/03

The value of innovation, the opportunities it can provide, the risks to avoid. For genuinely sustainable chemistry.

generating

value

The bioeconomy and the circular economy

2015 was the year of the Paris Conference on climate change (COP 21) and was decisive in the planning of a new model of production and of consumption that looks at reducing emissions and at a more efficient and fairer management of the planet's resources. It is now universally acknowledged that the linear system (production – distribution – consumption – disposal) adopted thus far, fed by enormous quantities of fossil fuels, has produced increasingly negative effects and is no longer sustainable. In the linear consumption economy, the life cycle of a product ends with the product becoming waste and not being reused anymore; this forces the economic chain to continually start the same process from the beginning. The paradigms of the bioeconomy and the circular economy were created to overcome this model. The bioeconomy concerns the production of renewable biological resources and the transformation of these resources (and of the resulting waste flows) into products that require fewer resources than traditional products. The circular economy is a system in which all activities, starting with extraction and with production, are organized in such a way that the waste produced becomes a

See more at chapter A, Volume II

resource, thereby restarting the cycle.
We have sought to anticipate changes in the chemical industry. Indeed, Novamont has always followed the principles that are today contained in the concept of the bioeconomy and our products, which are renewable and recyclable, achieve the model of a circular economy. In this sense by strongly combining two the aspects, in the case of Novamont, we can speak of a "**circular bioeconomy**".
The products made from Mater-Bi are made with natural raw materials and return to nature as fertilizers, through a process of composting, thereby completing the cycle of resources with natural recycling.

The chain of value: risks and opportunities

For us, attention to the aspects of sustainability occurs **along the whole value chain**, from the origin of the process to the final recycling of the product.

At the beginning of the production process, we constantly seek to increase the amount of renewable raw materials contained in our products. At the other end of the cycle, when the product becomes waste that has to be managed, we aim for complete biodegradability, which makes it possible to recover waste using innovative processes, such as organic recycling.

These strategic choices at the two ends of the value chain are our driving force and they create both opportunities and risks. The opportunities are linked to the integration of the biological cycle, the natural path from the earth to the earth, with the economic-social cycle, with the creation of new agricultural and industrial production chains. The risks are limited by respecting the laws and standards: laws and good practices regulate both the agricultural and the industrial sectors, and standards of biodegradability guarantee the environmental quality of the products and of their treatment. With the oil crisis at the beginning of the 1970s, and the need to consider biomass as an alternative to oil in the production of fuels, chemical substances and materials, it became clear that the most significant factor in assessing the risk/opportunity for the sector was the price of crude oil. In the short-medium term, price fluctuations can constitute an obstacle or an opportunity that is not easy to predict. However, in the long term, the trend goes towards an increase in the cost of oil, because the cost of extraction will rise and because of the global trend in penalizing the use of fossil resources for reasons of safeguarding the environment.

The value of the biodegradability of substances, particularly of plastics and of packaging, can be appreciated especially when there are anaerobic digestion and composting plants in the territory for recycling organic waste. In this case, when deliberately or accidentally mixed in with the kitchen waste, the packaging or object in biodegradable plastic ceases to be a contaminant and becomes part of the flow of organic materials that are turned into compost. Where waste management is balanced towards waste-to-energy,or landfill, biodegradability becomes a less important requisite that is unlikely to find space in the market. This is a risk for the marketing of biodegradable products, but it becomes an opportunity when awareness increases of the need to recycle all fractions. This is what is happening in various parts of the world, and certainly in Europe, where specific Directives discourage the landfilling of organic waste and where recycling occupies an important place in the waste hierarchy.

La storia

1990

Novamont S.p.A. was founded

1992

Production of first biodegradable bag in MATER-BI, and the Green Pen in MATER-BI

1998

First packaging in MATER-BI, with Ecolucart in the large-scale distribution

2001

Launch of the green tyre, with Goodyear

2002

Launch of Wave, an expanded plastic sheet in MATER-BI

2003

Development of Origo-Bi technology

2005

Launch of Pneo, an innovative bag in MATER-BI

2007

"European Inventor of the Year" award

2012

Foodservice products in MATER-BI at the London Olympics

Acquisition of Research Centre in Piana di Monte Verna

2012

Wet waste collection with MATER-BI bags, in Milan

2014

Launch of first prototypes of a new generation of bag at Ecomondo

Fruit and Vegetable bags in MATER-BI, in Unicoop, Florence

2015

Lavazza - Compostable Capsule

New Brand

Foodservice products in MATER-BI for Eataly, at the Milan Expo

Flexibility of the organization and corporate network

Our story is of a company that is constantly evolving, that is able to grow without losing flexibility and a predisposition to change. This has enabled us to win the challenges along the way, aiming at an increasingly central role in the bioplastics industry.

By integrating industry and agriculture in an increasingly concrete way, we select biologically-based raw materialsthat are produced with alternative approaches to those of the traditional petrochemical industry. When these components are not available, we support scientific research and promote the creation of new industrial businesses to fulfil this need. The most significant examples of these are:

- Matrìca,the joint venture with Versalis, for the production of chemical intermediates; one of the first examples of a biorefinery - a refinery not based on mineral oil but on vegetable oil;
- Mater-Biotech: the world's first industrial plant for the production of 1,4 butanediol starting with sugars.

These are two examples of reorganizing disused traditional plants, where the change to vegetable raw materials has encouraged growing integration with agriculture.

This has led to a further reduction in our dependency on fossil fuels and the creation of new production chains with greater social, economic and environmental sustainability.

Still with the aim of evolving continuously and of responding to the opportunities that the market may offer, over the years we have set up other joint ventures and created other associated companies:

- European and non-European trading companies
- A production company in the U.S.A.
- Sincro; A joint venture, with Coldiretti, set up in in Umbria 2006 to start producing intermediates and biolubricants from renewable sources and to growwith local farmers experimental fields for developing new crops and agronomic protocols that support the integrated biorefinery.
- Mater-Biopolymer: a company for the production of Origo-Bi biopolyesters, which uses a line with Novamont's proprietary technology. The company is also active in the development of new biopolymers.

This Sustainability Report only covers Novamont S.p.A.

Research and development

Novamont is a company that has a triple vocation: it is an industrial company, a research centre, and a training centre. Anyone who knows us, knows that innovation has always been one of our key values. This is why we have:

INVESTED

6,4%

OF OUR 2015 TURNOVER IN RESEARCH

with 20% of employees dedicated to research and development

REGISTERED

+1000

PATENTS

in the sector of natural and synthetic polymers and of processes for transforming renewable raw materials, with a continuous development of original technologies.

OFFERED

300

TRAINING ACTIVITIES

since 1996, to young researchers and experts for multidisciplinary projects, in collaboration with universities and research centres of excellence, in Italy and abroad.

DEVELOPED

EQUIPMENT AND FACILITIES

that go from laboratory scales to innovative pilot plants

€50
MILLION

On 18 December 2015, Novamont signed an agreement for €50 million to fund research and development activities and investments in innovative technologies in the bioplastics production chain. This is paid by the European Bank, for investments that support one of the first projects for the bioeconomy in the Juncker Plan.

First2Run, a flagship project for Europe

To demonstrate the technical, economic and environmental sustainability of a highly innovative biorefinery that uses low-input crops, such as cardoon, to obtain vegetable oils from which a wide range of bio-products are produced. This is the goal of First2Run, a flagship project for the European Commission, coordinated by Novamont, in collaboration with private partners and universities. The project was awarded unsecured funding of €17 million by BBI – Bio-Based Industries Joint Undertaking, a partnership between the European Union and the Bio-Based Industries Consortium (BIC). The study of the environmental and social impact of products that come from renewable sources is an integral part of the project, as are the activities of certifying results and informing the community of them.
First2Run encourages technical developments linked to world-leading production plants, which, so far, have benefited from private investments of over €200 million.

Spring, a cluster, where public and private are heading in the same direction

Founded on the initiative of Biochemtex, Versalis and Novamont, in collaboration with Federchimica, Spring is a non-profit association that provides a multi-sectorial overview for the development of the whole sector.
In 2015, it brought together around the same table eight Italian regions and many of the most important companies in the "sustainable" chemistry sector. This permanent roundtable seeks to identify guidelines, to share among public and private technological innovation in the biochemical sector, interregional collaboration, national development policies, and initiatives for training and encouraging local employment in the "green" sector.
The activities of Spring will follow a strategic road map outlined during 2015, a path that identifies the objectives common to all partners and the themes to be discussed with the authorities.

SPRING
Sustainable Processes and Resources for Innovation and National Growth

system economy

A way of understanding the industrial economy that does not concentrate only on factors linked to the production of goods or services, but that adopts a broader perspective by analysing the effects of production on the whole territory, in which economic, environmental, social and resource management aspects coexist. This view corresponds with a circular model of economics, in which recycled waste becomes a new raw material for subsequent cycles.

The Lavazza project: a 100% compostable capsule

In March 2015, the first 100% Italian, compostable capsule was launched; this project had involved us, together with Lavazza, in research that had lasted 5 years.
The Lavazza capsule is made of Mater-Bi, is compatible with the Lavazza Minù machine, and is available in two fine, 100% Arabica blends, which are certified by the non-governmental organization, Rainforest Alliance.
By applying the circular economy principle of zero waste, according to which, nothing is waste, but everything goes back to being a resource, with great benefits for the environment, we created a capsule that can be collected with food scraps and sent to industrial composting facilties where the spent capsule and coffee are recycled together into compost.

Lavazza and the culture of zero waste, in a product that wasn't there before: the compostable capsule.

LAVAZZA
TORINO, ITALIA, 1895

NOVAMONT
MATER-BI

Preparo l'espresso con la capsula compostabile in Mater-Bi® Lavazza A Modo Mio

1

2

Gusto il piacere del caffè Lavazza, miscela di pregiate origini 100% Arabica certificate da Rainforest Alliance

3

Getto la capsula compostabile nel contenitore dei rifiuti organici

4

I rifiuti organici vengono raccolti e avviati a compostaggio industriale

5

In pochi mesi la capsula in Mater-Bi® si trasforma in compost

Eco-design e Innovazione: L'involucro della capsula è realizzata in Mater-Bi®.

Caffè certificato: 2 pregiate miscele Lavazza – Ricco e Aromatico - contenenti caffè certificati dalla ONG Rainforest Alliance. La perfetta unione tra qualità e sostenibilità.

Nuova risorsa per la terra: Dal suo smaltimento si ricava compost utilizzabile come fertilizzante.

Sostenibilità del fine vita: Le capsule compostabili Lavazza A Modo Mio rispettano la norma UNI EN13432 – 2002 e sono certificate dall'ente Vinçotte per il compostaggio industriale.

I VANTAGGI

- incentivo alla pratica domestica della separazione del rifiuto umido
- diminuzione dei rifiuti indifferenziati avviati a incenerimento o discarica
- produzione di compost per il riutilizzo in agricoltura

#1CAFFÈPERILPIANETA