



Versalis—the transformation, a year on

Major focus on expanded portfolio and technology

Versalis (Milan), the chemicals subsidiary of energy giant Eni, is undergoing a metamorphosis. A turnaround plan, launched in 2012, will transform Versalis from a company heavily focused on petrochemical commodities and Europe into a more nimble and competitive organization specialized in differentiated products. The strategy involves strengthening Versalis' leading position in elastomers, expanding its portfolio, a drive into green chemicals and biotechnology through stronger R&D, and growth in emerging markets.

Versalis is the outcome of a restructuring of Italy's petrochemical industry during several decades. Because of this legacy, the business has been losing money for many years. Eni decided in 2011 to entrust Daniele Ferrari with revitalizing and steering the transformation of the business, formerly known as Polimeri Europa.

Ferrari, Versalis CEO, with 30 years' experience in the chemical industry, set a plan to restore a profitable growth path by 2016. "We have some ground to recover from the past. We need to tackle our loss-making sites and reduce capacity in basic chemicals, refocus on performance products, and increase our presence in fast-growing markets," Ferrari says. The program focuses on three sites—Priolo, Sicily; Porto Torres, Sardinia; and Porto Marghera, near Venice—the combined Ebitda losses of which averaged €210 million/year in 2008-12.

The restructuring at Priolo involved the downsizing of the site's ethylene plant, Versalis' largest, by about 300,000 m.t./year and the closure of a polyethylene unit. The Priolo site is being reconfigured to make higher value-added products, including the extraction of C5 to C9 hydrocarbons, currently lost in the production process, to make a distinctive range of hydrocarbon resins, among others, and become a leader in Europe in this segment, targeting fast-growing markets such as consumer goods.

Versalis has signed a partnership agreement with US firm Neville Venture for this program, and the new production will have synergies particularly with Versalis' elastomers business. The partnership represents



Versalis CEO Daniele Ferrari.

an important step in the overhaul of the Priolo plant and it confirms the central role of the site in Versalis' strategy. The project will require a €400-million investment.

The most radical transformation is taking place at Porto Torres. "The first success story is Porto Torres, which we are turning from a structurally loss-making site producing petrochemicals into an innovative and highly integrated biobased manufacturing complex," Ferrari says. Versalis, in June 2011, formed Matrica, a 50-50 joint venture with Novamont (Novara, Italy), a leading producer of biodegradable plastics, to establish a €500-million "green chemicals" complex at the site. Matrica will consist of seven units producing about 350,000 m.t./year of biobased monomers, biolubricants, and bioplastics. "This is the biggest European integrated third-generation biorefinery," Ferrari says. The first facility, producing a range of biobased monomers and other highly valuable derivatives, is due onstream at the start of 2014.

The cracker at Porto Marghera "is inefficient and underutilized, and the site is a good candidate for green chemistry combined with fossil-based chemistry," Ferrari says. Versalis, the leading European producer of elastomers, is a major consumer of butadiene in its solution styrene-butadiene rubber and polybutadiene rubber businesses. The company, which also makes

ethylene-propylene and ethylene-propylene diene-monomer rubbers, plans to double its elastomers capacity by 2016 at an overall cost of €600 million. Versalis, meanwhile, has linked with Yulex to make guayule-based biorubber materials and launched a project with Pirelli to test guayule-based rubber materials in tires.

A threatened squeeze on global butadiene availability has led Versalis to look at expanding capacity within its own system. New cracker projects around the world are increasingly based on feedstocks such as shale gas, which do not co-produce C4 fractions, from which butadiene is extracted. "We have equipped our sites with a very solid strategy around butadiene, which means that in the short term we will maximize extraction from our crackers," Ferrari says. Versalis is also developing its own butane dehydrogenation technology and already operates a pilot plant at its research center in Ravenna. "We have our own catalysts know-how and technology, which gives us a competitive advantage," Ferrari says. The process will be scaled up to industrial size and Versalis could eventually license it to third parties, he adds.

The third leg of the butadiene story is a project to develop biobased butadiene with leading US biochemicals technology company Genomatica. The firms signed a JV agreement in April 2013. The project "is still a long way away but we said that before the end of the decade we will be in a position to have a plant," Ferrari says.

Versalis' transformation involves capital spending of €2 billion in 2013-16, of which 75% will be for growth projects. This should rebalance the portfolio with more than 50% of the forecast 2017-18 sales of €6.8 billion/year coming from differentiated products, compared with one-third of the €6.4 billion in 2012. Versalis plans to raise sales in emerging markets to 20% of its total by 2017. Projects include two elastomers JV's, one with Petronas in Malaysia and the other with Lotte Chemical in Korea. Technology will also play a key role. "Our technologies, like the Italian-designed products they are used to make, are known around the world," Ferrari says.

Adding value to technology, developing new markets

Versalis is using its technology assets to spearhead the company's internationalization strategy. The group aims to extend its network outside Europe by establishing commercial strongholds in rapid-growth markets, particularly in Asia.

Thanks to the long history of Versalis and its predecessors, the company's patents and proprietary technologies cover almost its entire business portfolio of basic petrochemicals and polymers, phenol and derivatives, styrenics, catalysts, and specialty chemicals. The company has decided to meet the needs of licensing customers by providing engineering services, technical assistance, and training in its production units.

Elastomers is a specific target product, where proprietary Versalis technology can enable joint-venture agreements or other forms of cooperation with companies outside Europe, supporting the development of Versalis' presence in new markets while not introducing competition in its home market. "We decided to invest in our technology outside Europe," says Stefano Soccol, v.p./intellectual property (IP), licensing, and business development at Versalis. The model is to partner with companies that have feedstock and industrial infrastructure, he says.

"Our licensing activities, covering a wide portfolio of technologies, are relatively new—about 10 years old—and the first license was granted in 1992. They have grown as part of the global expansion of Versalis. Now we have a comprehensive structure covering licensing, contracting, and IP management and business development, enabling us to support the business with a completely different approach," Soccol says.

Each Versalis technology is proven in scale-up and in the company's own world-scale assets, many of which date back to the 1950s and 1960s. "We do not license unless we have a full-scale plant to show," says Soccol. "We see licensing as a vehicle to create relationships with third parties in order to utilize our technology assets and offer our manufacturing expertise."

The licensing business was very success-

ful in 2012, in revenue terms, Soccol says. He sees good times ahead, based on Versalis' range of technology offerings.

Two new joint ventures, with Petronas (Kuala Lumpur) in Malaysia and Lotte Chemical (Seoul)—formerly Honam Petrochemical—in South Korea, illustrate the new approach and extension of Versalis' technology-licensing activities. Versalis signed an agreement in July 2012 for the



Stefano Soccol, v.p./intellectual property, licensing, and business development.

jv with Petronas, for an elastomers plant at Pengerang, Johor state with capacity for 264,000 m.t./year, using raw materials that will be produced by a naphtha cracker under development there. Versalis is contributing technical and production expertise and marketing, in addition to technology. The jv with Lotte, announced in October 2012, is building a 200,000-m.t./year facility at Yeosu that is due to be onstream in 2015.

"We are known as one of the most expansive companies in the range of technologies for elastomers," says Soccol. "Versalis' technology offering is attractive because, in addition to its range—which covers elastomers, styrenics, polyolefins, and intermediates—all processes are proprietary and have been tested at full scale in Versalis' own production chain."

Not all of the company's technologies are on offer to every potential client, however. "Our core business is not licensing but



Ethylbenzene unit at Mantua.

manufacturing," Soccol says. "Clearly for some technologies within our portfolio we will have to assess the characteristics and the location of a new potential licensee, and take it on a case-by-case basis."

Certain products in the rest of Versalis' portfolio are on offer under a more open licensing approach. They include styrene, polystyrene, and acrylonitrile butadiene styrene. Versalis also co-licenses technologies for a number of products with Lummus Technology. They include cumene, phenol-acetone, isopropyl alcohol, dimethyl carbonate, and diphenyl carbonate.

Versalis offers a very flexible range of services, from process design packages to a complete front-end engineering and design package, that can be developed internally with the company's own engineering structure. Versalis, if requested, can also work in partnership with one of its approved engineering, procurement, and construction contractors that can offer EP, EPCM, LSTK, or OBE contractual models according to the customer's needs. This internal engineering capability is a major value-adding proposition that several producers—which have no in-house engineering company—cannot offer.

Meanwhile, several licensors that have good engineering capabilities do not have continuous access to production plants and lack direct contact with the market. "We can offer this combination, with no need to rely on third parties. We are a producer with engineering capability. We can therefore provide reliable technology, optimized in terms of efficiency and costs, and aligned with market needs," says Soccol.

Asia is a natural market for elastomers because of strong demand in the region's automotive and appliance sectors, which represent 80% of elastomers' end-use markets. Annual growth for those products has been running at 5-8%, with China in particular demanding high-performance radial tires for greater comfort, energy efficiency, and security as vehicle usage escalates.



Site transformation: The Matrica JV takes shape at Porto Torres.



Renewable feedstock: Versalis and Yulex will use guayule to make rubber materials.

Research: Enabling green and fossil-based innovation

Research and development are key growth drivers for Versalis. “We have lots of channels and instruments for finding ideas, with models for brainstorming and for working with universities and other external departments,” says Sergio Lombardini, v.p./research, development, and technological innovation. Research often starts from the knowledge of customers who are close to society’s needs and who understand their markets’ application requirements. “Good research can help reduce time to market, and enable process changes and design tweaks during the implementation of a project,” Lombardini says. “For this reason, our R&D organization has been redesigned, leveraging from one side a close cooperation with the business units and from the other an integrated ‘production chain’ from research, through technology, to engineering.” Versalis spends €45 million/year on R&D and has a combined 400 staff at two research centers: Ferrara-Ravenna for elastomers, and Mantua for plastics, monomers, and engineering. Green chemistry research is based at Novara, boosting links with Eni’s renewable energy initiatives. “In our innovation pipeline, we have valuable processes such as C4 dehydrogenation and high-performance functionalized elastomers nearing commercialization,” Lombardini says.

Versalis aims to be a key player in the bioeconomy, and has entered several research-oriented joint ventures, notably the Matrica JV with Novamont, which will build seven “green chemical” plants by 2016. The first two plants will start up

in early 2014 at Porto Torres, Sardinia, producing biolubricants from oleic acid purchased in the open market. Upstream integration with renewable feedstocks is via agro aggregation of thistles as raw materials for a biorefinery, under development by Novamont. Matrica is expected to create one of the most innovative green chemistry clusters in the world, and regenerate Versalis’ Porto Torres industrial site.

Technology partnerships can be a valuable growth element, especially in chemistry from renewables where intensive development will create a new “chemistry tree,” Lombardini says. “The key to chemistry from renewables is product development and the value of the molecular complexity of the feedstocks. Chemistry from biobased resources is at an early stage and we see partnerships as an accelerator,” he says.

Lombardini accepts that scale for plants using renewables cannot compare with that of traditional units. The scale of a biorefinery will not match that of a hydrocarbon-based plant because the agro footprint is too large.

Catalysis know-how is a key ingredient for successful R&D, Lombardini says. “We have deep experience in catalysts,” he says.

Another landmark project is the partnership between Versalis and Genomatica for the production of polymer-grade butadiene from renewable materials. The venture will leverage Genomatica’s proprietary technology and know-how for selective fermentation with genetically modified microorganisms, plus Versalis’ expertise in catalysis, process engineering design, and scale-up. “Genomatica has very interesting knowledge of how to exploit microorgan-



Sergio Lombardini, v.p./research, development, and technological innovation.

isms, to create specific molecules and other products required, through fermentation,” Lombardini says. The biobutadiene project is crucial to Versalis, because it aims to reduce the company’s exposure to the increasingly volatile butadiene market.

Versalis, meanwhile, has linked with Yulex (Phoenix, AZ) to make guayule-based biorubber materials and bioresins, leveraging the same crops and biomass. The venture will cover the manufacturing chain from crop science to biorubber extraction. Versalis will manufacture materials for various applications, including in the consumer and medical specialty markets. Guayule is a renewable, non-food crop, and is an alternative source of natural rubber because of its latex allergy-friendly properties. “Partnering with Yulex represents our commitment and momentum toward entering the global market as a major green chemistry player,” says Lombardini. A three-year project has been launched with Pirelli, to test the performance of guayule-based natural rubber materials in tires.

Separately, Versalis is working on a major green project with MIT.

Elastomers: Sustainable growth opportunities

Versalis' elastomers business is facing "a challenging economic environment in 2013," says Carmine Masullo, v.p./elastomers at Versalis. The replacement tire market has performed below expectations, in Europe and the United States, because consumers are reducing driving distances and replacing tires less frequently. The market has also been hurt by expansions in Asia in raw material butadiene, synthetic rubber, and natural rubber, resulting in more than 1 million m.t./year of new elastomer capacity in a slow market, Versalis says.

Versalis believes, however, that the long-term fundamentals of the market are strong. "The trend toward urbanization and growth of the population, and in GDP will result in the demand for rubber doubling in the next 20 years," Masullo says. The need for sustainable growth will create opportunities for suppliers that can combine performance with green chemistry, he adds. Versalis' elastomers have applications in a range of sports and leisure goods including golf balls and shoes, as well as several leading tire brands.

The challenge Versalis faces in the next 12–18 months is to take appropriate measures to weather the effects of an oversupplied market. These measures include streamlining the product portfolio and cost reduction.

Versalis' elastomers strategy for 2014–17 has three components: improving its competitive position in Europe, expanding overseas, and introducing new products. "Versalis' goal is to create a business with sales of €2 billion by 2017," Masullo says.

The company will invest more than €400 million to strengthen its European operations. A polybutadiene rubber and solution styrene butadiene rubber (SSBR) finishing line with a capacity of 30,000 m.t./year is being constructed at Grangemouth, UK. This plant is due onstream in the fourth

quarter of 2014. Construction of an ethylene propylene *diene* monomer (EPDM) rubber plant is due to start at Ferrara, Italy in the first quarter of 2014. An SSBR plant will be built at Ravenna, Italy with construction also due to begin at the start of 2014.

Versalis is also forming joint ventures outside Europe, one with Lotte Chemicals in South Korea and the other with Petronas in Malaysia. The jv's will produce EPDM, polybutadiene rubber, and styrene-butadiene rubber.

New products will include tackifier resins—companion products to thermoplastic rubbers—to be manufactured at Priolo. Target markets are adhesives and sealants for the hygiene sector with applications including health and baby care, diapers, and nonwovens. Novel products also include biobased extender oils to be made by the Matrica jv. The extender oils are a special mix of vegetable oil derivatives and are destined to replace fossil-based additives currently used in tire manufacture. This mix will, in particular, be used in the rubber compound that improves performance in so-called 'green tires' with lower rolling resistance. It also enables better processability in tire production. "These are the basis for a new generation of green tires with all of the associated performance and sustainability advantages," Masullo says.



Carmine Masullo, v.p./elastomers.

Intermediates: Targeting efficiency and integration

A main objective of Versalis' intermediates business in the olefins sector is to increase energy efficiency and the development of integrated petrochemical clusters, according to Emanuele Tagliabue, v.p./intermediates at Versalis. "To increase efficiency and improve production costs will be even more fundamental in the future for a European olefin producer," Tagliabue says. "You can never stop [improving] if you want to compete in the market."



Emanuele Tagliabue, v.p./intermediates.

Versalis is currently investing to make its steam cracker at Priolo much more competitive. The company says it is also evaluating an opportunity in the medium term to access more competitive feedstocks by sourcing ethane available from the United States. Some of Versalis' steamcracking facilities are already able partially to process light feedstocks.

"We also plan to focus more on C5 and C9 streams that we do not extract at the moment," Tagliabue says. "This will soon bring value to our system, and support the group strategy in hydrocarbon resins." Versalis, in an effort to maintain growth in derivatives, is also investing to build a 1-butene unit at Ravenna. Part of the production of this unit will be used captively by the company, and the rest will be placed on the export market.

"Most of our propylene production is dedicated to the merchant market and so we have never been in a position to capture the entire value of integration with propylene derivatives—something that, for a part of our propylene availability, we are considering," Tagliabue says. In addition, products such as dicyclopentadiene and acetophenone that are smaller in volume terms, in comparison with most of the products in the intermediates portfolio, will be developed further. "We are focusing more and more on the molecules we have available that are less sensitive to petrochemical cycles and have better added value," he says.



Polyethylene: Portfolio improvement drives gains

Versalis is concentrating on aggressive restructuring and portfolio improvement in its core polyethylene (PE) plants. “A combination of plant closures, efficiency improvements, and product portfolio enhancement has been put into place during the last 18 months,” says Giovanni Cassuti, v.p./polyethylene at Versalis. “This is the first time for years that our investments are focusing on development and not restructuring. After realigning the pieces of the puzzle, we really have a chance to go forward.”

Versalis reduced capacity by closing a linear-low density PE line at Priolo, Sicily and a low-density PE plant at Gela, Sicily. The company says that these closures will improve operating rates at other plants, significantly raising profitability. “While some important results are already visible this year, results in 2014 will strongly benefit from these changes,” Cassuti says. “The center of our strategy will be the market, and its demand and development. We have renewed our focus on more advanced, more profitable products. This is what we believe Europe needs: to raise the bar.”

The flexibility of the company’s swing PE line at Dunkirk, France and research aimed at expanding the ethylene vinyl ace-

tate (EVA) portfolio will help cement the company’s leadership position in the film and injection sectors, Cassuti says. Versalis is further enhancing its PE product mix with a number of other measures: the forthcoming production of resins for medical applications—Pharmalene is a new grade presented at the K show in Düsseldorf this year; a series of new plastomers based on proprietary technology, due to be launched by year-end; several high-grade products in the compounding sector; and new commercial agreements, Cassuti says.

“The reinvigorated business will tap into growing end-use markets with improved margins,” Cassuti says. The agricultural sector will also be an area of focus for Versalis, with applications such as irrigation and greenhouses, he says. The business is looking at supplying EVA for the thriving solar photovoltaic sector even if the last 12 months may have discouraged some suppliers, says Cassuti. “These sectors are actually going to save crucial resources such as energy and water in applications such as drip irrigation,



Giovanni Cassuti,
v.p./polyethylene.

solar panels, and irrigation,” Cassuti says. “There is a general misconception that plastics are polluting more than they are helping, even though a significant number of our products are aimed at overturning such a misinterpretation,” he adds. “We would like to prove that plastics, in particular PE, can really help the growth and sustainability of our world.” Versalis’ PE and PE/EVA grades also have applications in household goods ranging from milk cartons and shoes, to interior and outdoor design.

Versalis plans to maintain its market share in Europe, and will consider opportunities in other regions. “We would like to strengthen our presence in Asia, but we do not exclude areas like the Mediterranean Basin and Latin America. We need to build some important alliances, to be competitive and [maintain presence] in those areas,” Cassuti says. Versalis signed an agreement with LG Chem (Seoul) last month, under which LG Chem will supply Versalis in Europe with metallocene linear low-density PE based on LG Chem technology.

Styrenics: Restoring competitiveness

The European styrenics sector “has been hurt by feedstock volatility and poor profitability since 2004 with an unbalanced supply-demand ratio in the polystyrene [PS] business,” says Marco Chiappani, v.p./styrenics at Versalis. Major producers have implemented restructuring plans. Versalis completed its rationalization work in 2011 with the shutdown of general-purpose and high-impact polystyrene (GPPS and HIPS) plants, as well as an expandable polystyrene (EPS) unit, at Feluy, Belgium and the startup at Mantua, Italy of an EPS plant with a capacity of 42,000 m.t./year and a GPPS plant with a capacity of 85,000 m.t./year. The restructuring concentrated Versalis’ PS plants in Italy close to styrene monomer production.

Versalis also has EPS and HIPS plants in Hungary, and is the leading producer of PS in Central and Eastern Europe (CEE). The plants supply strong demand for insulation and appliances in the region. “Demand growth for EPS in CEE is among the highest in the world, due to the versatility of EPS, which enables its use in almost all build-

ing insulation applications such as in walls, roofs, and foundations,” Chiappani says. “The main appliance manufacturers are also present in CEE with huge output of refrigerators, washing machines, and dishwashers.”

Versalis is improving its competitiveness through the use of continuous mass polymerization technology to make PS and copolymers. The company plans to develop this technology for EPS, to help strengthen its position in the insulation market. “This market will grow in Europe at an annual rate of 3% in the next four years because of legislation on energy savings and greenhouse gas emissions,” Chiappani says.

Another key market is food packaging. “PS-based food packaging can significantly increase the shelf life of food, reducing waste,” Chiappani says. “The benefit of using PS in terms of emission reduction is 13 times greater than that caused during packaging production.” Other environmental benefits include potential energy recovery from recycling waste material.



Marco Chiappani, v.p./styrenics.



The latest MotoGP trophy, made this year using Versalis’ ABS.



versalis technology conference: value to compete

14-15 november 2013 - bangkok, thailand

www.versalistechnologyconference.com

versalis



versalis chemistry to evolve

eni
eni.com