dedicated to forestry, which can be used to produce food.

## BEE-GENERATED ADHESIVE

The glue used by honey bees to build the honeycomb contains wax. The wax is liquid at the bee body temperature. Only by cooling does it solidify and becomes sticky. Therefore, bee wax presents the ideal characteristics of modern adhesives. It is solvent free and can be applied in the liquid state.



## IMITATING LIVING SPECIES

The blue economy is based on the development of physical principles, using scientific techniques such as biomimesis, a sector still little known that is based on the study and imitation of the characteristics of living species to find new production techniques and improve existing ones.

## CIRCULAR ECONOMY

According to a recent research by the McKinsey Center for Business and Environment, a circular economy model applied to European industry would increase productivity by 3%, with a primary impact of around 600 billion per year on the European economy between now and 2030.

## ENTREPRENEURIAL OPPORTUNITIES

Today it becomes of primary importance to develop a new awareness among managers and entrepreneurs, inspired by the complexity of ecosystems. There are many opportunities that can be seized by focusing on the efficient use of resources and the elimination of waste, turning local problems into entrepreneurial opportunities and developing a systemic vision, to be contrasted with the management culture that contributed to the dissipated development model in which we live.

## LEADERS THAT INNOVATE FOR A SUSTAINABLE WORLD

We must prepare the next generation of leaders to understand that it is possible to create a company without money or experience; it is the only way in which fundamental innovations have found their way to the market. Based on science and emotional and social consciousness, the most aware entrepreneurs will be able to apply and develop these innovations to create waves of change that involve all sectors of the economy, pushing entire markets towards sustainability.

## LEARN FROM ZEBRAS

White stripes reflect sunlight and therefore reduce heat. Black ones absorb sunlight increasing the surface temperature. Zebras can reduce the surface temperature by about 9°C by exploiting the air currents generated by the alternation of their black and white stripes. The hot air above the black stripes rises, generating an air pressure difference with the air above the white stripes where pressure is higher. In this way, micro-currents are generated and cool the surface without mechanical ventilation. Inside some buildings built in Japan (painted with alternating black and white) during the summer the internal temperature is reduced by about 4.7°C, with energy savings of around 20%.

## NON WRITTEN RULES

There are rules to which we must adhere because of laws, regulations. Citizens and companies must observe them. But there are also unwritten rules, dictated by our ethics, education, moral sensitivity and humanity. These are the result of a choice and not an obligation.

## NATURAL POLYMERS

With green chemistry, petroleum-derived polymers have been replaced with those derived from various natural raw materials, including starch, amino acids, sugar, lignin, cellulose and many others. If we imitate the way ecosystems transform everything, instead of replacing a toxic element with a less polluting one, we can use green and sustainable processes everywhere.

### News taken from:

- Gunter Pauli, "Blue Economy", Edizioni Ambiente
- Gunter Pauli, "Blue Economy 2.0", Edizioni Ambiente
- Elena Comelli, "The Blue economy? It improves life and makes us grow", Corriere della Sera
- Dario Ruggiero, "Blue Economy, how to grow the local economy", Iteconomy.it
- Francesco Bevilacqua, "Interview with Gunter Pauli", italiachecambia.org
- Antonia Santopietro, "Interview with Gunter Pauli", zestletteraturasostenibile.com

# GREEN CHEMISTRY 2.0



*Nature must be imitated to combat global warming.*



**T**he Rector of Politecnico di Torino - Professor Guido Saracco, former director of the Center for Sustainable Future Technologies of the Italian Institute of Technology - is the author of the book “Green Chemistry 2.0: let us learn from nature how to fight global warming”. Reading of Professor Saracco’s essay, one of the most successful texts on green chemistry, the idea of listening to the author was born. The Editor in Chief of Evolve, Carlo Nicolais, met with him to interview him.

**Professor Saracco, in your book “Green Chemistry 2.0” you claim that our production systems must become circular. Why do you consider Circular Economy a sort of “turning point”? And what should be the relationship between raw materials and waste?**

What I advocate in my book is that it is possible to have a sort of circular carbon economy, at least temporarily. That is to reuse waste from carbon products, waste but above all CO<sub>2</sub> as raw material, to generate

high value-added products that would replace those that are derived from oil and other fossil sources. A little like photosynthesis that uses solar energy and carbon dioxide.

**To reduce oil consumption, can carbon dioxide become a resource? And how?**

If we consider a simple material balance, we discover that the carbon that we convert into carbon dioxide that is not absorbed by photosynthesis and therefore active in generating greenhouse effect is significantly higher than that associated with organic waste. This is primarily due to the extensive use of fossil fuels. This also highlights how the rebalancing of anthropogenic impact on the greenhouse effect cannot ignore the conversion of excess CO<sub>2</sub>, as well as, of course, the progressive containment of the use of fossil fuels. In converting carbon dioxide, it is necessary to do like nature, but much faster. Therefore, carbon dioxide conversion systems based on photochemistry, electrochemistry, the use of genetically engineered microorganisms, etc. are being developed. I speak about them in my book.

**In Europe the fight against plastic is increasingly decisive and there is a strong push towards plastic recycling and bioplastics as new solutions to imagine a development that does not generate plastic waste. Yet, the major oil companies plan that in the coming years the share of the transformation of oil and gas into plastics at the global level will become increasingly large, given the demand coming from the demographic growth and life standards improvement and consumption growth in the emerging economies, especially in Asia. What do you think about this contradiction?**

Obviously the two can exist together in a sustainability framework only if plastic is recycled also for secondary purposes (e.g. waste-to-energy, pyrolysis, gasification) and if, according to the sustainable carbon economy I referred to earlier, we learn to produce plastic materials from carbon dioxide and renewable energy, as well as designing ab initio a “second life” for all its products.

**With respect to the Paris Agreements on climate change, what are the achievable goals in the short term and what are the challenging objectives in the medium to long term?**

We need an ethical revolution right away, then an acceleration. Certainly, the economic crisis that hardly hits the developed countries

is not beneficial, and it leads to poorly virtuous behavior such as using coal as fuel because it is “cheap”. In this heated climate, simplistic recipes are not working. Back home we want to solve this with “Ecotaxes on SUVs” and jobs will be lost because big car groups will review their production plans in Italy. “Ecotax on fossil fuels” is set up and the protests of the Yellow Gilet started in France. Only global awareness of the need to resolutely fight climate change can lead to concrete results. Schools and Universities can have a great role in sharing knowledge and ethical principles. Scientific dissemination is a very important element of communication. Then you definitely need to hurry up with green technology before it is too late.

### **What is the future of biorefineries and how can they transform urban and agricultural waste?**

I believe, supported by what I know from the main industrial groups operating in this sector in Italy (Novamont, Versalis, Radici Chimica, etc.), that synthetic biology and metabolic engineering will play an increasingly growing role. By genetically modifying microorganisms it is in fact possible to activate metabolic pathways that lead to products of industrial interest originally not compatible with their metabolism. These products, which are not useful for the survival of bacteria, are therefore ideally excreted and easily recovered from bioreactor culture media. I foresee a great future for advanced biotechnologies and, relying on renewable electric energy, for electrochemistry. These processes take place at relatively low temperatures and therefore potentially are more efficient than traditional thermochemical processes.

### **In your book you talk about “artificial” photosynthesis. chlorophyll photosynthesis is no longer enough?**

Unfortunately, chlorophyll photosynthesis is relatively slow. Photosynthesis is a complex and fascinating life engine. The plants have pervaded our planet, but they did it because they are “resilient” and not so much because they are efficient machines for converting CO<sub>2</sub> and light into biomass. There are three factors limiting conversion efficiency: Enzymatic complexes that capture light for its conversion into chemical energy starting from photolysis of water (photosystems I and II) can capture only a fraction of light (680-700 nm wavelength). The chlorophyll antennas limit intensity of light effectively absorbed by the plants; in other words, only in the early morning or late afternoon it is possible to absorb the light coming from the sun with great efficiency. The third factor concerns the concentration of CO<sub>2</sub> in the atmosphere, which is paradoxically low for these purposes (410 ppm). And this reduces the speed of conversion of light and carbon dioxide into organic compounds. All this limits maximum efficiency to few percentage points with which the radiant energy of the sun can be converted into chemical energy residing in the biomass produced by chlorophyll photosynthesis.

### **In what way do you support the idea that we have to imitate nature by improving some processes?**

We must start from the “defects” of chlorophyll photosynthesis



**Guido Saracco**

and do better. For example, develop photovoltaic systems capable of capturing ever larger parts of the solar spectrum and do it more efficiently. We need to develop efficient and low-cost CO<sub>2</sub> capture and purification systems. At that point, renewable electric energy and high concentrations of CO<sub>2</sub> (perhaps under pressure) will collide in advanced electrochemical reactors to achieve efficiencies significantly higher than chlorophyll photosynthesis. It is the so-called “artificial photosynthesis”.

### **How can the production of bioplastics be industrialized?**

Large companies such as Novamont or Versalis are working on this. Not necessarily everything has to be “bio”. Production of monomers is an essential stage, for example, after which we enter the traditional processes of synthesis of polymers. Less promising but still interesting is the direct synthesis of biopolymers in microorganisms (e.g. poly-hydroxy-butyrate), especially for the complexity and costs of recovery of the biomaterials produced inside cells.

### **What do you think are the three innovations that will change the future of our children?**

Artificial intelligence, genetic engineering and widespread three-dimensional mobility.

### **Who are the public figures on the world scene that will bring innovation and will be mostly spoken about it in the next few years?**

I do not know them yet. First the collective ethical revolution, then we’ll see. Often, I simply see “fluff” or audacity in some of the current myths of sustainability... I’d rather not mention any names.

# GREEN ACCELERATION CHALLENGE

**"G**reen chemistry is a very topical issue, what is happening in the world in this segment is a great opportunity for our group". According to **Fabrizio Di Amato**, Maire Tecnimont's challenge has the flavor of technological innovation and precedes the evolution of the energy market.

To respond to a scenario that is evolving at increasing speed, the group specializing in engineering and infrastructure for the energy sector focuses on **"Green Acceleration"** by launching **NextChem**, a new company for the energy transition. A sector that today has an annual turnover of around 40 billion dollars in the world, with a growth rate of over 15 percent.

The goal, as the CEO pointed out, is ambitious: "We don't want to be caught unprepared in a world that is moving towards decarbonization. It is the right time to take the field by applying our skills in technology and plant engineering. Our idea of innovation involves the development, industrialization and marketing of new solutions that derive from validated technologies". Indeed, following the principle of low capital intensity, collaborations and scouting, Maire Tecnimont is able to bridge the gap between the idea born in the laboratory and production on an industrial scale. 

**DEVELOP AN ECONOMIC MODEL FOR ENERGY TRANSITION, FOCUSED ON RECYCLING AND BIOPLASTICS, REDUCING THE CARBON IMPACT.**

**THE GREEN ACCELERATION OF THE MAIRE TECNIMONT GROUP IS CALLED NEXTCHEM. THE CEO PIERROBERTO FOLGIERO: "WE ARE READY TO GIVE AN INNOVATIVE CONTRIBUTION TO THE CHEMISTRY OF THE FUTURE".**





The dedicated vehicle - NextChem - will manage a portfolio of technological initiatives in three macro areas, which represent the main emerging trends for the immediate future.

“**Greening the Brown**” activity aims at mitigating the environmental effects of the technologies used for the transformation of oil and natural gas. “**Circular Economy**” is focused on the implementation of the recycling of plastic and other waste materials. Finally, “**Green-Green**” is the innovative area with which Maire Tecnimont group aims to identify additives or oil substitutes to produce fuels and plastics from renewable sources.

“Over the past five years,” explained Folgiero during the presentation event, “our Group has invested around 50 million euros distributed over 70 innovative projects. With NextChem we set ourselves the goal of reaching ambitious economic targets: a big challenge that we want to win and that creates value for our shareholders”.

For Maire Tecnimont it is a turning point in some way, which has its roots in the chemistry of polypropylene (discovered by the Nobel Prize winner Giulio Natta) but which is strongly committed to making a difference in the present, positioning itself strategically for the energy future. “We are a good example of an Italian company that looks at the energy transition as an opportunity,” said the CEO. “We are facing a blank page, ready to start with the right attention to the intensity of capital to invest in innovation”.

# A NEW CONTEXT

**D**uring the presentation of NextChem, the CEO Pierroberto Folgiero explained that “Green Acceleration means first of all to be aware of what is missing and to build it. It means helping all the players in the supply chain to grow a new identity, redefining the roles of large companies, universities, start-ups and finance”.

If we look at the scenario, all the major players (both producers and buyers of plastics) are moving towards recycling and bioplastics, while the big oil companies are reviewing their investment plans for decarbonization. Thanks to its technological DNA, and its leadership in the transformation of natural resources, Maire Tecnimont is today able to act timely, to be the technological and industrial partner in the energy transition under way.

With this in mind (as we explain on page 24) Maire Tecnimont announced an **agreement with Enea** in the field of energy transition. A synergy in green chemistry and the circular economy, extended also to international actors specialized in renewable energy.



“Italy has no raw materials”, explained Pierroberto Folgiero, “so innovation is our oil. In developing low capital intensity technologies, focusing on scouting and strategic partnerships, we concentrated on the five major issues related to the energy transition”.



## NEW RAW MATERIALS

In the logic of reducing the sources linked to hydrocarbons, carbon is researched and extracted from natural feedstocks such as sugar and cellulose. Maire Tecnimont has an important focus on bio-ethanol, which is a fuel that is formed by fermenting recyclable biomass, especially sugar-rich agricultural products (cereals, sugar cane and cellulose). In Brazil it is already on the market as a transport fuel, in the West it is above all an additive to be mixed to lower emissions, used a lot for heating. Another type of new raw material is bio-ethylene, a component that precedes the production of virgin plastic (which therefore derives from renewable sources and not from hydrocarbons). Finally, there is the world of chemistry that deals with the “breaking” of the sugar and cellulose molecule, to use the carbon contained in them to satisfy other uses of traditional chemistry.



## NEW PLASTICS

On the one hand there is the development of a new economy of plastics, which must know how to design and produce materials with a view to recycling and reuse, bearing in mind that these are materials whose performance over time is degraded. In parallel, however, it is necessary to produce a share of new plastic (so-called “virgin”) through the technologies of chemical recycling or starting from renewable resources (extracting carbon from sugar and biomass). Not being able to recycle it all, part of the new plastic produced will have to be biodegradable: starting from organic raw materials, the new molecule produced will have the same yield as the traditional one and can be used in some market niches, particularly in the field of microplastics (invisible particles present in cosmetics, synthetic fabrics and tire dust).



## CO<sub>2</sub> REDUCTION

With a view to energy transition, it is necessary to push those technologies that minimize it and bring it to zero. As well as the innovative ways linked both to its capture and reuse. Based on the Paris agreements on climate change, a CO<sub>2</sub> extraction process is also needed to reach the set targets; that is, technologies are needed that are able to recover carbon dioxide. Together with those who push to implement forestification policies, there are also technologies to carry out the so-called “artificial photosynthesis”, a chemical process that, by reproducing the natural photosynthesis process, converts sunlight, water and carbon dioxide into carbohydrates and oxygen. Some researchers have not only improved the amount of energy produced and stored but have managed to reactivate a chemical reaction for hydrogen synthesis in algae, which has been inactive for thousands of years.



## ELECTRIFICATION

A big challenge is that of the sun, wind, water and earth heat energy storage. We have deepened the electrolysis technology (which lives a sort of Renaissance), a process that, unlike batteries, allows to transform the electric energy into chemical energy. Water and electricity together, or electricity used as any raw material to produce hydrogen, methanol, ammonia, fertilizers. Without touching hydrocarbons, at very low costs and using existing technologies in a productive manner.



## NEW USE OF GAS

The sector that uses natural gas as a raw material for producing energy is transportation considering it an intelligent solution in the (not fast) transition towards electric cars. Other ways to produce energy from volatile raw materials will concern the economies of methanol (a liquid that can be easily stored, transported and distributed, as is done with gasoline and diesel) and hydrogen. A third theme is that of “renewable” gas (or bio-gas) that derives from the fermentation of some waste. Maire Tecnimont is involved in the gasification of the dry part of the waste, from which (thanks to mature technologies) synthetic gases, chemical products such as urea and bio-fuels will be produced.

# THE CONTRIBUTION OF NEXTCHEM

**G**reen chemistry is a progressive path, which Maire Tecnimont divided into three phases. “**Greening the Brown**” activity aims at mitigating the environmental effects of the technologies used for the transformation of oil and natural gas. The second has to do with **Circular Economy** to implement mechanical recycling of plastics and promote chemical recycling. The third, called **Green-Green**, aims to identify additives or oil substitutes to produce fuels and plastics from renewable sources, and industrialize the production of bioplastics.

“Without being researchers - the CEO explained - as a group we contribute to accelerating the launch and commercialization of innovations, transforming good ideas into industrial plants, also thanks to a strong experience in technology and a solid engineering tradition in the execution of projects. In managing the technology portfolio, we play the role of competent intermediaries who, within an ecosystem, seek capital for the realization of the best projects. We are, in fact, the partner of choice for those who want to make innovation,

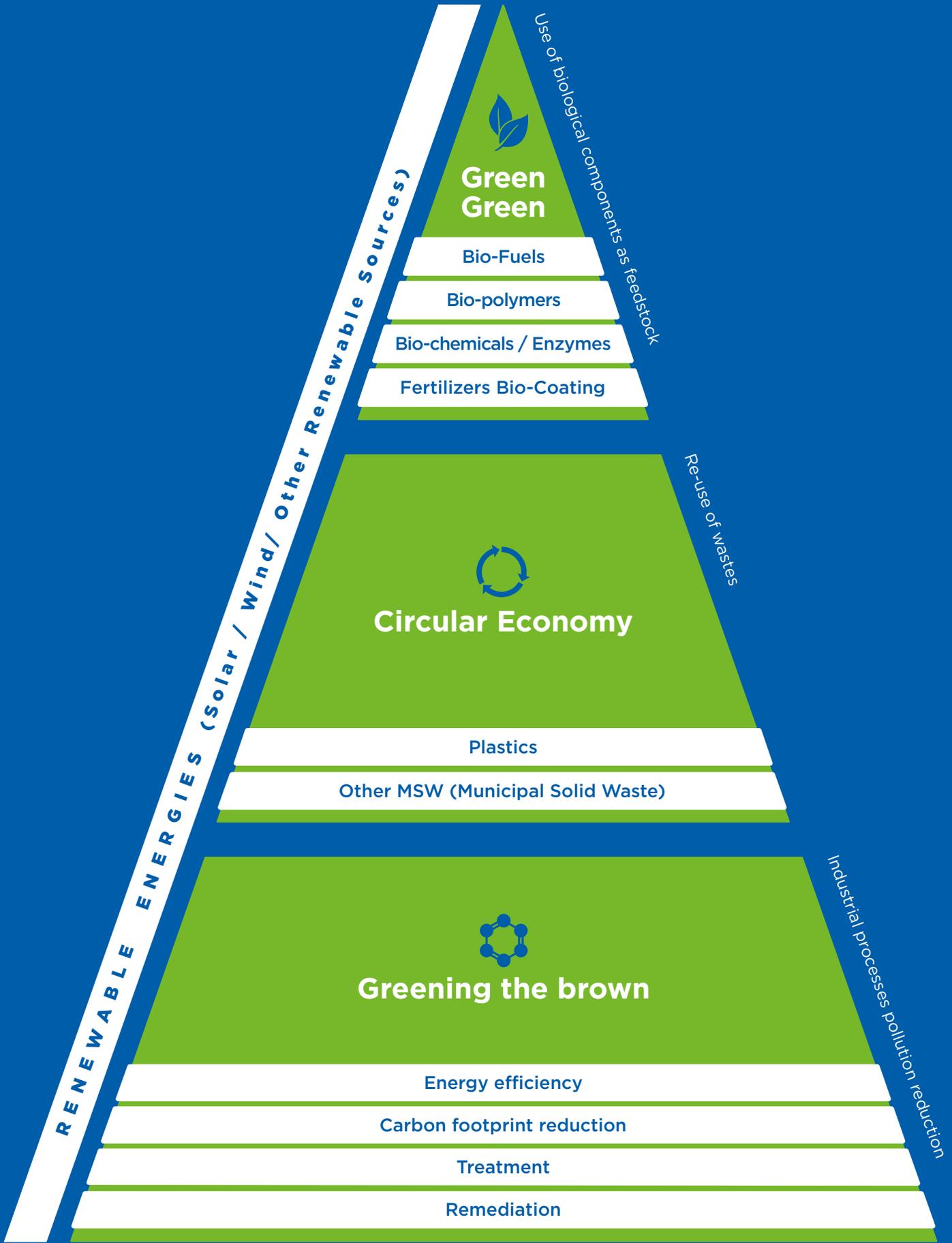
for those who want to make it flourish and come true outside the research laboratories”.

As mentioned, Maire Tecnimont has launched its own **Green Acceleration** project through a dedicated vehicle, **NextChem**. A new company that will manage technological initiatives in the field of energy transition to better respond to new market trends. The infographics shows the three areas of activity.



*We are, in fact,  
the partner of choice  
for those who want  
to make innovation,  
for those who want  
to make it flourish  
and come true outside  
the research laboratories.*





# TRANSITION TECHNOLOGIES

## THE MYREPLAST INDUSTRIES PLANT

Production capacity and quality of the finished product. In Circular Economy mechanical recycling offers high energy efficiency and great flexibility in the treatment of various types of plastic waste. NextChem - a new company focused on Green Acceleration - aims to combine the different types of plastic waste and to improve its technical characteristics, thanks to its know-how developed to regenerate the recycled polymer.

In February 2019 Maire Tecnimont entered this sector, investing in the development of its **first advanced mechanical plastic recycling plant**, located at **Bedizzole**, in the **province of Brescia**. The plant will be managed by a new company, **MyReplast Industries**, a subsidiary of NextChem and local businessmen as minority shareholders.

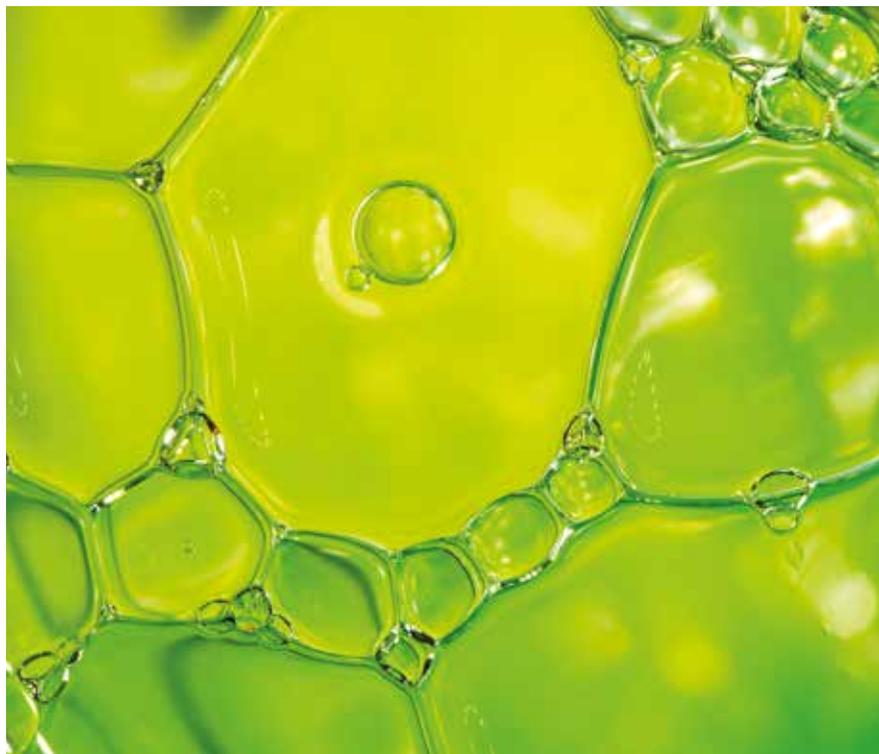
“In view of a new sustainable economy of plastics, explained the CEO Pierroberto Folgiero, this is an important step in our Green Acceleration strategy. Application of our process and plant-building skills to the new mechanical recycling business offers interesting opportunities in a sector that needs to industrialize the regeneration cycle of plastic materials”.

**Production capacity:** the plant is currently among the largest in Europe and is able to produce about 40 thousand tons of recycled polymers per year; **High flexibility:** the complex is able to treat various types of incoming plastic waste, both from industrial production

(for example, components of cars, food and industrial packaging waste), and from post-consumption, that is urban sorted waste.

The MyReplast Industries plant - based on an economically sustainable business model, without the use of public incentives - will produce high quality recycled polymers, with **recycling efficiency of around 95%**. Essential feature to approach high value-added “premium” markets and bridge the qualitative gap between recycled plastic and virgin plastic (coming directly from fossil hydrocarbons).

“Thanks to our leadership in the construction of polymer plants from hydrocarbons” concluded Folgiero, “Maire Tecnimont can play an accelerating role in the Circular Economy. In fact, reuse and recycling of polymers will create new raw materials and avoid their dispersion in the environment. In this field Italy can aspire to lead the transition towards green chemistry thanks to its great tradition of research, technology and industry”.





## THE DEMETO PROJECT

At the end of its post-consumer life cycle, the disposal of plastic polymer represents a major environmental challenge for the world. It is estimated that the decomposition of PET takes on average 450 years and that all this post-use plastic needs a place to go.

Landfills and incinerators have proved to be a non-optimal solution due to environmental impacts. Furthermore, a European Union directive aims to eliminate virgin plastic for packaging by year 2030. How? Through the reuse of existing plastic that will serve as raw material to produce new packaging.

It is therefore essential to push on the technology of chemical recycling. The DEMETO project aims precisely at the chemical de-polymerization of PET on an industrial scale, thanks to a process that exploits the alkaline hydrolysis reaction. A technology that allows the monomers to be recovered and recycled, closing the PET life cycle through a circular economy value chain. With positive effects on the environmental impact.

**The DEMETO consortium is led by the new company NextChem**, as project manager for the entire project. A leadership that brings vast experience in process design, project management and the implementation of complex engineering systems.



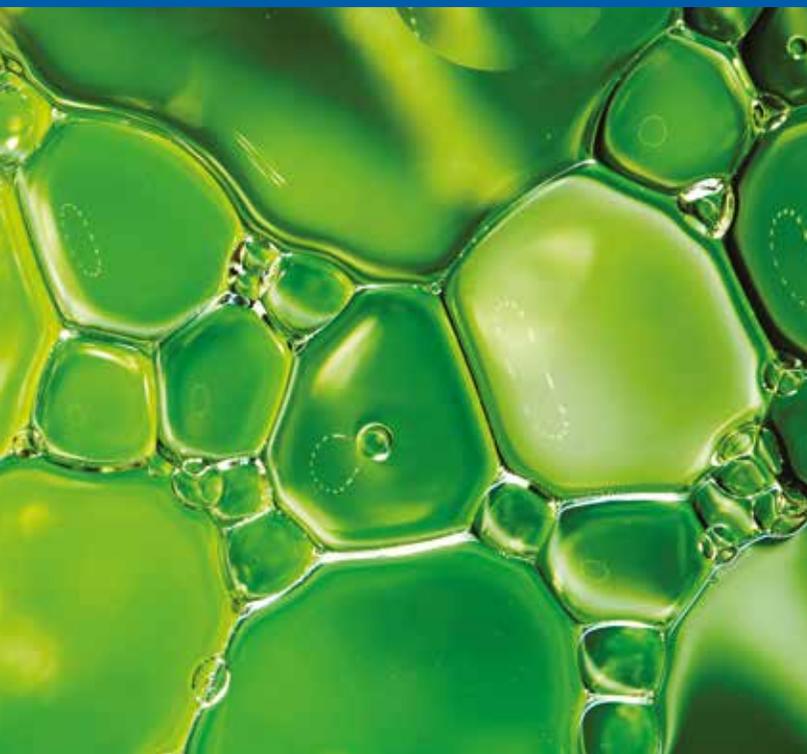
## MEWLIFE, PRODUCING BIOMASS FROM ALGAE

Using vegetation water to produce microalgal biomass. This is - starting from the recovery of waste water from the agro-food industry - the primary objective of the **MEWLIFE project**, part of the NextChem initiatives.

Microalgae are a promising biomass for the sustainable supply of raw materials and specialized products in various sectors, including food. Despite its great potential, the implementation of the use of this class of microorganisms on an industrial scale is limited, mainly for economic reasons. The main obstacle concerns availability of microalgae biomass at acceptable costs.

Europe produces about 70% of olive oil in the world (Spain, Italy and Greece as the main producers). Through an integrated system of phototrophic-heterotrophic cultivation not only **we reuse the waste water that comes from the olive oil production plants** (carbon source for microalgae growth), but we also use the biomass to test its **nutraceutical application** (which studies the nutrient principles contained in foods with beneficial effects on health) and for the production of biopolymers.

Wastewater from production plants - not treatable in conventional biological treatment plants due to the toxic effect of antioxidants (polyphenols) on activated sludge - will be usable thanks to the MEWLIFE project, which overcomes these obstacles by developing an integrated pilot set for physical and biological treatment of vegetation water.



# THE VALUE OF UPCYCLING

**WHAT WE USED TO CONSIDER AS WASTE BECOMES A NEWLY AVAILABLE RESOURCE. TO CREATE PRODUCTS WITH HIGHER PHYSICAL-CHEMICAL PERFORMANCE.**



**W**hen we talk about recycling, we mean a process by which a material is recovered for a new life cycle bringing it back, as far as possible, to the original properties, let's think about glass, aluminum and above all plastics. Taking into account that most of the recycled industrial products lose their initial characteristics such as, for example, strength, brilliance, transparency in the recycling process, the goal of research in this sector is to produce, in the field of plastics, products of equal or even better quality than the original product. >>



*It is an advantage for the environment: no new raw materials and disposal costs.*





At the scientific level, in fact, the new concept of Upcycling has become widespread: a process of conversion of the materials used into new materials or into new products of high commercial value, of similar or even better quality.

What we used to consider as waste becomes a newly available resource from which new value can be obtained. With Upcycling one can overcome the concept of “waste”. The advantage for the environment is dual: on the one hand it is no longer necessary to search for new raw materials (activity that involves use of energy, land consumption, water-atmospheric pollution, greenhouse gas emissions), on the other hand the disposal costs are reduced. Upcycling is already applied in the MyReplast Industries plant (which we mentioned on page 18), where thanks to our polymeric material selection and re-sequencing technology we are able to transform low value plastics (e.g.: fruit containers, diapers, industrial waste) in products with higher physical-chemical performance and therefore higher value. Among our customers there are top players in the automotive industry who buy our products to make bumpers for their cars.



# A FUTURE TO BE INVENTED

## Ferruccio Resta

Rector of Politecnico di Milano



“ A university without a company at its side to establish an open and quick dialogue and to transfer its research cannot give any added value to the system. ”

## Polimi investments

- New energy laboratories for hydrogen recovery and CO<sub>2</sub> capture
- 40 million euros to set up chemical and chemical engineering laboratories
- **TARGET:** repositioning of the Politecnico University in research infrastructures

## PoliHuB incubator

- 120 start-ups
- **INCUBATOR DURATION:** maximum 4 years, then start-ups must come out
- **NUMBER OF EMPLOYEES:** 500-600 people
- **REVENUE:** 40 million euros
- **RESULTS:** 8 major exit in the last 3 years
- **NOTES:** it is not up to teachers to oversee a launch process: an entrepreneur must supervise this stage

“IN THIS FIELD THERE ARE EXCELLENCES, BUT AN ECOSYSTEM THAT UNITES THEM IS LACKING,” SAID CHAIRMAN FABRIZIO DI AMATO DURING THE ROUND TABLE WITH REPRESENTATIVES OF BANKS, UNIVERSITIES AND MULTATIONALS. “WITH NEXTCHEM WE WANT TO MAKE THESE WORLDS TALK”.



## Mauro Micillo

Head of the Corporate and Investment Banking Division of Intesa Sanpaolo

“ In 2015 Intesa Sanpaolo was the first banking group to partner up with the Ellen MacArthur Foundation, a paradigm and challenge for those who believe in the theme of sustainability and the principles of the circular economy. Our goal is to support the growth and innovation of production chains. ”

## Joško Bobanovic

Sofinnova partner



“ We must use new technologies to achieve environmental successes. Sustainability is necessary as an element for our survival and technology is essential to achieve it. ”

## Sofinnova

- **WHAT IT DOES:** European venture capital firm specialized in biosciences
- **FIELDS OF INTEREST:** highly innovative technological models and visionary entrepreneurs
- **STATS:** it has promoted and financed 500 companies since 1972
- Current volume of funds under management exceeding € 1.3 billion

## Initiatives of Intesa Sanpaolo Innovation Center

- **5 billion euros** line (period 2018-2021) for innovative and transformation projects for SMEs and large companies inspired by the principles of the circular economy
- **Startup Initiative**, acceleration program for startups
- **Circular Economy Lab**, the first Italian laboratory for the circular economy based in Milan created together with the Cariplo Foundation

## Intesa Sanpaolo Innovation Center

- Located on the 31st floor of the Turin skyscraper of Intesa Sanpaolo, designed by Renzo Piano
- Employs 100 resources working on 50 projects
- **OTHER OFFICES:** London, New York and Tel Aviv

## Circular economy

According to the definition of the Ellen MacArthur Foundation, it is a term to define an economy designed to be able to regenerate on its own.

## Zambon Spa

- Chemical-pharmaceutical multinational present in 84 countries
- **FOUNDATION:** Vicenza, 1906
- **CURRENT LOCATION:** Bresso, Milan
- **MISSION:** offer innovative solutions to improve patients' quality of life, with a specialization in the treatment of diseases such as Parkinson's and Cystic Fibrosis

## Campus Openzone

It is a campus designed by Zambon on the outskirts of Milan, dedicated to Life Sciences. Its spaces will double by 2021.



## Elena Zambon

Chairman of Zambon Spa

“ Scientific progress needs sharing to bring together different perspectives. We need to turn our businesses into real organizations: here is where a company becomes a scientific campus where you can talk with other companies to reach a common goal. ”

# AN AGREEMENT FOR SUSTAINABILITY

**MAIRE TECNIMONT AND ENEA SIGNED  
A MEMORANDUM TO JOINTLY DEVELOP  
TECHNOLOGICAL INNOVATIONS.**



From the left Federico Testa, Fabrizio Di Amato

**G**reen chemistry, circular economy, recycling of plastics, innovative processes with low environmental impact: these are the keywords of the agreement signed by Maire Tecnimont and Enea to jointly develop technological initiatives in the field of environmental sustainability. A collaboration formalized during the event “NextChem - Maire Tecnimont for Innovation” and which in fact testifies to the Group’s desire to be among the protagonists of the **Green Acceleration**.

The president **Fabrizio Di Amato** emphasized the importance of the agreement: “In a changing economy, Maire Tecnimont is the ideal technological partner able to seize all the opportunities that derive from the new scenario of energy transition in progress. The agreement signed today is a further confirmation of the Group’s innovative DNA”. The signature confirms the close cooperation between Maire Tecnimont and ENEA on the development of innovative processes in the field of **plastic recycling**, with particular attention to efficiency, environmental impact and renewable energy.

The collaboration also pursues the objective of promoting the technical, scientific and entrepreneurial culture in the world. It is in fact necessary to spread the interest on innovation issues through a dense system of relationships and exchange good sustainability practices. The idea is to activate initiatives dedicated to issues of environmental protection, able to convince all the protagonists of the sector

to adopt a new cultural and operational approach through the creation of international networks and the organization of institutional events.

The words of the President of ENEA **Federico Testa** illustrate the strategic value of the agreement: “This agreement allows a large group like Maire Tecnimont to strengthen its competitiveness, drawing on the reservoir of innovative technologies and advanced services created by ENEA. And it marks a further step forward towards the goal - indicated in our Three-Year Plan - of increasing the direct transfer of the research results to the companies to favor growth and development of the entire country system”.

In March 2019 the first National Report on the circular economy in Italy was presented, carried out by the Circular Economy Network and ENEA. The report shows that Italy is always in pole position in the European rankings of the overall circularity index, a value attributed according to the degree of efficient use of resources, use of secondary raw materials and innovation in the categories production, consumption, waste management . The United Kingdom (90 points), followed by Germany (88), France (87) and Spain (81), are still far behind in the ranking of the five main European economies.

On behalf of ENEA - selected by the EU Commission to chair and coordinate the Italian circular economy platform - it was Director of the Sustainability Department, Roberto Morabito to take the word. “Today our country has all the qualifications for a successful transition from the linear economy to the circular economy, but obstacles and barriers still need to be overcome. Hence the importance of creating a National Agency for the use and efficient management of resources that can support the transition to the circular economy in terms of technologies, methodologies and tools for planning, management and measurement”.



# PLASTIC, TIME TO CHANGE

**T**he plastic industry is called to face an epochal transition, in the coming years of environmental sustainability. A complex challenge, at the same time technological, economic and cultural; a challenge upstream and downstream a very long and complex chain which begins with the extraction or production of the raw material (fossil or natural) and ends up in the homes of consumers.

The crossroads that leads to linear economy and circular economy at the same time is post-consumption life of plastic products. The recycling chain has structural limits, due to the organization of separate waste collection, the awareness of citizens, technological limits and the absorption of recycled materials. The upcoming implementation of the European directives on circular economy and of the European plastics strategy guidelines defines a horizon for overcoming the limits and joining the road to circular economy, for all products, for all application sectors.

Designing a plastic product based not only on functional characteristics it must have during its use or on the technological-productive or economic aspects, but also on its recyclability at the end of its life, will have to become a habit. Companies will have to take into consideration the aspects that impact the final recyclability of the product in terms of type of polymer to be used, mix of different polymers (and their possible recovery), mix of polymers with other materials, shape (considering space and volume that facilitates separate collection), dismantling, and so on. Thousands of designers, engineers, will have to revise the design guidelines. Initial processing companies, companies that produce goods with an integrated supply chain, brand owners, designers, the polymer industry, the recovery chain will have to work together to find new solutions, seeking new balances between technical, environmental, marketing and safety needs. There must be interlocutors in the companies within the supply chain able to speak the same language and align based on the same needs. A great commitment.

## ILARIA CATASTINI, SUSTAINABILITY PRACTICE LEADER, HILL + KNOWLTON STRATEGIES ITALY.

Everyone is convinced that much more can be done in the recycling of plastics, with greater political will, greater consumer education and commitment, greater investment by companies in research and innovation, greater awareness on the part of the public administration, user companies, consumers. A product containing recycled plastic is more virtuous than one that does not have one and therefore that is the direction to take, in the purchasing choices, in one's "vote with the wallet". It is known that one of the main culprits is not the plastic itself, but the citizens and their incorrect behavior, their poor education; that the bulk of the problem comes mainly from the countries which do not have waste management systems and still use rivers



as the main disposal site. But water, like wind, does not stand still, it travels, and carries that waste with it.

However, hyper-simplification of communication messages against plastic has the upper hand. It has a flaw and an advantage.

The flaw is free the message addressee from any responsibility. Saying “Dolphin killed by plastic” is different from saying “Dolphin killed by plastic that YOU didn’t separate and didn’t recycle”. With the first formula we do not get awareness of our role. Plastic, and only plastic, can make you many products that are life-saving for humanity, from biomedical applications, to motorcycle helmets, to car safety components; plastic helps reduce food waste; in some cases it reduces the carbon footprint from goods transportation and in others, such as insulation products, has a negative carbon balance over the life cycle, and a positive effect in climate change policies. Without plastic, some achievements in science, high-tech, aerospace, even environmental engineering would not have been possible. It is a terrible mistake not to make a distinction between redundant and useless applications and essential applications of a material that is a marvel of technology and has helped humanity to acquire a quality of life that we could only dream of and that millions of people today still don’t have.

The merit of these campaigns is that they are raising everyone’s attention to two problems that are no longer avoidable: one is the overall volume of world production - growing, especially due to the increase in quality of life levels in developing countries - which requires an accurate analysis of the capacity of the planet system to absorb and manage from now to the next decades and centuries; the other is the dispersion of microplastics deriving from the degradation of the products or the release of micro-parts during use (such as synthetic clothing fibers that are dispersed during washing in washing machines), which end up through sewage drains, rivers, seas, in the belly of fish that mistake them for food, and from there perhaps even in the human organism through the food chain.

These are gigantic problems, which cannot but be faced by those - politicians, scientists, far-sighted economic managers - who have, or simply feel they have, the responsibility to manage today’s problems that will impact many generations to come, on the protection of many species of animals, on the maintenance of natural balance and quality of life on planet Earth.

What is it for the global industry to go through this epochal transition by exploiting it as an opportunity, as a challenge? Without depriving the prevailing part of the world population (let us remember that 840 million people in the world live without access to drinking water, the primary asset to survive, more important than food) of that improvement in the quality of life that for us is perhaps irrelevant but for them is a great achievement of dignity and civilization? Without giving up some safety features that alternative materials do not have? What directions should research on materials take? What help do companies need from institutions, to change mindsets, design skills, machinery, organizational systems, to access adequate skills on the labor market, to safeguard jobs? Is a slogan like #plasticfree sufficient to represent all this? Or is it yet another socially and mediatically effective story unable to provide a complete reflection on the world of plastic?

The Italian plastic industry is opening up to examination, to sharing, to the search for solutions, stimulating companies and seeking joint discussions and round tables. The road is long, and leaders of change, training, dialog with all parts of society are needed. A challenge of the highest level and of great interest.



# MEASURE YOUR GREEN FACTOR

Answer the questions and find out how much you are informed about eco-sustainability.

1. The BIQ House is:	<p><b>A</b> Bio Intelligence Quotient which measures insects' ability to adapt to climate change.</p> <p><b>B</b> A building powered by an algae bioreactor built in Hamburg.</p> <p><b>C</b> The only psychosomatic medicine clinic in Toronto, where it is possible to establish the ability to communicate feelings verbally through the BIQ questionnaire.</p>	2. What are the Bug Hotels?:	<p><b>A</b> A new typology of tourist facilities that respect a series of parameters linked to sustainability.</p> <p><b>B</b> Insect shelters built to protect biodiversity in cities.</p> <p><b>C</b> The most common design errors in hotel construction.</p>	3. A "green frame" is:	<p><b>A</b> A set of guidelines of a Municipality for the management of urban green areas.</p> <p><b>B</b> A traditional tartan wool Scottish fabric used to make kilts.</p> <p><b>C</b> A structure with a frame to hang on the wall to expose small vertical gardens.</p>
----------------------	--	------------------------------	--	------------------------	---

## 4. Lítla Dímun, in Denmark, is famous because:

- |   |  |   |
|---|--|---|
| <b>A</b>  | <b>B</b>                                   | <b>C</b>  |
| It has a lenticular cloud that always surrounds it. | It was the location of the film Cast Away. | It is a natural park inhabited only by wild horses. |

## 5. Hunting Pollution is the name of Europe's largest antismog mural. Where was it made?

- |  |   |   |
|--|---|---|
| <b>A</b>   | <b>B</b>  | <b>C</b>  |
| In Rome, in the Ostiense district, center of the city's underground culture. | In Paris in the V arrondissement, not far from the Sorbonne University. | In Barcelona along La Rambla, the busiest street in the city. |

Answers: 1 b; 2 b; 3 c; 4 a; 5 a.

# ECO HIT PARADE

Green world and sustainable lifestyles: “who” and “what” at the top?  
This is what the ranking issued every year around the world say.

According to NASA, the plants that better purify domestic and office air are:

- 1** **Ficus, variegated ivy** and **aloe** eliminate up to 12 micrograms of formaldehyde every hour
- 2** **Anthurium** removes about 10 micrograms of ammonia per hour and is able to absorb even considerable percentages of formaldehyde, toluene and xylene
- 3** **Dieffenbachia** absorbs formaldehyde, toluene and xylene from the environment
- 4** **Dracena marginata** removes about 10 micrograms of xylene and toluene from the environment
- 5** **Sansevieria** absorbs alcohol, acetone, benzene and small amounts of formaldehyde and xylene
- 6** **Spathiphyllum** removes up to 19 micrograms of acetone every hour
- 7** **Orchid** absorbs xylene
- 8** **Pothos** removes carbon monoxide

The list of the most virtuous countries in the fight against food waste according to the Food Sustainability Index:

- 1** France
- 2** Germany
- 3** Spain
- 4** Italy

The most ecological tech companies According to Greenpeace's Greener Guide are:

- 1** **Fairphone**, based in Amsterdam and stands out for a strenuous battle against pollution and the elimination of planned obsolescence
- 2** **Apple**, for low use of plastic
- 3** **Dell EMC** for its policies related to renewable energy
- 4** **HP** for the transparency of information related to sustainability

# THE CHALLENGE OF NUMBERS

**"T**ake the Challenge" in the Maire Tecnimont Group's industrial vision means to consider individual challenges as an opportunity for growth and a specific focus on results. In the recent presentation of the 2018 financials trend, made to analysts and the press, the CEO **Pierroberto Folgiero** highlighted the growth of the main indicators compared to 2017.

Maire Tecnimont closed the year with a consolidated net profit of € 117.4 million, up 20.2% compared to the adjusted figure for 2017. Revenues amount to 3.64 billion (+3.4%), while EBITDA amounts to € 205.7 million, up 8.4% compared to 2017 adjusted figure. The increase in volumes reflects the evolution of the projects and is attributable to the main EPC contracts under execution".

"Thanks to the acquisitions of 2018 which amounted to almost 3 billion euros," explained Folgiero, "our backlog, composed of high-quality projects in all our business lines and in various geographical areas, as of December 31 remains at a high level, 6.6 billion euros.

**PROFITS AND REVENUES UP IN 2018  
FOR THE MAIRE TECNIMONT GROUP.  
THANKS ALSO TO COMPETITIVE  
POSITION AND THE SUCCESS  
OF ITS BUSINESS MODEL.**

In particular, the new orders include the project to revamp and rebuild the Heydar Aliyev refinery in Baku, Azerbaijan, on behalf of SOCAR; the construction of a new polypropylene unit (PP5) at Borouge 3 complex, on behalf of Borouge in the United Arab Emirates; new LPG train at ZCINA plant in Algeria, on behalf of Sonatrach; new high density polyethylene and polypropylene units in India, on behalf of HPCL - Mittal Energy; new high density polyethylene unit and the extension of a polypropylene unit in the Philippines, on behalf of JG Summit Petrochemical Corporation, executed in Joint Venture with another contractor; FEED and early procurement activities for the new process units and offsites of a petrochemical complex of Exxon Mobil in the United States.

"At the end of last November," the CEO continued, "we officially launched NextChem business unit, thus confirming our **part in the green chemical sector**, guided by our technological DNA, passion for innovation and our desire for better environment. This is an area that will provide great satisfaction to the Group and a source of long-term value".

In conclusion, the top management of Maire Tecnimont expressed satisfaction with the results of 2018, which show a **strong competitive position** and highlight the **business model success**. Folgiero concludes: "We continue to focus our commercial efforts on a large number of interesting opportunities around the world to generate new projects, particularly in the petrochemical sector".

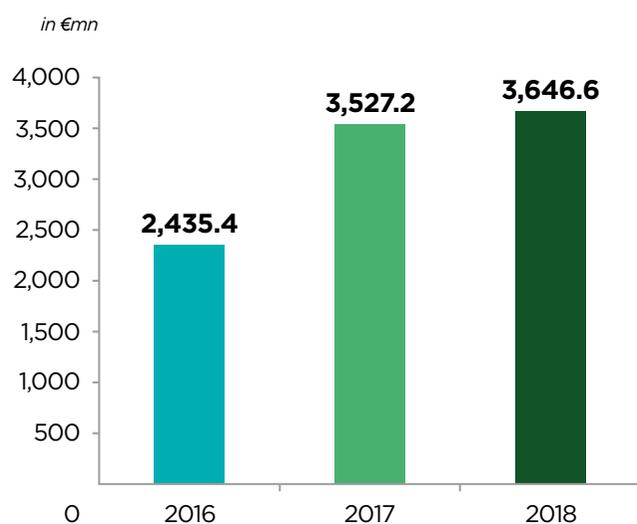
The Board of Directors also decided to propose a dividend distribution of €0.119 per share. The total dividend amount of €39.1 million implies a payout ratio of 33% of the Consolidated Net Income, in line with the Group dividend policy adopted in previous years.

# FINANCIAL RESULTS

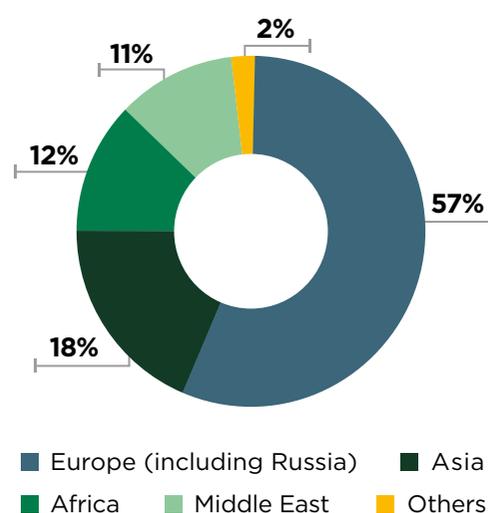
## 31.12.2018

31

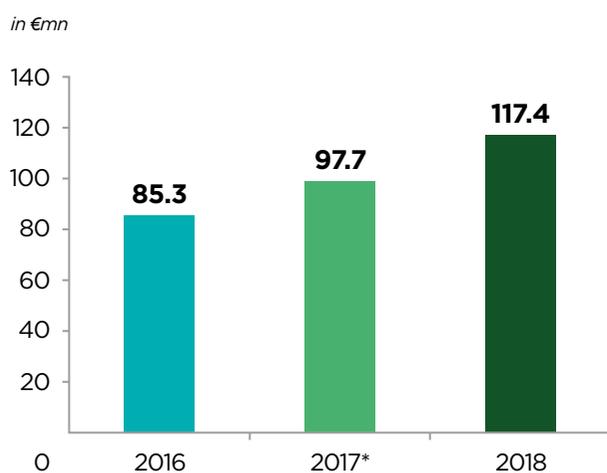
### Revenues



### Order portfolio

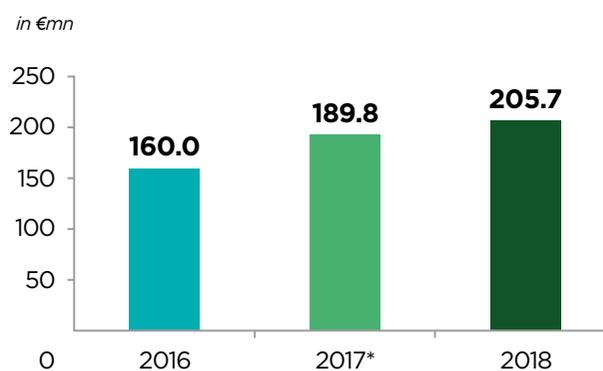


### Net income



\* Data adjusted both by retroactively applying IFRS 15, and by excluding a non-recurring positive impact of € 28.3 million (before tax)

### EBITDA



\* Data adjusted by retroactively applying IFRS 15

# BEHIND THE SCENES OF INNOVATION

*“MyReplast Industries plant in Bedizzole (BS) is among the largest plastic recycling plants in Europe. At full capacity, it will produce 40,000 tons per year of polymers destined for upcycling”.*







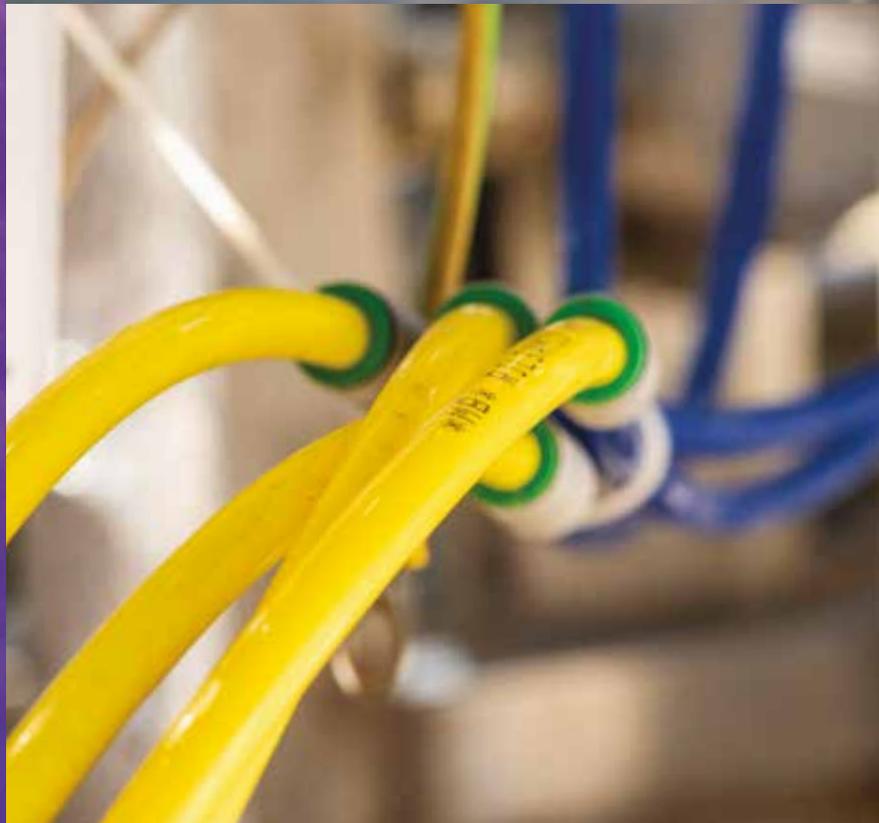
H2S cracking zero emission pilot plant in Nanjing, China



*“Our 'not impossible mission' is to split hydrogen sulfide (H<sub>2</sub>S) into H<sub>2</sub> (hydrogen) and sulfur thanks to the cracking reaction produced by our KT SOAP catalyst to achieve zero atmospheric emissions”.*

36

*“DCCD™ (Dual Column Cryogenic Distillation) technology is an innovative process to separate the acidic components contained in natural gas wells, such as CO<sub>2</sub>. In this way, greenhouse gas emissions are limited, making the process more economical and sustainable”.*





Piacenza DCCD™ pilot plant





*“Thanks to the MEWLIFE project, wastewater from olive oil production plants will be used to produce microalgae biomass to create biopolymers”.*

40

*“With the share in Pursell Agri-Tech, a US company specialized in controlled release coated fertilizers, we combined the best of urea (Stamicarbon) technologies with the coating ones (Pursell)”.*





New generation fertilizer plant inauguration in Sylacauga, Alabama, USA

# THE OCEAN CLEANUP

**T**he beautiful stories, the real ones, made of passion, commitment and courage. Those in which the happy ending seems inevitable but then you stumble and look for a new solution with greater determination. The shoulders are wide, the mind is open and the goals to be reached are too important to waste time. We have to try again; we need to improve. We like this story because happy ending is not guaranteed. It is a story about The Ocean Cleanup, a Dutch non-profit organization, active since 2013 in the development of innovative technologies. What does it do? Cleans up the oceans of the world from plastic, using alternative methods.

The Pacific is the focus of this company, known to be not only the largest ocean, but also the stormiest. Almost a perfect setting for a story told in an American blockbuster with meters high waves, frightening storms and violent currents. But in a film like this some scenes would be out of place and would undoubtedly be cut. The scene in question is called Great Pacific Garbage Patch and is a large island of floating waste.

Yes, the Pacific is also the planet's most polluted ocean and cleaning it with traditional methods is not feasible: too much money, too much time, too many risks. But you can't turn a blind eye, we're not in the cinema, it's not a movie. It is the reality that has the shape of a giant plastic island. Hence the idea of the young Dutch entrepreneur Boyan Slat, an innovative, ingenious, and bold proposal. Create a large mobile platform in which the plastic materials, thanks to the floating barriers and the force of ocean currents, are first pushed in the direction of the barrier and then retained by it. Finally, they are removed.

But Wilson, the floating barrier launched in September 2018 from the Bay of San Francisco, during the navigation lost at its part about 20 meters long. In other words, the 001 System - as the experts call it - broke. The expedition to the Pacific has been interrupted: the platform has returned "home" to the mainland, where a team of engineers and scientists are ascertaining the causes of the failure and are trying to make the structure more performing.

## THE DUTCH NON-PROFIT PROJECT TO CLEAN UP THE PACIFIC FROM PLASTIC WASTE.

A setback, of course. But nothing more according to Slat, who on Twitter explained that "missteps like this are inevitable when experimenting with a new technology so quickly". And he specified that these are "solvable" problems, promising that "the cleaning action of the Great Pacific Garbage Patch will become operational in 2019". In fact, according to the program, over the next year the equipment should complete all the necessary tests. The 001 System is the first prototype of 60 devices that Ocean Cleanup hopes to use soon to clean up the oceans from plastic waste.

Maire Tecnimont believes in the responsible use of plastics, sustainability and innovation that improves the environment in which we live. For this reason, our Group has decided to support the project of The Ocean Cleanup.



## PROJECT CARD

# Wilson, code name System 001

### WHAT IS IT?

A series of inter-connected floats that form a gigantic horseshoe on the surface of the ocean

### LENGTH

600 meters

### STRUCTURE

A “skirt” is attached below the float, at a depth of 3 meters

### FEATURES

The float is designed to capture plastics, while the skirt prevents smaller particles from escaping

### ENERGY USED

The float uses only natural ocean currents to capture the plastic

# Great Pacific Garbage Patch

### WHAT IS IT?

The most famous oceanic area where macro and micro-plastics and fishing equipment waste accumulate

### EXTENSION

20 million square km

### WHERE IS IT

In the Pacific, in an area between California, Hawaii and Japan

### WHY

In the North Pacific Subtropical Convergence Zone, the warm waters of the South Pacific meet the cold waters from the Arctic Circle. Here the currents carry debris and the action of the Subtropical Pacific Vortex keeps them together

### WHEN

It was discovered in 1997 by the sailor Charles Moore



## 44 THE OCEAN CLEANUP

# Who is Boyan Slat

### PLACE AND DATE OF BIRTH

Deft (South Holland), 27 July 1994

### AGE

24 years

### PROFESSION

CEO and founder of the non-profit organization Ocean Cleanup (which employs 65 people including engineers and scientists)

### EDUCATION

He interrupted his aerospace engineering studies at Delft University of Technology to fulfill his dream of cleaning up the oceans

### THE IDEA

While scuba diving during a trip to Greece he saw many plastic items in the sea. He is convinced of the need to find a solution to the problem

### FUNDRAISING

His idea presented at a TEDx talk wins over insiders and investors. He collects 30 million dollars over 5 years

### FAMOUS PHRASES

“Technology is the most powerful agent of change. It is an amplifier of our human possibilities”, *The Economist*



# GOODBYE TO MICROPLASTICS IN COSMETICS

**B**ye-bye microplastics in cosmetics. Italy is the first nation in Europe to ban them, banning their sale from 1 January 2020. What are they? Solid plastic particles, insoluble in water, measuring 5 mm or less, added to rinsing and exfoliating or cleaning cosmetic products.

The ban on microspheres contained in exfoliating masks, bath foams, toothpastes and other personal care products - is essential in the fight against "marine litter". These are polluting substances for aquatic ecosystems because their tiny dimensions pass through filters in purifiers. At the same time, massive presence of invisible pellets in everyday products makes them a source of significant marine alterations: it is estimated that for every single shower up to 100 thousand microspheres can end up in the seas and that every day up to 24 tons of plastic microgranules pour into the European seas from the use of cosmetics, for a total of 8,600 tons per year. And the Mediterranean is a sea with the highest concentration of microplastics in the world.

The polluting path of the cosmetic microspheres therefore begins in the showers and sinks to end up

## FIRST IN EUROPE, FROM 2020 OUR COUNTRY WILL BAN THE MICROSPHERES PRESENT IN SHAMPOOS AND MAKE-UP PRODUCTS.

in the sea: where fish ingest them, without being able to digest them. During their journey the microspheres absorb toxic substances that we will find in the ground, in the bottled water, on our tables, even in the air we breathe. Our planet, we know, is an interconnected system where every environment constantly comes into contact with other habitats. Water, air and earth know no boundaries, and penetrate each other at all times.

In addition to advanced legislation in Europe, much focus is placed on research into the development of new biodegradable and alternative molecules to replace plastics, as explained Pierroberto Folgiero, CEO of Maire Tecnimont, with a view to new corporate strategies on green chemistry: "Plastic recycling subject sees us ready as a Group to undertake new technological and innovative challenges. Not being able to recycle it all, one part will continue to be produced from scratch. But it will be biodegradable 'virgin plastic'. Starting from biological raw materials, the new molecule produced will have the same yield as the traditional one and can be used in some market niches, especially in the field of microplastics, especially for cosmetics".

In general, research in this sector is exploring the potential of obtaining components for the cosmetics industry from renewable plant sources. The microplastics in shampoos, lipsticks and mascaras, often derived from fossil sources, will instead be increasingly produced from biodegradable raw materials obtained, for example, from the residues of beets and sugar cane processing.



# AN INGENUITY HERITAGE AS A COMPETITIVE ADVANTAGE

**THE NEW PROJECT TO RECOVER AND CATALOGUE ALL MAIRE TECNIMONT HISTORICAL ARCHIVES WAS PRESENTED TO GIVE LIFE TO THE FIRST ITALIAN ENGINEERING EXPERIENCE CENTER.**

**"W**ithout memory it is difficult to determine if you are really going down the road of innovation". The words of Chairman of Maire Tecnimont, **Fabrizio Di Amato**, contain the profound meaning of the initiative **INGENUITY HERITAGE**. This is a project that aims to **enhance the historical, technical and cultural identity of the Group**, through the recovery of a very rich archive of materials that tell decades of engineering history, in Italy and in the world.

"This is the first leg of a journey that will lead us to the realization of an **engineering museum**", announced Di Amato during the presentation of the project, which took place at the National Museum of XXI Century Arts (MAXXI) in Rome.

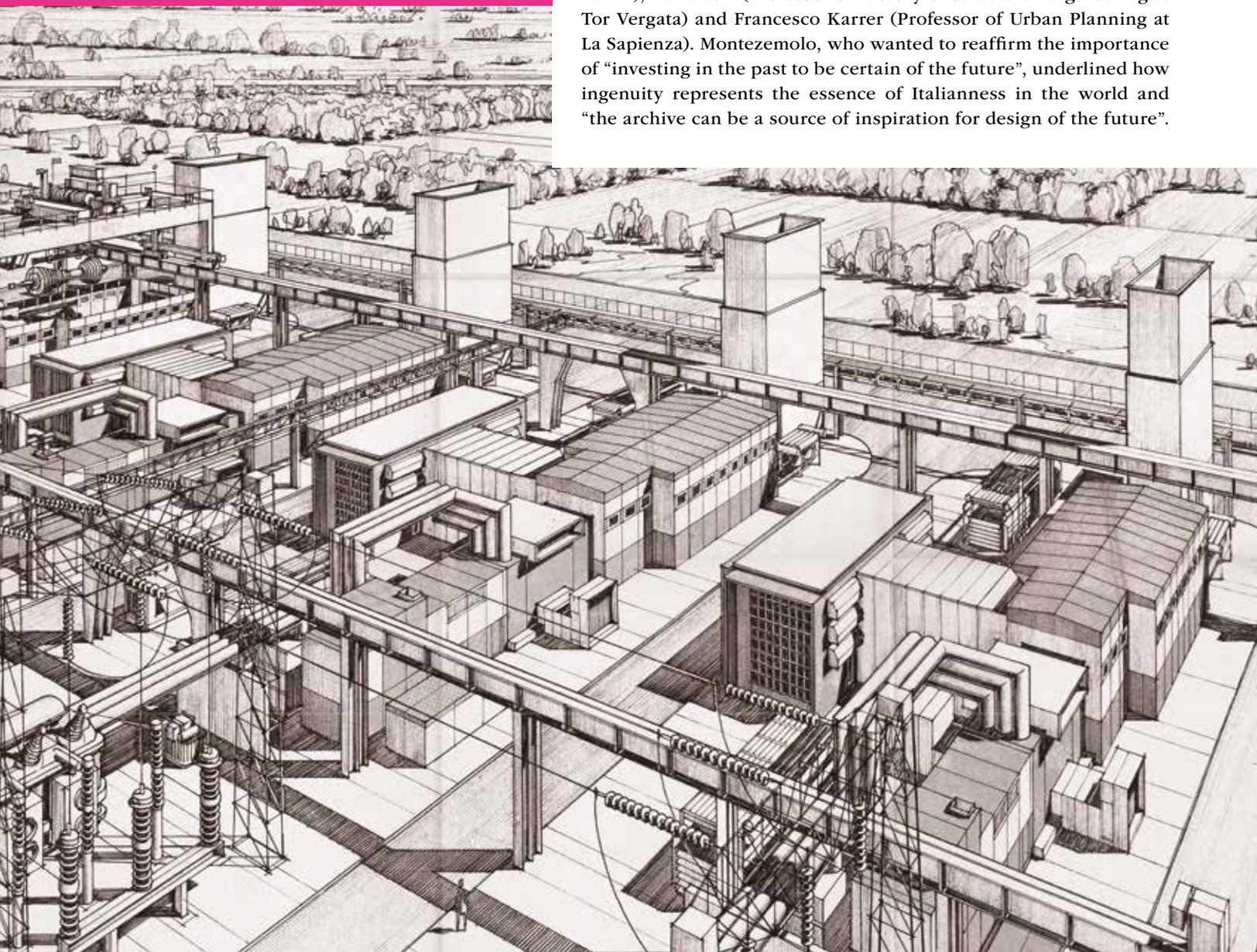
It will not be a traditional structure, but the first engineering **experience center** in Italy, housed in our **Milan headquarters**. The museum will show the characteristics of the realized projects, becoming an experience center from which to draw suggestions, ideas, intuitions. And there will be a lot of material to be drawn inspiration from, since the classification will concern all the archives of the various Group companies: from the former Fiat Engineering to Tecnimont, from KT- Kinetics Technology to Stamicarbon, TPI and Tecnimont Pvt Ltd. "Because the knowledge acquired in the past must be used as a competitive advantage for planning the future," explained the CEO **Pierroberto Folgiero**.



A careful research work that has lasted six years so far and that has also involved the **Department of Architecture and Design of the Polytechnic University of Turin**. The vast archive of the former Fiat Engineering (which joined Maire Tecnimont in 2004) is on focus, a real **cultural archive of architecture and engineering of the second half of the 20th century**, composed of about 7 thousand boxes, 6 thousand files and 65 thousand microfilms as well as reports, handwritten notes and photographs. For a total of 2,600 square meters of materials estimated at almost 26 million euros worth of assets. A cultural legacy that has also obtained the declaration of national historical interest with the decree of the Archival and Bibliographical Superintendent of Piedmont n. 22/2018 of 30 October 2018.

A succession of design experiences that are among the most significant in Italian and international history:

Turbogas power plant, Maddaloni, Caserta, 1969



transport infrastructures, administrative centers, residential districts, industrial plants built by Quaroni, Danusso, Covre, Albini, Nervi, Morandi, Zevi, Aulenti, Gabetti, Isola, Piano, Halprin, Rogers, Krier. “A symbol for engineers,” said Pierroberto Folgiero, “and of how engineering is applied knowledge that transforms reality”.

And just to give visibility to a so illustrious and conspicuous heritage of talent, now perfectly classified, two volumes were presented **The Fiat Engineering projects 1931-1979 and 1980-2008** (published by Silvana Editoriale). Pages that contain essays, files and images capable of making the reader trace back the history of the Group through a selection of the most significant projects for the industrial and civil development of our country.

In addition to Fabrizio Di Amato and Pierroberto Folgiero, the event was attended by Margherita Guccione (director of MAXXI Architettura), Luca Cordero di Montezemolo (president of Italo, Telethon, Manifatture Sigaro Toscano), Paolo Mellano (director of the Department of Architecture and Design of the Polytechnic University of Turin), Tullia Iori (Professor of History of Structural Engineering at Tor Vergata) and Francesco Karrer (Professor of Urban Planning at La Sapienza). Montezemolo, who wanted to reaffirm the importance of “investing in the past to be certain of the future”, underlined how ingenuity represents the essence of Italianness in the world and “the archive can be a source of inspiration for design of the future”.

# THE NEW FRONTIER OVERSEAS

**INVESTMENTS IN TECHNOLOGICAL START-UPS, LEADERSHIP IN FERTILIZERS, AGREEMENTS WITH GLOBAL PLAYERS SUCH AS EXXON. MAIRE TECNIMONT IN THE UNITED STATES IS AMONG THE KEY ACTORS OF THE NEW PETROCHEMICAL REVOLUTION. WITH STRATEGIES THAT LOOK TO GREEN CHEMISTRY.**



United States

**T**he evolution of a company, especially a multinational company, can in many cases recall a path similar to that of the protagonists of a classic Hollywood story. There is a challenge to be grasped, a series of strategies to be developed, a phase of attempts, steps forward, rethinking and obstacles to overcome. And then a moment of stability and balance, where the company finds its identity, in its own people and in the goals achieved.

With a quick analysis of Maire Tecnimont's presence in North America, **Giovanni Sale** - Senior Vice President of Corporate Strategies of Maire Tecnimont Group (and current VP for Americas) - explained to Evolve that the challenge taken by the Group to become a protagonist in the US market is one of those exciting tests (and at the same time full of complicated variables) that give the idea of how an entrepreneurial path can reach levels of excellence over time.

"In the United States, explained Sale, which is home of oil and gas, we have been called, in recent years, to industrialize and commercialize a series of important technological innovations in the context of "Greening the Brown". With shareholdings in **Siluria** in San Francisco, where a new transformation from gas to propylene has been developed, and in **Pursell Agri Tech** in Alabama focused on urea coating, we are investing in specialized start-ups in gas and fertilizers sectors. Siluria and Pursell Agri Tech are young companies that aim at more sustainable solutions in a market conditioned by intense energy transition".

## The time of shale gas

In the so-called "first wave of petrochemicals" - which hit the US economy from the 1960s to around 2000, when Tecnimont was an extraordinary company that combined expertise in petrochemistry and oil and gas. The company was known overseas for its great

history: it was the engineering division of **Montecatini / Montedison** and built plants using proprietary technologies in the field of plastics that had earned the Nobel prize to **Giulio Natta**.

“Until the eighties,” continues Sale, “our presence was of great support to some projects in the field of engineering and procurement.” For geopolitical reasons, over the following decade we focused on plants and orders located mainly in Central and South America. However, these have been important years because many of our current leaders have trained and professionally grown during that period. With the advent of shale gas around 2008, much has changed: we call it ‘the second wave of petrochemical’. Many observers today say that after ten years the “shale gas” revolution is not fading but has just begun... ”.

Shale gas, according to a report by the IHS Markit (*“The Shale Gale Turns 10: A Powerful Wind at America’s Back”*) has radically changed the US national energy landscape. The Northeast has replaced the Gulf Coast as the largest gas production region in the United States. Pennsylvania and New York, which traditionally imported most of the energy, are becoming exporters. In addition, natural gas production in the United States increased by more than 40% between 2007 and 2017, bringing gas prices down by more than two thirds in the same period. Ten years after the start of the revolution, the total recoverable natural gas reserves seem to increase year by year.

Maire Tecnimont has continued to work on what the CEO **Pierroberto Folgiero** defines ‘technological adjacencies’. “The investments and partnerships with Siluria and Pursell Agri-Tech go exactly in that direction,” explains Vice President Sale. Being the American market very competitive, for some years the Group has strategically concentrated on sectors more compatible with our entrepreneurial history. Thanks to a large-scale agro-food sector, the demand for fertilizers has always been very high in the United States. Our know-how and the cutting-edge technologies we make available through Stamicarbon have meant that the name Maire Tecnimont has become increasingly associated not only with engineering and construction of petrochemical plants, but also with intellectual properties in this sector”.

## A fertilizers plant in Iowa

In September 2012 Maire Tecnimont announces that two of its subsidiaries, Tecnimont SpA and Stamicarbon BV, were awarded two contracts relating to a new fertilizer complex in Iowa, United States, by Iowa Fertilizer Company (IFCo), a wholly owned subsidiary of Orascom Construction Industries (OCI). “Our Group has provided engineering services and materials procurement for the construction of a new 2200 MTPD ammonia plant based on KBR technology. In addition to that, Stamicarbon BV provided a ‘process design package’ for a new urea production plant that was part of the same fertilizer complex. A double award that allowed Maire Tecnimont to consolidate its presence in North America’s urea licenses market. In fact, today 100% of the fertilizer plants built in the USA use Stamicarbon technology. It is a clear sign in the strategic sector of fertilizers, thanks to the expertise of our Group both in licensing and in construction”. A further step forward in a fast-growing market such as the US was made thanks to the agreement signed in 2014 with Foster Wheeler to build and revamp petrochemical, chemical



50



and fertilizer plants in the USA, Canada and Mexico. Sale explains, “At a time when the shale gas revolution was reshaping the geography of the downstream industry globally, Maire Tecnimont made its excellence available in the technology-oriented chemical sectors, including olefins and fertilizers and, in particular, in polyolefins (polyethylene and polypropylene), thus providing significant added value for our customers”.

## To Silicon Valley with Siluria

In 2016 the Group’s commitment to developing innovative industrial processes and technologies led to the acquisition of a minority stake in Siluria Technologies, a company based in San Francisco, which develops innovative industrial technologies to produce chemical products and fuel from natural gas. “The technologies,” continues the Vice President, “are based on an innovative and proprietary process of direct conversion of methane into ethylene and propylene, the so-called “OCM” (Oxidative Coupling of Methane)”. With this investment Maire Tecnimont has become the exclusive partner of Siluria for the development, marketing and licensing of this new technology”.

Thanks to this revolutionary innovation, converting natural gas (the most abundant and cheapest hydrocarbon) directly into one of the most important products of basic chemistry (propylene) finally becomes possible. It is useful to remember that propylene is one of the main constituents of the global petrochemical industry, with a total market of around 100 million tons per year. For decades, propylene has been obtained through energy and resource demanding processes. Today, through an innovative process, it is possible to produce it efficiently: that is at lower temperatures, with less hydrocarbons and, ultimately, cleanly. “This collaboration,” adds Giovanni Sale, “capitalizes on Maire Tecnimont’s international expertise in the engineering and construction, technology and new business development sectors, thanks also to the innovative contribution of MET Gas Processing Technologies, a Group’s company specializing in the development of innovative technologies”. We are all very happy to combine these strengths with the revolutionary technological development platform of Siluria: this also means feeling more and more present in the Silicon Valley market, thanks to high added value solutions for our customers in the Oil & Gas and Petrochemical sectors”.



## Stamicarbon technology in 100% of the plants

Returning to fertilizers, a sector in which Italy is a traditional leader, one of the strengths of the Maire Tecnimont group is ownership of a large number of patents related to urea (which today is a gas derivative). “In 2017 in Alabama,” explains Sale, “we stipulated, through Stamicarbon, an agreement with an American company to create a coating production plant. Maire Tecnimont acquired a 20% stake in Pursell Agri-Tech, an American start-up specialized in the development and marketing of polymer-coated fertilizers. We thus combined the best of urea (Stamicarbon) and coating (Pursell) technologies”.

The American company developed a new technology for coating fertilizers at a competitive cost and with controlled release: urea pellets are covered by a membrane that opens a little at a time depending on temperature and humidity and releases the product gradually into the soil, over a period ranging from 3 to 6 months. The Vice President continues, “We can treat and fertilize very extensive agricultural lands, using less urea and being more efficient. If the product is not dispersed in the atmosphere and in the air, there is no waste and smaller than usual amount is required. In the end, excessive fertilization decreases, and the environmental

impact of fertilizers is also reduced. We are really satisfied because Maire Tecnimont has a worldwide exclusive right to market this technology outside the US. The first urea was produced from fossil fuels, today we use gas. And shortly, speaking of green chemistry, from gasified waste coated with biodegradable coating”.

## Exxon contract

Looking back on Maire Tecnimont in the United States, we can say that today the Group has become part of world petrochemical leaders, thanks to its ability (demonstrated globally) to do excellent engineering. With a strong push towards energy transition, the Group chaired by Fabrizio Di Amato and managed by Pierroberto Folgiero, is evolving to keep up with the transformation. “The ability to export globally a technology that produces polymers from gas rather than fossils,” says Giovanni Sale, “has added a strategic focus on technological innovation that embraces green chemistry and the whole topic of waste and plastics recycling”. Thanks to this background, now big investors and big petrochemical companies want to join us. An example? The agreement with **Exxon**, a top-level multinational company that has recognized Maire Tecnimont as a key strategic partner for the development of new polymers in the United States”.

A milestone achieved last November which consolidates the Group’s global leadership in the polyolefin market and expands its presence in North America, a complex and attractive market, also in terms of industrial plants. “The agreement with Exxon gives us further impetus for the future,” concludes Sale, “in a sector (the petrochemical sector) that presents interesting opportunities for new investments in the United States and Canada, driven by cheap feedstock (shale gas and derivatives). In America we are proving to be ready and able to operate in Anglo-Saxon culture, where the keywords are transparency, efficiency, competence and planning. It is not easy to compete every day with researchers and managers from the best universities on the planet, such as Berkeley and Philadelphia. Here you breathe the most important industrial, financial and technological culture in the world. The challenge is therefore sky high, exciting and risky at the same time. But we look to the future with great commitment and positivity”.



Fertilizers plant, Iowa, USA

# FROM GREAT CHALLENGES TO SMALL DECISIONS

**"W**e are ready to make an innovative contribution to the chemistry of the future". In the words of the CEO **Pierroberto Folgiero**, the green acceleration of the Maire Tecnimont group is called NextChem. Starting from the thought of those who theorized the Blue Economy (Gunter Pauli) and those who have studied the Green Chemistry 2.0 (Guido Saracco), this issue of EVOLVE addresses an overview of Green Acceleration, both as an economic model for the energy transition, and a real portfolio of innovative technologies. At the service of a sector that - with a growth rate exceeding 15 percent - now has an annual turnover of about 40 billion dollars. Therefore, green chemistry is a new market that will reward the actors who, with entrepreneurial and managerial courage, will take on the challenge of accelerating.

Among the company mottos that are accompanying the cultural turnaround of the Maire Tecnimont group, this issue's point of reference is **"Take the Challenge!"**, a message that invites us to cultivate passion for results and challenges in the open sea. In the moments of discontinuity, it is necessary to have the taste



*Time to procrastinate is over.  
To be successful in our work,  
everyone must feel responsible  
even in small actions.*

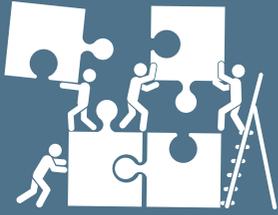


**FROM THE MOTTO THAT ENCOURAGES US TO TAKE UP CHALLENGES, TO THE ONE THAT VALUES EVERY SINGLE DECISION. BECAUSE THE RESULTS OF A GROUP ALSO DEPEND ON THE CHOICES AND MICRO-CONTRIBUTIONS OF EACH INDIVIDUAL.**

for change, experiencing the volatility of the scenarios not as a threat but as an opportunity to demonstrate one's skills and entrepreneurial attitudes.

What does it mean for a large company to take the wind of change? It means entering into processes and disseminating an entrepreneurial attitude in micro-decisions, given that in complex organisms you should not underestimate the importance of every single decision maker to let the company evolve. This will indeed be "Every Single Decision Counts!" - the motto of the next issue of EVOLVE in early summer. "The contribution of each of us often makes the difference," the Chairman **Fabrizio Di Amato** explained several times. Time to procrastinate is over. "Because the success of our work is the result of a thousand individual choices made in the right sequence". "Companies are complex social contexts," the CEO **Pierroberto Folgiero** stresses, "and therefore influencing organizational behavior is probably the most beautiful and challenging exercise at the same time. For this reason, when we take the individual micro-decisions, typical of business systems, we create value and make our corporate culture increasingly entrepreneurial".

## RIDE THE TURNAROUND!



The challenge of our Group: impeccably deliver our portfolio through operational and financial discipline.

**Master the change, be actively part of it!**

## TAKE THE CHALLENGE!



Managing uncertainties is the core of our job... As a sailor faces the sea every day.

**Let the passion for results drive your actions!**

## EVERY SINGLE DECISION COUNTS!



Our work-success is the result of a thousand single choices made in the right sequence. There is no time for procrastination.

**Your contribution makes a difference!**

## STEP UP AND MAKE THINGS HAPPEN!



Talk and listen directly to your colleagues. Sending an e-mail could not be a solution. Let's keep our doors open.

**Beat the bureaucratic approach!**

## BE ADAPTIVE!



Fast changes in the market create discontinuities while opening also opportunities to the most responsive players.

**Agility is the key!**

## WE ARE RESILIENT!



Recovering quickly from drastic changes is part of our noble and precious DNA. We live in a tough environment, but adversity made us stronger.

**Let's capitalize on lessons learnt!**

## NOT JUST THE COMPANY, THIS IS YOUR COMPANY!



Building together the success of our Group creates shared value to everyone.

**Be entrepreneur in a network of entrepreneurs!**

## OUR TOMORROW IS NOW!



These are extraordinary times. If we stay focused on our corridor of growth we will be ready to build the next decade of Maire Tecnimont.

**The floor is ours!**

