

# Cronimet Envirotec – A case study in innovation

The expectations of the brightest young people entering the world of work are markedly different from what they might have been when today's major metal industry leaders entered the business.

The nearly 40-year-old international business Cronimet Holding realized that to attract and build an innovative management team to run one of its most recent acquisitions – a company now recycling industrial sludges and metal powders at a plant in Bitterfeld-Wolfen, 50 km from Leipzig – it would need to adopt a non-traditional approach to recruitment and provide a modern office environment.

The solution was to treat the subsidiary company as an “incubator” business and to open an office in a co-working space on the sixth floor of a skyscraper located beside the main university buildings in central Leipzig.

It was there that *Metal Market Magazine* met Cronimet Envirotec CEO Filipe Costa to discuss the subsidiary's strategy, progress and priorities, while surrounded by contemporary furnishings and wall murals, a variety of works of art and some small potted succulent plants. At just 36, Costa is the oldest member of the management team based there.

Discussion took place at a large black satin-finished table, which doubles as a table tennis table, while along the corridor a selection of small but well-equipped glass-fronted offices provide private workspaces, smaller meeting rooms with sofas and screens, and shared spaces for teams using common areas.

The trendy ‘start-up vibe’ that the whole working environment offers seems to have paid dividends for Cronimet Envirotec, although Costa stressed that, as a four-year-old business, the subsidiary company is well beyond that stage of its development now.

## A strategic acquisition

Cronimet first took interest in an independent business called Destimet Green Services in 2013. Costa said that at the turn of that year into the beginning of 2014, Cronimet already knew about the vacuum distillation technology that the company was developing, but knew little about Destimet as a business.

After learning more, Cronimet took a minority share in the company, based on its interest in the technology and its applicability to the metals market. During 2013-15, Cronimet developed its

understanding of the business model further and, by the beginning of 2015, decided to acquire a majority share of the company. Costa joined the business in January 2015.

His clear mandate was to develop a strategy focused on the metal market and to integrate the company with, and to broaden the capabilities of, Cronimet itself. “We decided to buy out the company 100% in August 2015,” Costa recalled. “We then had the freedom to reshape the company and implement the strategy that we developed,” he added.

More people were hired and production capabilities ramped up. “Our first step was to get the production staff up and running and then to get more production staff because we foresaw growing demand,” Costa explained. This process was implemented throughout 2015.

At the beginning of 2016, the focus changed from growing the production team to expanding the whole team around their output to support the business. “We hired a sales director and started developing our sales team. I was getting to know the market, because I came from outside the metals market (*see box*). I started to get new customers and that was an interesting start right there,” Costa recalled.

The new sales team also focused on getting to know their customers in order to penetrate their markets because the client base and material suppliers were not the same as the metals businesses that Cronimet already dealt with.

“We are always working with the producers of metal parts and really the places where the waste is produced. We didn't have traders in between us and them,” Costa recalled. By the second half of 2016, it became a priority for the subsidiary to deepen its integration with the Cronimet group. That process included helping the group's traders to understand the value of industrial sludges, Costa recalled.

It also demanded rebranding the company to become Cronimet Envirotec. That project started in mid-2016 and was completed by the end of that year. “So in January 2017 we started with a new website



The plant in Bitterfeld-Wolfen processes industrial sludges and metal powders

homepage, name and brand,” said Costa. The holding company liked the logo and the website design, style and structure that Envirotec developed and has rolled that out to other parts of the group when needed. “It was a way that the company showed how we work together with ideas going both ways,” Costa noted.

### Digital and mobile

“We also realized that we were still working like a typical mid-size German company,” Costa recalled. “It was not mobile, it was not cloud-based, it was not ‘digital’ at all,” he added. Other companies that he and members of his team had worked for had a completely digitalized world. “So we decided to bring that to us at Envirotec.”

Costa himself does most of his work on his iPad. “That is something we changed at the beginning of 2017 in order to be more mobile and agile and to have the information we need wherever we are,” he stressed. “I have everything I need in here,” he said, pointing to his tablet.

The company uses Google G Suite. “We report everything into the cloud, taking advantage of all of the security features they have built in,” said Costa. “That is how we manage our data. We have a policy that we want to have everything readily available on our mobile devices. We work together on documents for example. It makes our life easier,” he explained.

Envirotec’s plant at Bitterfeld-Wolfen is in an industrial area of eastern Germany. “It is a very nice town, but it is difficult to attract young talent to that area,” said Costa. So it was in 2016 that the company opened up its small co-working office space in Leipzig, with the idea of attracting Masters students to work with the business. “That gave us the opportunity to get to know them better and they got to know us. Many of the people that we now have as full-time hires with us started as students and came from their studies for Masters degrees,” Costa explained. Cronimet Envirotec now has 28 people working for the business.

“There was not a culture clash [for the new recruits] when we started because they helped to create our culture and they lived it. The only thing that has changed [for them] is that they now have to be here!” he smiled.

Working time in Leipzig is flexible. Of necessity, the staff at the production plant work 24/5 on a three-shift basis. All staff have to follow standard operating procedures (SOPs) when required. The plant has three shifts of four workers, two

## A chemist and business leader

Cronimet Envirotec’s 36-year-old CEO Filipe Costa holds a PhD in chemistry, for which he wrote his thesis about the use of carbon dioxide as a chemical building block in work that he did in Germany. His research group was particularly interested in catalytic methodology and systems.

At the same time, he started to do a three-year modular MBA in Stellenbosch, South Africa, near Cape Town. It focused on leadership and ways to think differently on a strategic basis. He said that it demanded a considerable amount of self-analysis and that “It changes the way that you think and makes you more aware of the people around you that you work with.”

He said that a period of operating in “two different worlds” when completing his PhD and working in Germany – in between flying to South Africa for MBA modules – was hard work but also a very stimulating time that broadened his horizons.

On completing his PhD, he joined a large chemical company and started work in a laboratory in “a typical corporate job.” The MBA changed his outlook, with its

business content and emphasis on entrepreneurial thinking.

While living in Berlin, he subsequently joined a group of entrepreneurs who founded a company for the pyrolysis of end-of-life vehicle tires. The process evaporated the rubber content of the tires to win an oil, and to recycle separate types of carbon black from different layers of the tire, leaving steel tire cord.

They built a proof-of-concept plant in Germany to run continuously and managed to develop a carbon black that was the first to be recovered from a tire for the manufacturing of new tires.

When a larger competitor bought out the company, Costa decided to expand his personal development at that point by accepting an offer to join Cronimet.

He said that they have a very collaborative approach to management and that the entrepreneurial approach encouraged by the Cronimet group is also nurtured within Envirotec: “That way the sense of responsibility and accountability grows,” he explained.



people for logistics, a maintenance worker and a plant manager: “She brought another view to the company as an engineer,” said Costa. Two more staff work full-time on logistics, invoicing and regulatory waste issues. “We are a certified waste handling company, so every single kilogram of material that goes through our hands has to be logged and documented,” he stressed.

Over the past two years, the company focus has been to grow within the metals market, to get to know customers even more, and the technologies they use that produced the waste that Envirotec processes. “And at the same time to grow this team and to have the technological proof of concept, to run the plant continuously 24/5, and to implement all of the learning that we had from the previous years of operating the production system,” Costa summarized.

### Present focus

Envirotec is looking to innovate further and to focus on several key projects this year.

The biggest investment is to build a new storage facility and yard for incoming metal sludges and powders. It is a large, liquid-proof, three-sided covered concrete building, lined with an oil- and waterproof impermeable membrane. The raw material store is being built on a 2,500 square meter overall area and will be subdivided to hold different types of material.

“We are also changing some parts of our existing yard to use both capabilities together to make the process more efficient,” said Costa. Work is scheduled for completion by June 30 this year.

“We hope at that time that we will be able to accept all of the material that we are being offered. At the moment, one of the challenges we have is that we do not have a big enough storage area to manage all of

## Vacuum distillation technology

Cronimet Envirotec has two similar production units at its site in Bitterfeld-Wolfen. Each has a 12 cubic meter dryer that can accommodate tonnes of material to be processed. Material is charged into them from the top from a holding bunker. Vacuum valves open to charge material into the dryer and close when all of the material to be processed has entered. The plant occupies a three-storey building.

The dryer is then heated. It contains a rotating shaft fitted with paddles to stir the material in a figure-of-eight movement. A thermal oil system heats the outside of the dryer and the shaft inside it to maximise heat exchange with the contents and thermal efficiency.

“As soon as the contents start to move from the liquid to the gas phase we filter out the dust from the gas, while metal content stays at the bottom of the dryer,” Costa explained. “The gas stream goes through a quenching and condensation unit where we win back water and oil after cooling it down.”

As the process runs at temperatures above 300°C, much care is taken when discharging the machine. Removing several tonnes of very hot metal powder with a high surface area could be hazardous but, to avoid a reaction with oxygen, the plant has a cooling bunker under a nitrogen atmosphere. The material enters the bunker at temperatures above 300°C but, after short and intensive cooling, the material emerges at 60°C.

“We are now building up a briquetting facility, into which discharged powders will enter directly in order to produce almond-shaped briquettes with binder content of less than 5%,” noted Costa. He stressed that throughout the whole process, the metal that the company receives remains metallic, rather than emerging as an oxide. Consequently the foundry purchasers of the recycled metal do not need to have a reduction process, but can melt the metal directly.

the customer input that is coming in,” he explained.

“Our overall 20,000 tonnes per year of processing capacity will be the same, but our efficiency will be higher,” he said. At present, rented external storage facilities, certified to handle these kinds of materials, are used in addition to the company’s own yard, but that presents more of a logistical challenge.

It will be far more convenient for the company to have a single buffer stock of materials to process on their own site. Capex for the new yard and a new briquetting facility is within the range of €2-3 million (\$2.3-3.4 million).

## Many materials processed

The types of material that Envirotec can process are many, various and growing in number. The speed of processing material depends in part on its physical consistency. “If it’s wet, it goes a bit slower. If it’s drier, it goes a bit quicker,” Costa explained. Wetter sludges tend to have more oil content.

“We have 64 different material codes and growing. We started with four or five in 2015,” he said. That does not represent 64 different customers or 64 different types of material, however. “On the nickel-containing material side, for example, we have each code representing a different percentage of nickel content,” he explained

The appearance and overall composition of metal-containing sludges are similar – a grey-brown material that also contains a water and oil emulsion. “We are in a nickel-based metal market, high-speed steel and hard metal market,” said Costa. “Those are the three markets that we are focused on, and also the subsidiary industries that supply these markets of course,” he added.

Envirotec also has clients in heavy industry, where it works with catalyst recyclers and other companies that need to have oil and moisture removed from their catalysts, such as tungsten, vanadium or nickel catalysts used for industrial processes. These are usually in the form of pellets and become covered by a lot of oil and water in use. “They create challenges for the further downstream processes of our customers, and that is why they come to us for their treatment. We offer our services on a tolling basis,” said Costa.

Tolling work represents about 25% of Envirotec’s business at present. Within the other 75%, depending on the metal content and the value recycling can create further downstream, the company has customers that have to pay for the metal to be recovered because they have hazardous sludges that demand very strict treatment, with some constituents that need to be disposed of afterwards. Some materials are delivered for free, while others are purchased by

Envirotec at a price based on the metal content.

“We work in a very complex market for sludges and powders. Customers have a choice. Some may choose to dispose of it somewhere else, burn it off or send it to landfill. Most of those options are downcycling or not recycling at all – just disposal of the material,” Costa said.

“But disposal and landfilling in Germany costs more money than we do,” he stressed. “We can be highly competitive to other options within the market. We do this by being as efficient as we can be. We are cutting down costs, have a process that is lean and does not create too much waste on site.”

## Plant capabilities

A focus for the original Destimet Green Services was to serve the industry for solar panel manufacturing. “Part of the production process generated a silicon cake mixture as a slurry or sludge. The idea was to use this product and dry it to get the silicon back,” Costa explained. It also had the idea to be a recycler of mineral waste in order to treat contaminated soil removed from sites before building work could commence on them.

Neither of those activities is a focus for Envirotec now, but work with the oil industry, started on a small scale by Destimet to process mud from drill cuttings, continues. “When you are drilling for oil, you have to add a lubricant to the drilling head,” Costa explained. “You inject oil and water when you’re drilling offshore, so the mineral, oil and mud comes out when you are drilling.” Envirotec has managed to grow that business. “We are still handling that and have been treating that material since 2013, and on a stable and growing basis since 2015.”

The synthetic oil that this mud often contains is extremely expensive, Costa noted. “We are able to 100% recycle the oil and the customer gets their oil back,” he summarized.

Treating drilling mud now accounts for 15-20% of Envirotec’s business. Metals account for about 60%, and the balance is tolling and other work.

## Further development

“For everything we have in large, we also have the same in small,” Costa said, referring to a small pilot facility that the company has at its commercial plant to test out different new materials that could be processed, to carry out laboratory tests and to produce small-scale metal briquettes as samples. ▶

The fastest customer that Envirotec secured – operating in the automotive sector – took just two months. That speed came in part from the fact that the sludge to be processed came from a German customer operating under German regulations. “We have to have a disposal contract for such material and we are under a privilege rule in Germany because we are a certified waste management company able to take waste from other companies in the country [with less paperwork than if it came from elsewhere].”

The fact that the client already knew exactly what the content of the material was and had already carried out thorough sampling helped to expedite the contract. After laboratory testing at Cronimet at a 0.5 kg level, followed by scaling up to 100-200 kg at the pilot plant, it was determined quickly that all was well to proceed with commercial processing. “We received the first shipment of 20 tonnes of material coming in two months after we started,” Costa recalled.

Envirotec has customers throughout Europe, including the Netherlands, France, Austria and Italy, as well as in Germany. Clients can call on the waste handling experts within Envirotec as well as within the Cronimet group itself. Costa acknowledges the help that Envirotec has received from Cronimet’s quality management and regulatory issues department in particular. Obtaining the necessary regulatory approvals for the new yard at Bitterfeld is one of many areas in which group expertise has assisted progress, he noted.

## Further capacity expansion

Costa also said that the commercial units operating at Bitterfeld (*see technology box*) are already of optimal size. Future increases in sludge and slurry processing capacity there would need extra units to be installed, but is there scope to build a similar plant elsewhere in the world, potentially at one of Cronimet’s many other international sites?

“We need to evaluate and learn the markets and their drivers,” Costa responded, noting that they are different in Europe from those in the US or Asia. “If the regulatory and market needs are there, then yes, we definitely see an opportunity in the future.”

Up to now, Envirotec has been working closely with Cronimet’s central laboratory in Karlsruhe, where it has been sending all of its samples for analysis. The volume of business now under way has justified



Throughout the whole process, the metal received remains metallic

Envirotec investing in its own analytical laboratory equipment to test samples at its own site, next to its existing pilot plant equipment, while continuing to draw on the central laboratory’s experience.

Envirotec also hopes to have a full-scale plant for briquetting up and running by mid-year. “We have projected capacity for that of 30,000 tonnes per year of powders to allow for future expansion in briquetting,” said Costa. That line could take powders sourced from elsewhere, in addition to those produced by Envirotec’s own vacuum distillation process.

Costa is looking forward to the inauguration of the new yard and storage facility later in the year as well as getting to know the powder market to feed Envirotec’s new briquetting facility. He explained that powders for processing by Envirotec into briquettes could arise wherever metal is treated without water and oil for surface optimization, such as in shotblasting. “This is something completely new for us, which we are still learning about,” he said.

## Market drivers

Given the range of materials that Envirotec can process, the number of potential customers is large. Costa said that while Envirotec has to be competitive on pricing, “and our growth shows that we are,” the company also focuses on recycling and keeping metals within that loop. “We want to stop the loss of resources,” he added.

He said that the company’s customers do not focus solely on price: “We have seen from C-suite levels in companies that they

want to see their companies being more sustainable and efficient.” They are consequently looking for more sustainable options and means of recycling waste.

“That provides an opportunity for us,” he stressed. “If you work with a company like us, we have 100% transparency and are quite nimble. We offer our customers different solutions. They come to us when they want to dispose of some material and we take care of everything – from sending them specialized ASP 800 galvanized steel containers, which are fully certified to handle and transport dangerous waste, to arranging transport and offering them a full service,” Costa explained.

By that means, the company integrates itself into the customers’ processes. “That was one of the priorities we have had in recent years, so having the right management team to manage such complexity is also one of our priorities,” he added.

“Another priority is to manage our growth,” said Costa. “We are now a four-year-old company. We are a young and innovative company, which is learning and whose business is getting more complex by the day. We try to manage that – to manage that complexity into where we want to be and to integrate that more into Cronimet because, wherever we have complexity on our side, we might get help from somebody in the Cronimet group.”

He concluded that being part of a large family-owned business with a top-level management that has embraced innovation at Envirotec, and across the whole group, is a big advantage.