# CURRENTS

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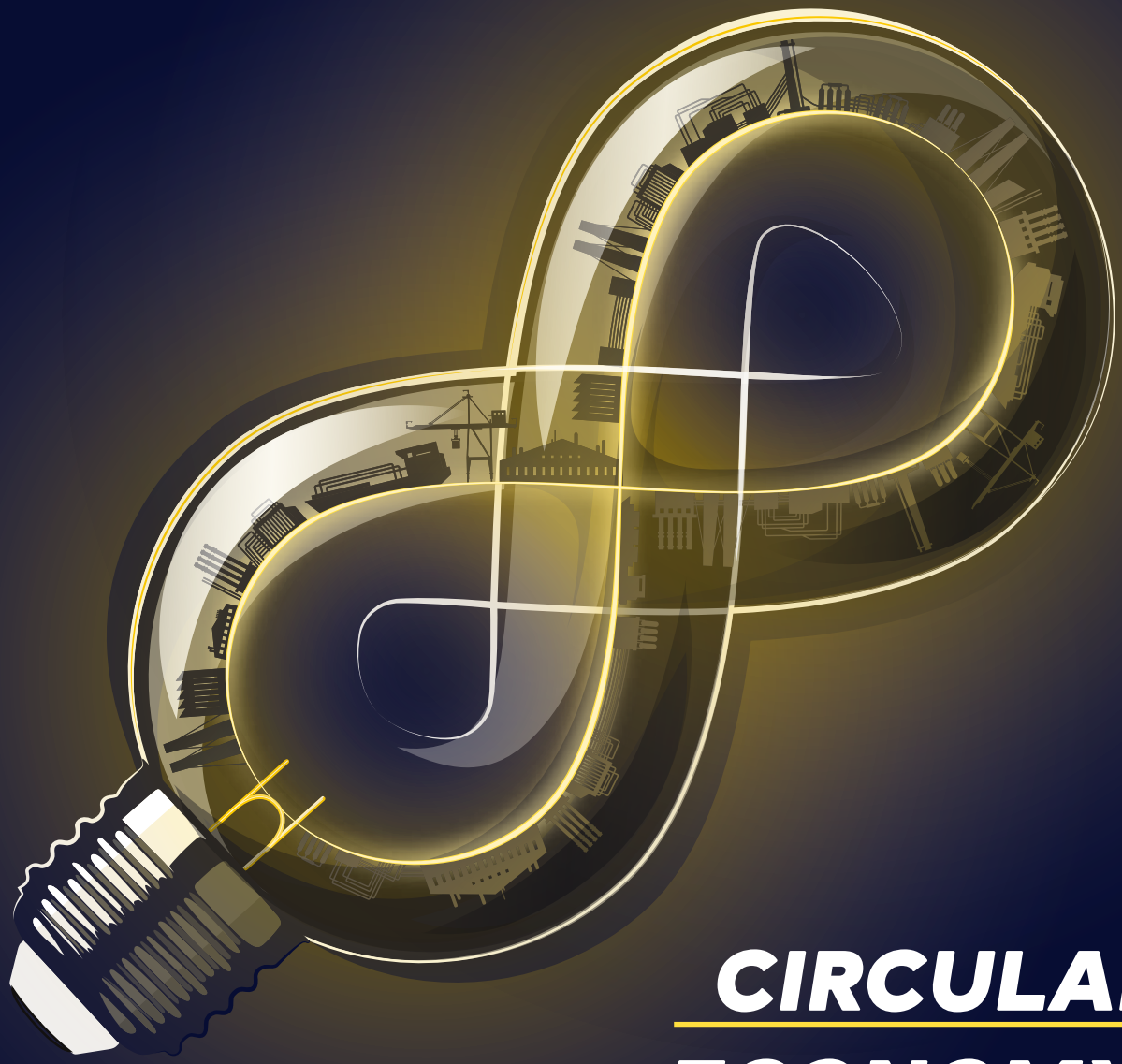
The magazine of a port in motion



# CIRCULAR ECONOMY, PORTS AS ROLE-MODELS

HAROPA PORT Le Havre Rouen Paris

## *WHY IS THE TRANSITION TO A CIRCULAR ECONOMY BOTH A NECESSITY AND AN OPPORTUNITY?*

**TWO KEY OBSERVERS SHARE THEIR VISION AND THEIR ANALYSIS:**

**Emmanuelle LEDOUX**, Director of INEC, France's National Institute for the Circular Economy.
**Roland MARION**, Head of the circular economy department of ADEME, the French energy and environment agency.

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# editorial

It is in full knowledge of the work done up to this point that I take up today the post of general manager of HAROPA PORT, France's leading port, one that has successfully placed its ambitions at the service of innovation, multimodality, industrial development and the ecological transition.

In the face of the challenges posed by that transition, the historical complementarity between the ports of Le Havre, Rouen and Paris offers an opportunity that I will ensure is central to my concerns going forward: the opportunity for development of synergy between the stakeholders in our local regions.

I say this because the climate emergency and the risk of depletion hanging over natural resources have led to the emergence of a new economic model : the circular economy. That model is not only more economic and more sustainable, it is also a source of development opportunities.

Indeed, in a study published in 2024, McKinsey estimates that investment in the transition to a circular economy, combined with better use of the means of production, could generate €1,800bn in net economic profit for Europe, plus an additional seven points in economic growth, by 2030.

This promise is especially relevant and of interest to port industrial areas and their industrial customers. That is so for a number of reasons. Ports are gateways for inward and outward flows of raw materials and energy, as well as locations for production and consumption, and they are faced in the immediate term with major issues relating to renewal and adaptation. Additionally, given the density of their industrial fabric, they offer especially favourable contexts for the implementation of virtuous loops. They even have a strategic role to play in the management of their real estate and the creation of synergy.

HAROPA PORT is of course an active contributor, as well as a facilitator, in the creation of industrial symbioses in its ports. But the future of the Seine Axis can be circular only if all those involved in the port and local regional ecosystem align with this approach. Hence this edition devoted to the circular economy: it highlights what can be transformed, reinvented and implemented by working together. It is up to us, collectively, to come up with novel solutions and ways of doing things in order to leave behind the "extract – use – scrap" triptych and make a successful move to circularity.

**Benoît ROCHET,**
CEO of HAROPA PORT

# Circular economy creates ECONOMIC and SOCIAL VALUE

**TO PROMOTE THE CIRCULAR ECONOMY AND ACCELERATE ITS DEVELOPMENT: THAT IS THE CORE MISSION OF INEC, FRANCE'S NATIONAL INSTITUTE FOR THE CIRCULAR ECONOMY. EMMANUELLE LEDOUX, ITS DIRECTOR, ANSWERED OUR QUESTIONS.**

***"Ecological transition policies must [...] necessarily take into account the issue of natural resource availability. And in any case, we have no choice!."***

Emmanuelle Ledoux joined INEC in 2019 following a career in both the public and private sectors, a career characterised by a strong interest in environmental issues.

**In what way is the circular economy absolutely key to the ecological transition?**

*The ecological transition is underpinned by three pillars: decarbonisation, to combat global warming, protection of biodiversity, and conservation of natural resources. However, we will not succeed if we work on all three separately. In the case of decarbonisation, for example, we need to speed up electrification. And that presupposes development of the electricity grid. Development to which copper, as an electrical conductor, is indispensable. This means that ecological transition policies must take account of the question of natural resource availability. In any case, we have no choice! Reducing our impacts is no longer enough: that does no more than delay the final reckoning. Only by shifting to circularity – by which I mean the implementation of virtuous loops in which we produce better, consume better and reuse materials more – can we lighten the pressure.*

**"It is clear that both France and the European Union import a large percentage of their resources. And that makes them highly dependent and vulnerable to unforeseen adverse events."**

**Looking beyond the ecological transition, what are the issues for France and Europe in this shift to circularity?**

*First of all, there is the issue of sovereignty. It is clear that both France and the European Union import a large percentage of their resources. And that makes them highly dependent and vulnerable to unforeseen adverse events. We saw just that during the Covid-19 crisis, and more recently with the tensions arising from the geopolitical situation. Hence the importance of regaining control of our supply chains. The move to circularity is also a response to an economic issue. According to McKinsey, circularity would allow Europe to save $380bn in raw materials every year. The circular economy generates value, creating local, long-term, non-offshorable employment and supporting industrial and agricultural activity in local regions, as well as fostering the development of new economic sectors centered on reuse and recycling. That is the macroeconomic picture. Where benefits for companies are concerned, I have discussed these in a book co-written with Gregory Richa*. The circular economy enables them to differentiate their product offerings, invest in new markets and broaden their range of activities. They can optimise their costs based on shorter supply chains and savings on inputs, transport and waste management. They will also make their operations more secure, enabling them to cope with shortages and price rises affecting certain commodities. And finally, they will shrink their environmental footprint and focus, or refocus, their teams on the ecological goal, which will count in their overall performance.*

**How have the French and European authorities been tackling these issues?**

*There has been a growing awareness, illustrated for example in France by the anti-waste legislation for a circular economy in 2020, and in the European Union by the package of measures adopted in 2022 to accelerate the transition to the circular economy. Progress is being made in areas such as traceability, packaging, reduced use of plastic and the Product Passport. But despite all this, we are still awaiting real action to some extent. There are undoubtedly many successful trials, but we are still a long way from large-scale deployment. Currently, 93% of our economy is wedded to a linear model and "throw away" logic is predominant. There is an urgent need to speed up the implementation of the circular economy.*

**How can it be speeded up?**

*Above all, what is needed is a political vision and project and all that flows from that: a regulatory framework and investments. Nevertheless, it is complicated because it entails far-reaching reforms to every stage in the production and consumption chain, as well as the involvement of a large number of stakeholders. Take the example of the repair bonus created to encourage consumers to have products repaired rather than buying new. The French authorities increased it in January 2024. It*

**« Pivoter vers une industrie circulaire », paru en 2022 aux Editions Dunod*

*is an effective measure. But applied just to shoes it is obviously not enough. For it to have a real impact, steps are also needed to increase the numbers of high street shoe repairers, this having fallen in recent years from 45,000 to 3,500 due to lack of demand. Which in turn entails a need for vocational training and real estate to enable new shoe repairers to set up shop across the country.*

***"The circular economy generates value, creating local, long-term, non-offshorable employment and supporting industrial and agricultural activity in local regions, as well as fostering the development of new economic sectors [...]."***

*Shoes also need to be easily repairable, which involves eco-design. Lastly, and above all, an economic model for repairs needs to be created to make them attractive, without which everything else will be pointless. Indeed, a repair can sometimes cost more today than a new product! To remove this brake, INEC has proposed the application of a circular economy VAT rate of 5.5% for repair services.*

**You mentioned INEC: what is its role in this context?**

*Our primary role is to help document and raise awareness of the circular economy to promote a general conviction that it is important. A second role is to set in motion action by private and public actors in order to build the circular economy of tomorrow. Our major advantage is our diverse membership: INEC is a body that brings together companies, professional federations, local government, institutions, NGOs, non-profits, as well as others. This drives a vision of the circular economy that covers the entire range of economic, social and environmental issues. In some cases we are precursors: for example, we carried out the first resource-focused analysis of France's National Low-Carbon Strategy. We are also a source of novel proposals: we have put forward 40 for circular industry, 20 for circular agriculture and, in May 2024, we published a European Programme for Resources based around 17 measures. Our activities sometimes extend to providing operational assistance. In 2023, for example, working jointly with CEREMA, the Centre for Studies and Expertise on Risks, the Environment, Mobility and Urban Planning, we published a practical guide for public-sector policymakers when organising a local circular economy for inert waste.*

**In your view, are ports places where development of the circular economy is particularly relevant?**

*It is relevant to every local territory, but perhaps even more so to ports because of their centrality to supply issues and their role as hubs for the organisation of logistics chains. This is even more the case for HAROPA PORT, which is both a river port and a seaport.*


# A GENUINE change of MODEL

*Roland Marion heads ADEME's circular economy department.*

**THE CIRCULAR ECONOMY IS A STRUCTURAL REVOLUTION THAT ENABLES INDUSTRY TO MITIGATE THE IMPACT OF ITS ACTIVITIES ON RESOURCES.**

**How would you define the circular economy?**

*I would begin by saying that it is the opposite of the linear economic model, i.e. the exploitation of materials for the production of goods, followed by their consumption and then an end-of-life as waste. That model is no longer sustainable: we must not only conserve increasingly scarce non-renewable resources but also make use of renewable resources at an acceptable rate, a rate slower than their capacity to regenerate. That is the core of the circular economy: instead of sending goods to waste, they are used as inputs. It is a model that mitigates the impact of industry on resources and helps improve the environmental quality of products. And in most cases, it results in savings! For industry, it's a genuine change of model: the aim must be to rethink every stage in the production cycle, keeping in mind the need to optimise, reuse and share resources (cf. figure on next page).*

**"For industry, [...] the aim must be to rethink every stage in the production cycle."**

**What legislative framework can foster such changes?**

*In France, three laws contribute to the development of the circular economy. Firstly, the law on the energy transition for green growth of 2015 set a target for a reduction by half in the quantities of waste going to landfill between 2010 and 2025. The law against waste and for the circular economy of 2020 laid down a number of specific targets, aiming for example at a 5% reduction in waste from economic activities between 2020 and 2030. It broadens the range of products covered by Extended Producer Responsibility (EPR) following the "polluter-pays" principle. And lastly, the climate and resilience law of 2021 also set new targets relating particularly to consumer information, providing for trials of environmental quality product statements in certain sectors (specifically, textiles and food).*

**What is ADEME's role with regard to companies?**

*To begin with, we support them financially and technically in their ecological transition. We make available to them foresight analysis studies for specific sectors, notably in order to anticipate issues arising from resource scarcity. And lastly, we provide leadership for professional and local networks in order to accelerate sectoral and regional dynamics.*

**What stage has development of the circular economy reached in France?**

*France has no reason to be ashamed of its position in Europe, but one key stage is yet to be reached: work needs to be done on common indicators that allow the degree of circularity of a region or an activity to be measured. Such monitoring is key! And also, such benchmarks could lead on to quantified targets, as has been the case in other countries around the globe.*

# THE 7 PILLARS OF INDUSTRIAL TRANSFORMATION

**From product design to product recycling, the implementation of the circular economy will inevitably lead industry not only to changes in processes but also to new interactions between economic actors. The goal? To generate synergy with the local regional ecosystem in order to save resources across the industrial cycle as a whole.**

## 1 Sustainable supplies

**Using resources efficiently** to limit environmental impacts.

**Example**

Utilisation of raw materials derived from recycled products, e.g. plastic, paper.

## 2 Eco-design

**Designing products that mitigate environmental impacts** throughout their life cycle (raw materials, manufacture, transport, recycling).

**Example**

Designing single-material packaging that is easier to recycle.

## 3 Industrial & regional ecology

**Optimising the use of resources** (materials, energy) within a regional ecosystem (recycling).

**Example**

Capturing $CO_2$ from industrial processes and using it to produce hydrogen as a source of energy.

## 4 Economic utilisation

**A new economic model based on use**, not acquisition, of products/tools.

**Example**

Renting equipment from suppliers (e.g. printers, machines) along with a maintenance service, instead of purchasing it.

## 7 Recycling

**Revalorising** the raw materials in products at their end-of-life

**Example**

Recycling plastic to produce new items; recycling paper to make paperboard.

## 6 Reuse

**Recovering product components at end-of-life** for repairs or new products.

**Example**

Reusing the components in obsolete products (e.g. components in electrical cabinets, circuit boards in machinery).

## 5 Repurposing

**Recovering and potentially refurbishing products to enable them to be used more than once.**
Instead of throwing a product away, it is utilised again by one or more businesses.

**Example**

The second lives of industrial pallets and construction items (e.g. windows, electrical installations).

## 4

# The benefits FOR INDUSTRY

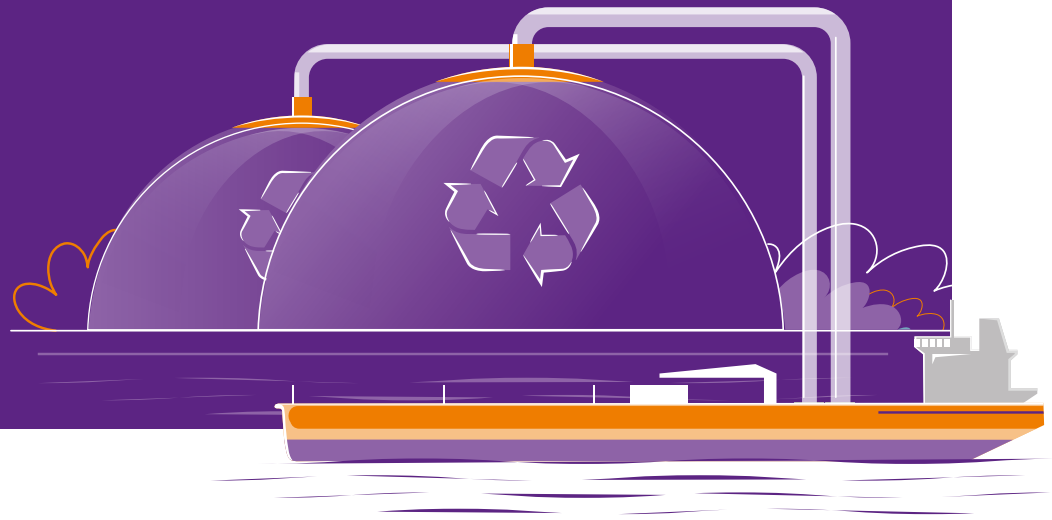
***ENERGISING LOCAL EMPLOYMENT***
by setting up businesses based around waste sorting, product disassembly, or production using recovered or recycled materials.

***SAFEGUARDING THE COUNTRY'S ECONOMIC SOVEREIGNTY***
by working with local partners and resources.

***IMPROVING THE IMAGE OF PRIVATE ENTERPRISE***
by limiting the environmental impacts of its activities and communicating on the topic.

***MAKING SAVINGS***
by extending the use lives of products, by renting or reusing products and even by selling waste (industrial ecology).

# TRANS-FORM



# The circular economy arrives in PORT

Blandine LAPERCHE

**BLANDINE LAPERCHE IS AN EXPERT ON INDUSTRIAL PORTS IN TRANSITION. SHE HAS IN FACT CO-WRITTEN A BOOK ON THE SUBJECT, PUBLISHED IN 2024*. SHE RETURNS FOR US TO THE SUBJECT OF RELATIONS BETWEEN PORT INDUSTRIAL AREAS AND THE CIRCULAR ECONOMY, USING AN EXAMPLE SHE HAS STUDIED EXTENSIVELY: DUNKIRK.**

*"Blandine Laperche lectures on innovation economics at the Université du Littoral Côte d'Opale and chairs the Innovation Research Network."*

**Would you say that industrial ports are natural testbenches for the circular economy?**

*They do in fact provide a favourable context for the development of the circular economy for four reasons. The first is that they are connected to a hinterland, and – in the case of the major seaports – to international markets. This makes them gateways for numerous inward and outward flows and as a consequence they are badly impacted by pollution. Dunkirk alone accounts for 21% of France's industrial $CO_2$ emissions! Given current issues surrounding the climate and the environment, and against the backdrop of a transition to a more ecological society, ports are obliged to look at new sustainable development models and pathways. The second reason is also linked to this high number of flows. Large quantities of materials do in fact travel through ports: commodities such as iron ore, earth, dredged sediment, manufactured products, energy, waste, and so on. In addition to the logistics flows linked to goods transportation and storage. This makes possible the creation of synergies and virtuous loops locally or more widely. The third reason: port industrial areas are places with a diverse economic fabric based around sectors such as steelmaking, metals, chemicals, petrochemicals, among others. This rich, dense web goes hand in hand with available real estate for new operators and infrastructures. Which is a source of opportunities for collaborative industrial projects linked to the circular economy: companies can group together to form networks whose purpose is to pool, exchange or substitute resources, both physical and other. Heat lost due to a plant's industrial process can for instance be used to heat buildings. Cooperation of this kind is fostered by preexisting relationships built up over time between port operators.*

**"Ports [...] are particularly useful places for implementing and testing innovations relating to the circular economy and decarbonisation."**

**Ports industriels en transition, de l'économie circulaire à la décarbonation (industrial ports in transition, from the circular economy to decarbonisation) by Sophie Boutillier, Blandine Laperche and Son Thi Kim, published by L'Harmattan ("L'Esprit économique" series)*

*With these there arises what might be termed industrial symbiosis: i.e. a form of circular economy distinct from the traditional linear economy and its foundation on the "extract, use, scrap" triptych. And lastly, the fourth reason: the circular economy is a response to the issue of attractiveness for ports. It provides a source of differentiation in the context of heightened global competition. And not simply because environmental issues have become a competitive lever. It also enables ports to equip themselves with comparative advantages, offerings of pooled services, for example.*

***"The circular economy is a response to the issue of attractiveness for ports. It provides a source of differentiation in the context of heightened global competition."***

**Ports also see the circular economy as a way of contributing to the development of their local regions ...**

*Absolutely. The circular economy is indeed a vector for local regional development. It helps in combating climate change, protecting the environment, renewing the industrial fabric, assisting the emergence of innovations – both technological and other – as well as enhancing attractiveness ... The path adopted by Dunkirk is an illustration of this. After the Second World War, the port began to specialise in heavy industry ... and then, some decades later, it bore the full brunt of the steel crisis. At the end of the 20th century it began a conversion to industrial ecology, one of the pillars of the circular economy, the purpose of which is to optimise local regional resources. This conversion was driven by companies such as ArcelorMittal, public-sector actors and non-profit associations, ECOPAL in particular. This set a very real renaissance in motion. Dunkirk's image has completely changed, and it is now a flagship for France's green reindustrialisation. And the local region, which took many years to fully assess the benefits of industrial ecology, now promotes it as a lever*

## A global TREND

**Given the pressure exerted by planetary issues and global competition, the circular economy will not develop in French ports alone. One example is Rotterdam in the Netherlands, which has set itself the goal of becoming a circular, zero-emissions port by 2050. Another is Antwerp-Bruges in Belgium, which is determined to become the leading port for the reconciliation of economics, people and the environment. Most notably there, Air Liquide will be building an industrial demonstrator to convert ammonia produced using renewable energy into green hydrogen.**

*for employment, an accelerator for innovation and a hope for a new future.*

**You have referred to a demonstrator: are ports particularly favourable places for circular economy innovation?**

*Backed as they are by the major advantages already described, they are in fact particularly useful places for implementing and testing innovations relating to the circular economy and decarbonisation. And in fact experimentation is flourishing in ports in diverse areas ranging from $CO_2$ capture, storage and reuse to the valorisation of dredged sediment. But there is one negative point highlighted by field surveys. The latter confirm the presence of an ecosystem of innovations centred on the circular economy. A symbiosis has developed between fifty or so interacting companies. This is reflected in the establishment of a growing number of industrial feedback loops, around the decarbonisation of cement production, in one example. But there are fewer innovations than you might imagine. The reason for this is straightforward: the companies operating locally are not where the decisions are taken because they belong to major international groups whose research and development teams are based elsewhere. Which means that innovation does not arise locally; it is not endogenous. And that is a major brake on progress.*

**In your view, how might that brake be removed?**

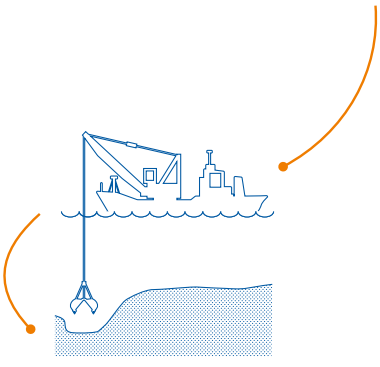
*It will not be possible to develop the circular economy without amassing knowledge. That is why I think one solution would be to strengthen relationships between industry and academia in local regions. Our universities train our young people and create new economic sectors, thereby providing economic actors with the human resources and skills they need. Which is essential. But by working together more closely we could go further and encourage the emergence in industrial ports of circular innovations in phase with local resources and issues.*

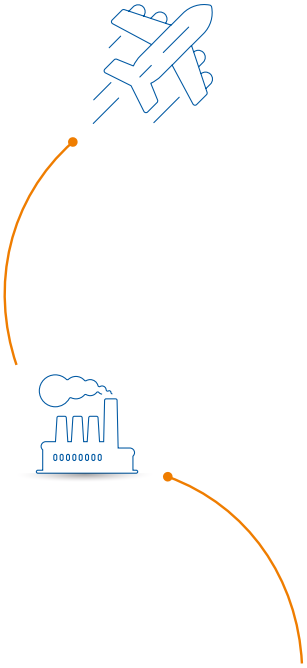
***"It will not be possible to develop the circular economy without amassing knowledge. [...] I think one solution would be to strengthen relationships between industry and academia."***

# Eco-products made from dredged sediments

**Every year, HAROPA PORT dredges around six million cubic metres of sediment to guarantee sufficient depth to accommodate ship draughts. How can that sediment be used with the circular economy in mind? That is precisely the point of the SEDINNOVE project!**

After a phase involving feasibility studies, followed by successful laboratory testing, the SEDINNOVE project, conducted in partnership with Néo-Eco, a specialist in recycling and waste valorisation, is now entering its trial phase. HAROPA PORT has set up a pilot site at Honfleur to look at valorisation of the sediment as an input for the production of marine concrete and road sub-base. Something of a circular revolution for the port! The technical quality of the concrete and sub-base, as well as the quality of the discharged water, are currently being tested "at scale". Ultimately, these eco-products will be proposed to local operators likely to have a use for them. The stakes in this project are major: development of a new local economic sector for waste valorisation while at the same time limiting the dumping at sea of sediment, which is an extremely cumbersome waste product for port areas.





# $CO_2$ to get aircraft into the air

**Having been selected in the HAROPA PORT call for projects in 2022, ENGIE has partnered with Air France - KLM to invest in the Grand Canal officially designated "turnkey" site in Le Havre. The France KerEAUzen project is aimed at developing an e-kerosene production facility by 2030 to use $CO_2$ captured at industrial sites in the area.**

It is expected to recycle 270,000 tonnes of $CO_2$ annually from industrial sources to produce around 70,000 tonnes of e-kerosene every year by combining it with renewable hydrogen. The goal? To use pipelines to supply the Roissy-Charles de Gaulle and Orly airport facilities, thereby addressing French and EU obligations. This pioneering 250MW electrolysis plant for the sustainable aviation fuels market is also expected to enable the delivery, starting in 2028, of renewable hydrogen to industry based in the port industrial area and companies in the heavy transport sector, as well as inputs for green chemicals such as naphtha. Green solutions for difficult-to-decarbonise industries.

# HAROPA PORT, a catalyst for circular projects

**HAROPA PORT IS A CONTRIBUTOR TO THE DEVELOPMENT OF THE INDUSTRIAL CIRCULAR ECONOMY IN ITS PORTS. ITS ROLE? ATTRACTING COMPANIES WHOSE ACTIVITIES ARE ESSENTIAL TO ENABLING THIS SHIFT AND MANAGING THE MUTUAL COMPLEMENTARITY OF COMPONENTS OF THE INDUSTRIAL FABRIC, AS WELL AS BUILDING RELATIONS BETWEEN ECONOMIC ACTORS AND MAKING THE PORTS PART OF REGIONAL DYNAMICS.**


Kris DANARADJOU

*"In our ports the ecosystem needed for establishing an industrial ecology is already in place, including top-ranking industrial operators, especially in the Seine Valley petrochemical complex. For them, the river is a decarbonised logistics corridor providing maritime and waterway links between various sites along the Seine Axis. Building partnerships with other economic operators enables these industries to develop the circular economy more generally."* For Kris Danaradjou, deputy CEO of HAROPA PORT, development of industrial activity in the ports must inevitably be circular! It is a necessity for economic actors faced with the demands of the ecological transition. Like the Danish port of Kalundborg, whose first industrial ecology projects dates back to the 1960s, HAROPA PORT is working to create the right conditions for the move to circularity.

Firstly, as an owner of real estate, HAROPA PORT organises the introduction of strategic activities and the mutual complementarity of components of the industrial fabric, working to promote the development of the circular economy. Cooperative industrial projects are nothing new here. Founded in Le Havre in 1977 with the port community, Sedibex is now one of Europe's biggest waste valorisation plants. In 2022, an extension of its underground steam network was used to supply 265,000 tonnes of steam to eight industrial facilities. As an addition to the heat networks, the hydrogen and synthetic fuels sector will be able to benefit from the circular economy in this industrial cluster. Kris Danaradjou explains that *"in theory, it is possible to produce most types of synthetic fuel by combining hydrogen produced from water, electricity and $CO_2$, of which we have*

*Kris DANARADJOU has been a deputy CEO of HAROPA PORT since 2021. His core task is to oversee economic intelligence for the development of traffic and the introduction of new industrial operations in areas administered by HAROPA PORT.*

*large quantities on the Seine Axis. For this fuel to be considered green, regulations will require the use of biogenic rather than industrial $CO_2$, and we need to prepare for this change and work with suitable supply sources".*

## NETWORKING INDUSTRIAL FIRMS

Next, HAROPA PORT builds links between Seine Axis economic operators to generate circularity between their activities. A role facilitated by the facts that the three ports are mutually complementary and that they have operated historically as a network. For example, the SOCRATE non-profit association formed by HAROPA PORT and the economic non-profits Synerzip-LH, INcase-Industrie Caux Seine and Upside Boucles de Rouen allowed a bid to be submitted for the ambitious ZIBAC (Zones industrielles bas carbones – low-carbon industrial zones) project. Thanks to this call for projects, SOCRATE has set in motion studies costing €15m – half funded by ADEME – to seek solutions for the decarbonisation of industrial operations, some of which are based on the circular economy. SOCRATE is notably looking at the evolution of industrial water resources across the Le Havre and Port Jérôme industrial basins, taking into account projected requirements and possibilities for reuse. The roadmap for these studies also includes the feasibility of a major $CO_2$ capture and storage project ($ECO_2$ by CCS Axe Seine).

## PARTICIPATION IN THE REGIONAL TRANSITION

Additionally, concentrating major economic activities across its home cities as it does, HAROPA PORT can support local areas going down a circular economy development pathway. For example, in Gennevilliers, the port's methanisation plant will from 2025 be valorising 50,000 tonnes of food waste from the Paris area to produce biomethane for heating and fuel for buses (30,000MW). This site will also supply 43,000 tonnes of digestate to agriculture that can be transported using the port connections present at every production site.

Kris Danaradjou concludes by stating that HAROPA PORT intends to develop an information watch and distribution system: *"We need to move faster on this aspect, which is why we have included the SYNAPSE network, which brings together French actors in the field of industrial and regional ecology. Its online platform has extremely useful resources for looking forward to the future and stimulating new experiments in the circular economy."*

***"HAROPA PORT organises the introduction of strategic activities and the mutual complementarity of components of the industrial fabric, working to promote circular economy."***

**Kris DANARADJOU**

## Promising SECTORS

**A number of activities linked to the circular economy are expected to develop along the Seine axis in coming years:**

**— Production of less environmentally harmful fertilisers, notably using digestate, the residue left by waste methanisation.**

**— Production of e-fuels by combining hydrogen and $CO_2$ captured in industrial plants.**

**— Reuse of industrial water as part of the consumption cycle.**

**— Decarbonised transport loops using river-based logistics enabling, for example, the carriage of packages on the outbound journey – particularly to the Paris consumption basin – and waste on the return leg.**

# Moving to a new economic model for ports

**PORTS ARE KEY COMPONENTS IN THE "ALL-PETROLEUM" ECONOMY, AND THEY NEED TO REINVENT THEMSELVES WITH THE ARRIVAL OF THE ECOLOGICAL TRANSITION. THE CIRCULAR ECONOMY MIGHT WELL HELP THEM DO SO. EXPLANATIONS BELOW.**

The combat against global warming and the exhaustion of natural resources mark the commencement of a new world era: the post-oil era has begun. This is a development of the greatest possible relevance to ports. That is because it obliges them to rethink their business model, which has been founded until now on the revenues generated by importing, storing and processing hydrocarbons. As confirmed by Nicolas Mat, general secretary of the non-profit PIICTO at Marseille-Fos: "*Port authorities will need to adjust to a structural downward trend in the flows generated by these activities.*"


Nicolas MAT

The imperatives of decarbonisation and resource conservation do not impact port throughput alone. They also lead companies operating in port industrial areas, as well as port authorities themselves, to make environmental performance an integral part of their development strategy. Their very survival is at stake given that this will enable them, among other things, to continue to be attractive (especially to younger generations) and avoid the societal acceptability issues increasingly making themselves felt in their local areas.

## THE CIRCULAR ECONOMY AS A SOURCE OF REVENUE

Against this backdrop, the circular economy – and particularly one of its pillars, industrial ecology – benefits ports in three ways. It can be a factor for their growth by generating new flows and new activities. It can also enable them to enhance their competitiveness by offering companies operating in port areas services to facilitate their energy and ecological transition: supplies of low-carbon electricity, for instance. And lastly, the

*Nicolas Mat, an expert in industrial and regional ecology programmes, is the general secretary of the non-profit association PIICTO (Plateforme Industrielle et d'Innovation de Caban-Tonkin / Caban-Tonkin industrial and innovation platform) at Marseille-Fos.*

circular economy is a way for them to limit their own environmental footprint, by for example managing their waste and valorising it more effectively. Nicolas Mat explains that "*all of this can lead ports to seek revenue to offset the losses resulting from the post-oil transition. Hence the benefits of changing their business model, notably to foster the establishment of exchange loops for materials and energy within the economic and industrial fabric of their local regions. Here we can point to the example of loops that allow steel to be produced with more recycled scrap metal, or the use of (chemically) recycled plastics in certain industrial processes, this despite a challenging economic and regulatory context.*"

## PORTS AS FACILITATORS AND SOURCES OF SUPPORT

Backed by their hinterland, their extensive customer catchment areas and their real estate resources, ports are key locations for the organisation of such circular loops. This will necessarily involve changes in their role. Specifically, real estate management will become crucial. Ports will be able to use it to accommodate, replacing traditional traffic-generating activities, new operations that valorise flows locally. Their governance and approach to cooperation also need to change. Here Nicolas Mat adds: "*The new models based on circularity demand extremely close cooperation between public and private sector actors. Ports, along with others, sit on steering committees and technical commissions implementing such programmes. But they have a key facilitation and support role. They have all the more legitimacy for action in this domain because ports are places that concentrate all of our broader societal issues, making them strategically important incubators for a successful ecological transition in their regions.*" He is well-placed to discuss this aspect: his non-profit, PIICTO, leads the Syrius programme (synergies régénératives industrielles sud / southern industrial regenerative synergies). Syrius was selected in ADEME's call for projects for low-carbon industrial zones (ZIBAC) and aims to set up a zone to pioneer the decarbonisation of French industry and green reindustrialisation. Nicolas Mat points out that "*the circular economy will be an essential lever for action, underpinning a substantial number of initiatives that will emerge under the programme.*"

***"The post-oil era has begun. This is a development of the greatest possible relevance to ports."***

**Nicolas MAT**

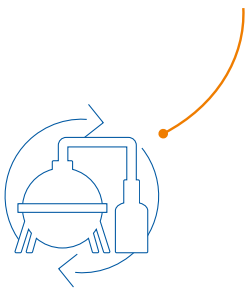
## PIICTO IN SUMMARY

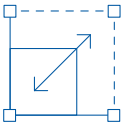
**PIICTO, a non-profit association, has a membership comprising around fifty industrial operators based in the Marseille-Fos port industrial area. It was formed in September 2014 to drive an industrial ecology and innovation approach in conjunction with Marseille port authority, local and central government and suitably qualified individuals in the surrounding region. Its goal is to participate in the emergence of a benchmark port industrial area that will be decarbonised and competitive across the Southern European zone.**

# Green energy from non-recyclable waste

**Officially opened in November 2024 in the Gonfreville-l'Orcher port industrial area, the Biosynergy 76 biomass boiler breaks new ground in waste valorisation in France: it produces steam and hot water by burning wood waste and solid refuse recovered from port area companies and Normandy households.**

Biosynergy has a capacity of 43.5MW, capable of generating 350 GWh/year, supplying heat to the district heating network in the south of Le Havre (70% of total requirement there over the next two years, the equivalent of 24,000 housing units) as well as three local industrial producers: Yara, Chevron Oronite and Safran Nacelles. The combustion facility allows the emission of 50,000 tonnes of $CO_2$ to be avoided every year, compared with burning fossil fuels, in addition to valorising 100,000 tonnes of non-recyclable waste which would otherwise go to landfill. This innovative project, driven by the SUEZ Group and VAUBAN Infrastructures, represents an €85m investment, and enjoys support from ADEME and Normandy regional government.





# Extract is now the biggest processing facility in the Paris area

**An initial expansion was undertaken in 2019 to accommodate earth excavated in the course of Grand Paris construction works. Extract, a subsidiary of VINCI, has now once again expanded its facility for the valorisation of excavated earth, sediment and industrial waste at Bruyère-sur-Oise port, increasing its area from four to six hectares and making it the biggest processing site in the Paris area, one now capable of handling 400,000 tonnes of materials annually, compared with 250,000 tonnes previously.**

It was opened in the autumn of 2024 and represents an investment of €7 million, allowing Extract to add a new, state-of-the-art washing line for the development of materials circularity, in addition to diversification of its processing methods (bioremediation, stabilisation and neutralisation), which in turn makes it possible to deal with a wide range of pollutants and valorise up to 95% of incoming volumes of earth and sediment. The waterside location of the facility permits the use of river barges carrying up to 2,500 tonnes of rubble, the equivalent of 85 trucks, arriving from construction sites in the Paris area, Normandy and north-western France.

# Antwerp-Bruges port undertakes its move to CIRCULARITY

Dries VAN GHELUWE

*“Dries Van Gheluwe, Manager Invest for Antwerp-Bruges port, has headed up the NextGen District project, creating a new port industrial cluster dedicated to the circular economy.”*

**TO REPLACE THE FORMER GENERAL MOTORS PLANT, ANTWERP-BRUGES PORT AUTHORITY IS CREATING AN 88-HECTARE CLUSTER FOR INNOVATIVE COMPANIES IN THE CIRCULAR ECONOMY SECTOR. NEXTGEN DISTRICT'S CORE TASK? TO PROVIDE THE PORT'S INDUSTRIAL OPERATORS WITH THE ECOSYSTEM THEY NEED TO UNDERTAKE AN EFFECTIVE SHIFT TO CIRCULARITY.**

### Could you describe for us the NextGen District at Antwerp-Bruges port?

*Located on the former General Motors site, the NextGen District is the new industrial cluster totally dedicated to circular economy operators in the port area. Covering 88 hectares, the equivalent of 110 football pitches, Antwerp-Bruges port authority hosts innovative companies that contribute to a new circular economy model for industry.*

### How was the NextGen District project born?

*Following General Motors' exit in 2010, Antwerp-Bruges port authority acquired the site with the aim of setting up a company operating in the circular economy sector. We then realised that we would not be able to find a single candidate for the whole of this enormous site. Therefore, in 2019, the idea came up of bringing in a plurality of operators. So we divided the area into various plots to be marketed and provided roadways and basic utilities: electricity, water, Internet and gas.*

### How does this project fit into the Antwerp-Bruges port industrial ecosystem?

*NextGen District's goal is primarily to provide solutions for the port's historical industrial operators in order to support their transitions and help them achieve compliance with EU decarbonisation legislation. We surveyed the relevant companies, and specifically those in our chemicals cluster, in order to discover their needs. We then focused on a number of activities: recycling operators for the management of industrial waste and the utilisation of greener raw materials, plastics especially, production of ingredients for alternative fuels – methanol, ammonia and hydrogen – and $CO_2$ capture and use solutions.*

**How did you launch the project?**

*We rolled out a bid process in four waves, in 2020, 2021, 2022 and 2024, to attract circular economy pioneers and guarantee the mutual complementarity of the companies involved. We had no problems at all in attracting firms. Indeed, the location is ideal: close to Europe's biggest chemical industry cluster and integrated into multimodal transport and energy transmission infrastructures. We also set up a cluster dedicated to R&D start-ups, NextGen Demo, which is effectively a testbench for the circular economy. On this 2-hectare site companies can upscale the testing of their projects before bringing them to market. For NextGen Demo, we are stepping outside our usual role as a real estate vendor: we are marketing plots in what is effectively a business park complete with buildings.*

**At what stage are you now in this project and which are the initial companies?**

*We have found the five main firms for NextGen District, i.e. more than half those we are seeking, and we have our first two for NextGen Demo. Plant construction starts in 2025, and operations are scheduled to commence in 2027/2028.*

*Ekopak will be recycling wastewater from Antwerp to provide cooling water and steam for port operators. It will also bring with it a key operator for NextGen District – Plug – which is expected to produce 35 tonnes of green hydrogen per day for supply to energy sector companies. Triple Helix will process mattress and insulation panel polyurethane foam and used PET to make polyols, the basis for the manufacture of polyurethane products used by industry. Bolder Industries will manufacture petrochemical products and steel with used tires, particularly for the chemicals cluster. And lastly, PureCycle will recycle 60,000 tonnes of polypropylene a year – and up to 240,000 tonnes in the future – for supply most notably to packaging logisticians.*

**"Located on the former General Motors site, the NextGen District is the new industrial cluster totally dedicated to circular economy operators in the port area."**

**What are the initial expectations for NextGen Demo?**

*Two operators have already signed up to become part of this laboratory cluster. Power to Hydrogen is working on a new way of producing less costly green hydrogen using anion exchange membrane electrolysis. TripleW has developed a process for producing lactic acid from food waste. A notable use for lactic acid is as an input for biodegradable plastic and biochemical products.*

**How do you see the future of the port?**

*NextGen District enables us to start shifting industrial operations to the circular economy, which is essential for the decarbonisation of the port's activities. The issues involved are obviously ecological, but the activities concerned also provide economic opportunities. For example, waste processing is a source of industrial activity that did not previously exist, creating new materials flows, along with spin-off in terms of revenue and employment. The port has an essential role to play in the success of this industrial transformation, a role that is not limited to simply providing strategic locations and infrastructure. We need to link up the various operators in order to generate circularity between all their activities. Such a local loop will contribute to a change in corporate practices worldwide.*

# How is public policy assisting the circular economy?

**FRANCE AND THE EU HAVE AMBITIOUS GOALS WHERE THE CIRCULAR ECONOMY IS CONCERNED. THE MOVE TO A CIRCULAR ECONOMY IS A KEY PROJECT FOR THE ECOLOGICAL TRANSITION AND IS A NECESSARY PRECONDITION FOR THE ACHIEVEMENT OF CARBON NEUTRALITY. THE LAWS AND PROGRAMMES ADDRESSING THIS NEW ECONOMIC MODEL CALL UPON EVERY POSSIBLE MEANS TO WIN OVER INDUSTRY.**

France was among the first countries to take regulatory steps in favour of the circular economy. But the first incentive measures came with the adoption on February 10th, 2020 of the law against waste and for a circular economy[1] - known as the AGEC legislation. This instituted a system of bonuses and penalties for sectors subject to EPR (Extended Producer Responsibility) – referred to as "eco-modulation" – reducing or increasing the amount of the eco-contribution to be paid to their eco-organisation by the relevant companies, depending on environmental performance criteria and in particular their incorporation of recycled materials, sustainability, repairability and recyclability.

***"€200 million has been earmarked for the circular economy component of the France Relance economic recovery plan for the years 2021-2022."***

Another lever exploited by legislators: public procurement. State procurement takes up nearly 8% of France's GDP and is driving offerings that meet circularity criteria. The AGEC legislation therefore sets out a list of products for which public agencies are obliged to procure goods either reused as such or including reused materials[2].
While most of the provisions in this law relate to consumer goods rather than to industry itself, the European Commission's action plan for the circular economy[3] is aimed at making circularity an integral part of industrial processes by facilitating symbiosis and highlighting digital techniques for monitoring and mapping resources, in addition to advocating green technology.

*1. Law 2020-105 of 10 February 2020 against waste and for the circular economy.*
*2. Official decree 2024-134 of 21 February 2024 on the obligation in public procurement to purchase goods deriving from the reemployment, reuse or including recycled materials, and banning the governmental procurement of single-use plastic products, Official Journal of the French Republic (JORF), 23 February 2024.*
*3. A new Circular Economy Action Plan 'For a cleaner and more competitive Europe', European Commission, 2020.*

## PUTTING THE MEANS IN PLACE TO PURSUE OUR GOALS

While legislators have tackled the subject, it is funding that will, in practice, allow companies to undertake their transition to circularity in industry.

Indeed, EU regulations are already channelling financial flows towards the environmental transition: the European Investment Bank stopped funding fossil fuels in 2022 and has committed to earmarking half of its investments for environmental projects from 2025 onwards. At national level, France's economic recovery plan is also fully aligned with the AGEC legislation. After €200m was earmarked for the circular economy component of the France Relance recovery plan for the years 2021-2022, an additional €370m was added from public funds in order to support innovation for the circular economy over the period 2021-2027 to accelerate the recycling of plastics, composites, textiles, strategic metals and paperboard. One notable purpose of this financial support is to encourage research and development directed at identifying more effective recycling solutions, setting up industrial recycling plants and integrating tools into industrial pathways to permit the reuse of recycled materials in products.

As part of the same strategy, a major call for projects divided into a number of distinct compartments was issued on behalf of central government by ADEME, France's agency for the ecological transition, under the heading "Innovative solutions for improving the recyclability, recycling and reincorporation of materials (RRR)". Its purpose? To assist projects for innovations relating to materials sorting and plastics recycling technologies. A way of helping new solutions to emerge for more and better recycling. This call for projects, whose winners are not yet known, has been allocated total funding of €45m for the years 2022-2024.

Assisting the upscaling of circular projects is also the purpose of "circular economy" impact contracts funded by ADEME and administered by France's finance ministry, the budget envelope for which has been raised to €30m in light of the enthusiasm it has engendered. The objective is to foster the emergence of environmental innovations rooted in local areas. In practical terms, the winners of the call for declarations of interest will receive funding from one or more private investors who will be reimbursed subsequently by government if the project succeeds. Investors therefore accept the risk of failure in exchange for a predetermined return in the event of success. In 2020, the first impact contract attracted 27 applications, of which 8 were selected.

*"While legislators have tackled the subject, it is funding that will, in practice, allow companies to undertake their transition."*

The government's incentive mechanisms are likely to grow in number in coming years. In October 2024, the minister for the ecological transition, Agnès Pannier-Runacher, announced the formation of a working group to set up a bonus/penalty system. This would make it possible to increase the reincorporation of recycled plastics along the lines of what is already in place for EPR sectors. The idea is to incentivise producers to incorporate in their products recycled plastics, preferably French in origin, to replace cheaper virgin plastics. Also in preparation, the 2025 finance bill combines tax incentives, subsidies and regulations of which, if passed, firms will be able to take advantage.

# RE-INVENT

# Initiating and scaling up circular industry

**WHAT IS MOTIVATING INDUSTRIAL FIRMS TO MOVE OVER TO CIRCULAR MODELS? WHAT ARE THE ISSUES AND WHAT LEVERS CAN BE USED FOR A COMPANY'S SUCCESSFUL TRANSFORMATION? BELOW, TWO VIEWPOINTS ON THIS VITAL GOAL FOR FRANCE AND FOR EUROPE.**

*“ Grégory Richa is an associate director at OPEO, a consultancy on operational transformation in industry. He is co-author of the book Pivoter vers une industrie circulaire (The shift to circular industry).”*

Grégory RICHA

Cédric PERBEN

*“ Cédric Perben leads Eastman's transformation in Europe, targeting circularity for PET, copolyesters, and polyester textiles. He heads up the project for Eastman's molecular recycling plant for plastics at Port-Jérôme in Seine-Maritime.”*

**Cédric Perben, Eastman is investing almost a billion euros in a recycling plant in Normandy. Can you describe for us this remarkable industrial project?**

**Cédric PERBEN :** *Eastman is indeed planning to set up a molecular recycling plant in Normandy, at Port-Jérôme-sur-Seine with the initial capacity to process over 100,000 tonnes of polyester-rich plastic waste difficult to recycle using traditional recycling technologies (mechanical recycling) and which would otherwise be incinerated. The project aims eventually to provide more than 350 direct jobs and 1,500 indirect. Which means that the plant would be the biggest of its kind in France and Europe.*

**In what way is this a change in paradigm for the Eastman Group?**

**CP :** *For us, the circular economy is a 'kodak moment'. To go down this road has strategic importance for the long-term viability of our business. We are currently faced with a global crisis in waste: just 9% of the world's plastic products are recycled; that is far too little, and the problem will only get worse as the population grows. Eastman developed advanced recycling techniques – molecular recycling – as long ago as the 1970s, has constantly improved them since, and has already marketed them for numerous applications (cosmetics, electronics, reusable bottles). Today, working with customers looking to reduce their impacts, we have scaled up the latest state-of-the-art techniques to industrial levels, achieving the efficiency needed to reduce plastics to monomers for subsequent reprocessing to make plastics whose quality is strictly identical to plastics made with raw materials of fossil origin. This is essential for us, and it explains our investment of several billion euros in three international projects for molecular recycling facilities (two in the United States and one in France) in order to meet regional needs and follow the locally-based logic imposed by the very principle of the circular economy.*

**Grégory Richa, you support industrial firms in their shift to circular models. What role can circularity play for industry?**

**Grégory RICHA :** *Energy costs, Chinese dumping, supply chain vulnerability: European industry has rarely been under such threat. As for the energy transition, that is moving the technological goalposts in sectors such as mobility and heavy industry. Without a change in paradigm, many manufacturers will no longer be able to operate by 2035. Circular industry is the long-term solution to the challenges posed by competitiveness and sustainability. For the manufacturers we have supported, circularity has opened up new ways of creating value through reduced consumption of raw materials, longer product life, economical functionality, and the development of plants for remanufacturing/refurbishing/repurposing. Offering up to 15% more revenue, these models are not only attractive but also more resilient since they are based on less energy-intensive local supply chains. Renault Trucks, Schneider Electric, Cemex, Eastman and many other groundbreaking manufacturers in their sectors are investing in these models, and they are right to do so.*

> ***"Circular industry is the long-term solution to the challenges posed by competitiveness and sustainability."***
>
> **Grégory RICHA**

**In practical terms, how can success be achieved for a company's circular project?**

**CP:** *Achieving success in a project like ours requires work at a number of levels. Internally, we had to progress from a breakthrough technical innovation to an industrial-scale project. Eastman's strength is that it succeeded in putting a "start-up" type of organisation in place to speed up development of the project for a viable industrial adventure. Externally, we had to involve the whole range of stakeholders: investors and customers, of course, but also local regional actors with whom dialogue and co-construction have been vital. This enabled us to become part of a real industrial fabric in the local region on a highly connected platform, while at the same time taking biodiversity issues into account. It is impossible to achieve success in this type of project by working alone.*

**GR:** *Scaling up a circular industry project is a question of vision, breaking with the past, and execution. The need here is to create new value chains with genuine capacity for innovation, rather than for technical innovation alone. Building markets previously wedded to newly manufactured products, putting in place waste collection systems and traceability and industrial assets for the reprocessing of products and materials: at every stage there are major unknowns. Which means that you have to be able to carry out a small-scale project, involving your customers, in order to find your market and prove its economic viability, without taking on industrial risk. And then you need to implement the transformations needed for upscaling, inside or outside the company.*

**What issues are involved in making a circular project such as Eastman's a reality – and looking beyond that, circular industry generally?**

**CP:** *We need genuine political and regulatory stability. Looking beyond the plant itself, our project can enable the construction of a whole new sector. That involves a great deal of investment, based on decisions taken at the time in a favourable context. But that context has changed and today the new rules must be detailed and clarified in order to protect our industry in the face of risks of unfair competition, most notably in recycled PET plastic, from countries outside the Eurozone. If that is not done, the profitability and long-term viability of our project will be deeply compromised. Today, the regulatory uncertainty is leading our customers to rethink their purchasing policies. That is why in November 2024 Eastman decided to slow the project down. We will not take any final investment decision so long as we have not secured minimum volume commitments from our customers in order to be sure of the viability of the investment. That being said, Eastman is totally committed to making the project a reality and plant construction is ready to begin. The question is not so much "whether" the project will go ahead, but "when". Other planned investments in plastics recycling are affected by the same issues, whether the recycling is mechanical or chemical.*

**GR:** *Developing circular industry means helping new recycling and repurposing sectors to emerge at national French and European scale backed by the regeneration of a productive and social fabric. This is a unique opportunity for the decades to come, with no major technological risk, because if we know how to produce, we know how to repair. For that, we will need a real innovation, investment and protection policy to support the emergence of this new industry for the long term.*

# One manufacturer's move to the CIRCULAR ECONOMY

Alexandre LIÉGEON

*"Alexandre Liégeon is port activities and river transport manager at CEMEX."*

**TRANSITIONING TO THE CIRCULAR ECONOMY IS A MAJOR CHALLENGE FOR INDUSTRIAL FIRMS, ESPECIALLY IN SECTORS SUCH AS CONSTRUCTION THAT MAKE INTENSIVE USE OF MATERIALS. CEMEX, A GLOBAL PLAYER IN BUILDING MATERIALS, SHOWS HOW AN INTEGRATED, AMBITIOUS AND INNOVATIVE STRATEGY CAN TRANSFORM ENVIRONMENTAL CONSTRAINTS INTO OPPORTUNITIES.**

### What place does the circular economy occupy in the Cemex Group?

*For Cemex, the circular economy is fundamental in meeting our carbon neutrality commitments and proposing sustainable construction solutions to our customers. This is reflected at a number of levels in our strategy: the creation of our Vertua range containing all our eco-designed, low-carbon products and solutions; the valorisation of construction waste as a new resource for increasing the percentage of recycled aggregates in our products; the creation of a service activity – Regenera – dedicated to the management of inert waste deriving most notably from earthworks and demotion operations.*
*Looking far beyond regulatory obligations, the Group is genuinely determined to innovate and act as a circular economy leader in the construction sector.*

### Port activities, especially in the Paris area, are key to running your business. Can you tell us more about this?

*We have indeed developed a highly integrated river-based infrastructure to provide a sustainable response to urban development issues and adapt to regional logistics constraints. That infrastructure connects up the entire construction value chain from quarries to worksites and back. Recycling facilities are essential components of the system for limiting the extraction of new materials and optimising flows. They provide storage for worksite waste and rubble for sorting, recycling or revalorisation, while at the same time offering management, traceability and logistics services, among others.*

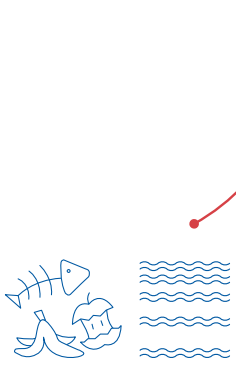
### What are the issues when going down this path?

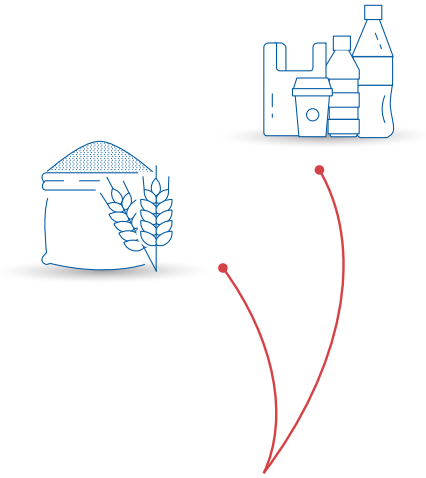
*Applying the circular economy in our operations is as much a necessity as it is a choice due to the value of the mineral resources we use. We will continue to innovate in order to limit extraction and our products' impact, eco-designing our concrete types and use of recycled materials.*
*We will also need robust political support if we are to maintain our industrial and logistics structure within city boundaries given the competition for other land uses. Every stakeholder is necessary to the consolidation of the circular economy model in order to generate a sufficiently large and sustainable impact on local regions.*

# Gennevilliers: heating from biowaste

**The valorisation of food waste is one of the challenges currently facing the energy transition as identified by EU legislators. In 2025, the biomethanisation facility at Gennevilliers port will come on stream.**

A project driven by SYCTOM (syndicat mixte central de traitement des ordures ménagères / central public/private organisation for the treatment of household refuse) and SIGEIF (syndicat intercommunal pour le gaz et l'électricité en Île-de-France / intermunicipal body for gas and electricity supply in the Paris area), the future plant will be operated by PAPREC. Its purpose is to process food waste collected in Paris and 81 municipalities in the near suburbs for the production of renewable energy, all entirely at local level. The programme will make possible the conversion of up to 50,000 tonnes of food waste into 30,000MWh of biomethane for injection into the Paris area public gas network to replace fossil gas. This represents the gas consumption of 5,000 households or 120 buses running on biomethane. The digestate – the residue left from methanisation – is to be taken by river to be used as fertiliser.





# Transforming wheat... into bioplastic

**It is a first for Europe: in Port-Jérôme-sur-Seine, two industrial firms have come together to develop a bio-industrial, circular and sustainable facility dedicated to the production of green chemicals.**

A strategic agreement was signed in April 2024 between Futerro, a Belgian company specialising in the manufacture of lactic acid, and Tereos, a French cooperative already operating in the region and with a major role in the sugar, ethanol and starch products market. This means that from 2027, Tereos will be supplying an annual 150,000 tonnes of dextrose derived from wheat starch and produced directly at its Lillebonne plant for delivery to Futerro's future biorefinery. Thanks to this raw material, Futerro will be able to produce "platform molecules" such as lactic acid and lactide, in addition to PLA (polylactic acid), a recyclable, biobased plastic with a small carbon footprint. A 1.5km pipeline system will connect the two neighbouring plants and most of the wheat processed by Tereos will arrive by river from the Radicatel terminal. The establishment of this synergy will enable the creation of 250 direct and 900 indirect jobs.

# DE-PLOY

# “The circular economy has a major role in a regional development STRATEGY»


*“After training as a geologist and vulcanologist, Bruno Petat spent his entire career in industry, managing two Le Havre storage facilities, before joining Synerzip-LH.”*

**BRUNO PETAT HAS BEEN HEAD OF INDUSTRIAL PLATFORM DEVELOPMENT IN THE SYNERZIP-LH NON-PROFIT SINCE 2018. HE TOLD US MORE ABOUT THE LINKS BETWEEN THE CIRCULAR ECONOMY AND LOCAL REGIONS.**

### What is Synerzip-LH’s mission?

*Our association was set up in 2016 following the terrible accident at the AZF plant in Toulouse. Its initial task was to drive measures to strengthen the safety culture in Le Havre’s port industrial area, bringing all the relevant entities together. It has a specific duty to protect companies based near SEVESO sites storing hazardous materials. That task presupposed the networking of companies and local regional stakeholders. Since 2018, the management and leadership of that network has had a second objective: in addition to preventing industrial risks, Synerzip-LH is an active participant in radical change in the region, and is committed to its economic development, working alongside local operators. Most notably, we work with the Seine Estuary chamber of commerce and industry, Le Havre Seine Développement, the Seine Métropole urban federation, HAROPA PORT and Le Havre port authority, France Chimie Normandie and the Union Maritime et Portuaire.*

### How can this non-profit act as an incubator for circular economy projects in Le Havre’s port industrial area, as well as more widely in the region?

*To begin with, the firms that are members of our network have an interest in the circular economy because it addresses issues that relate not only to the environment but also to sovereignty. The diversity of their operations, as well as the strong presence of the chemicals and petrochemicals sectors, provide them with numerous opportunities in this domain. Here I have in mind for example steam utility networks, raw materials flows, waste treatment and biobased chemicals. The functioning of Synerzip-LH is also beneficial in that it is based on the generation of synergy between member firms: we encourage them to link up their know-how, resources, skills, and so on. Indeed, links of this kind are central to the circular economy. Finally, Synerzip-LH is a clearly acknowledged interlocutor for all concerned in the region, institutions, politicians or other*

*non-profits. This means that we are able to play an effective role as catalyst and facilitator for circularity-based initiatives. Our involvement in the industrial map project launched by the AURH, the Le Havre and Seine estuary city planning agency, is a practical illustration of that role. This map is being constructed in partnership with the whole range of local stakeholders. It will identify every node and every flow in the region from Le Havre to Rouen, focusing initially on decarbonisation. It will be a dynamic resource providing extensive knowledge of the ecosystem and enable us to work on a range of scenarios for its evolution. Synerzip-LH is contributing to its creation by helping the AURH establish contacts with industry and gather data.*

***"The industrial map project will identify every node and every flow in the region from Le Havre to Rouen, focusing initially on decarbonisation."***

**How is the cooperation on the Seine axis structured between Synerzip-LH and the non-profits Upside Boucles de Rouen and INcase-Industrie Caux Seine, which are also developing industrial synergies, and Le Havre and Rouen port industrial areas?**

*Since 2024, this cooperation has been structured mainly around SOCRATE (see page 16), a French project acronym that translates as the "collective, rational Seine axis organisation for the energy transition". This project was selected following the call for projects issued by ADEME for the development of low-carbon industrial zones. Working in close conjunction with HAROPA PORT, SOCRATE is led by the non-profit of the same name, the founding members of which are HAROPA PORT, Synerzip-LH, Upside Boucles de Rouen and Incase-Industrie Caux Seine. The project's objective is to put in place decarbonisation solutions founded on – among other things – the circular economy. This is a project for the long haul, and we are only in its first phase at the present time: the initiation of engineering and feasibility studies on topics such as water resources and $CO_2$ capture and reuse. But SOCRATE has already received a warm welcome from Seine Axis industry. Companies are willing to make their data available and devote time and human resources to these topics. Along with financial resources: 18 companies are for example jointly funding the study on water resources and around a dozen the $CO_2$ study.*

**How would you characterise the governance of a project like SOCRATE?**

*What is most important is to identify a point where two logics intersect. On the one hand, there is a logic that might be described as "vertical". This relates to the fact that companies operating on the Seine axis belong to large corporate groups of national, or even international, stature. For that reason, they are applying locally the development strategy laid down by their group's main management. And on the other, there is a regional logic, one founded on the opportunities available to those companies in the ecosystem within which they operate. That ecosystem may for example give them with the option of recovering $CO_2$ discharged from neighbouring plants in order to produce e-fuels or e-methanol.*

**“In addition to preventing industrial risks, Synerzip-LH is an active participant in radical change in the region.”**

*To identify that point of intersection, dialogue needs to be established between companies that in many cases have not previously been communicating with each other. And that is what we try to do as a priority with SOCRATE. We also foster dialogue between companies and local government. HAROPA PORT is involved for example in a waste heat project in the Rouen area as well as in another study, along similar lines, relating to biogas production in Le Havre.*

**How can the circular economy be integrated into a regional development strategy and what outcomes can we expect?**

*The circular economy can play a major role as a contribution to a regional development strategy since in addition to its environmental benefits – whose importance is in fact growing for economic actors and both central and local government – it is a source of innovation, investment, attractiveness, competitiveness and employment. One of the most striking examples of this is SEMEDI, an industrial waste incineration facility operated since 1977 by Sedibex in Le Havre, whose heat network supplies steam to industrial plants. This is highly typical of port areas such as Le Havre, where a multiplicity of use cases are available and where the real estate exists to host experimental facilities, start-ups and new operations. This is all the more applicable given that Synerzip-LH facilitates these types of initiatives using a “Plug-n-Play” approach aimed at simplifying and accelerating the relevant formalities as far as possible. We have also contributed to the implementation of local virtuous loops. With the support of our association one company has for example discovered that one of its effluents can be used by another local firm as a reagent for processing its waste. It now supplies that effluent and can therefore avoid the need to invest in treatment processes. And the other company no longer has to purchase, at a high cost, the previously necessary reagent. This is the kind of win/win collaboration we would like to see more of.*

# Towards a large-scale circular economy?

**WE ARE AND CONTINUE TO BE A RAVENOUS ENERGY-DEVOURING SPECIES. THE WORLD ECONOMY OF 2024 COMPRISES A LITTLE OVER TWELVE BILLION TONNES OF GOODS TRADED VIA SEA ROUTES[1]. HUMANITY'S OVERALL CONSUMPTION OF ENERGY IS STILL 80% DEPENDENT ON FOSSIL RESOURCES. THE CHALLENGE OF THE ECOLOGICAL, ENERGY AND ECONOMIC TRANSITIONS IS STILL COLOSSAL, AND PORT COMMUNITIES ARE IN THE FRONT LINE.**


Yann ALIX

We have discussed this topic in a collective publication used in the proceedings of COP 21[2]: the circular economy can find unique spaces in port areas for experimentation and innovation. Transit, storage, processing, recycling: all forms of activity converge on break points – the ports. Large-scale circular economy and industrial ecology are part and parcel of the effort to build a carbon-neutral world.

## SCALING UP: THE PROBLEMATIC ESTABLISHMENT OF SYNERGY BETWEEN LOCAL AND WIDER REGIONAL INITIATIVES

Along the same lines as what we observe in the digital transformation with the ChainPORT[3] global initiative, the most innovative port authorities seek to pool their practices. They set out to co-produce innovative solutions that prepare the future for port areas. Such networking capitalises on a critical sharing of best practice and is founded on mutual commitment developed on the basis of the benefits of pooling issues, projects and resources. What has prevailed in the domain of digital innovation appears to be more complicated to bring about for economic circularity and ecological industrialisation.

*1. UN Trade and Development (UNCTAD), 22 October 2024, Review of maritime transport 2024, Navigating maritime chokepoints (UNCTAD/RMT/2024),*
*2. Alix, Y., Mat, N. and Cerceau, J. 2015. Économie circulaire et écosystèmes portuaires. Tome IV. (The circular economy and port ecosystems. Volume IV) Les Océanides series. SEFACIL Foundation. Editions EMS. 424p.*
*3. Hamburg Port Authority, Chain port, Network locally – globally networked : https://www.hamburg-port-authority.de/en/chainport*

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One reason for this is the fact that each port ecosystem has its own industrial and energy legacy that shapes the specific uses of its real estate. The methods of the circular economy require adaptations that optimise exchanges of materials and energy. This means that every port environment needs to customise its circular economy and ecological pathway. However, large-scale duplication will not generate economies of scale since the dividends from circular solutions arise in the areas in which they are applied. Another reason relates to the fact that the private industrial sector, chemicals/petrochemicals in particular, implement practical circular economy solutions unsuited to large-scale standardisation. Processes and customary practices are optimised for regional consistency in accordance with the set of constraints and opportunities present in each port industrial environment. A third reason concerns regulations that do not create a uniform general framework for the international stimulation of a "universal circular economy". This translates into highly disparate levels of port maturity with regard to the circular economy, depending on the level of economic development, the legal and regulatory environment, the application of national fiscal rules favourable to the energy and ecological transitions, and so on.

***"Unlike their European counterparts [...], American port authorities do not have available to them laws and regulations that favour development of the circular economy."***

## A LARGE-SCALE CIRCULAR ECONOMY: DIFFERENCES OF POLITICAL VIEWPOINT

While major European ports such as Rotterdam, Hamburg and HAROPA PORT are pursuing ambitious pathways in the area of the circular economy and industrial ecology, the picture is quite different in the United States, particularly in light of the potential threat posed by the energy and industry policies of president-elect Donald Trump. Unlike their European counterparts, encouraged by the positions adopted by Brussels, American port authorities do not have available to them laws and regulations that favour the development of the circular economy. In China, the circular economy has been announced as one of the pillars of the 14th five-year plan (2021-2025), making waste a resource to be used for industrial development that consumes less water, electricity and raw materials. Seaport and river/seaport ecosystems in many Chinese provinces are large-scale testbeds for new industrial and manufacturing processes.

*4. Polyvia, Union des transformateurs de polymères (union of polymer processors), 19 October 221, Économie circulaire : mieux comprendre la nouvelle politique chinoise (circular economy: a better understanding of China's new policy) : http://bit.ly/4hiiOFV*

The authorities in Beijing have announced that the cumulative output from production in all recycling sectors could amount to €655bn[4]. In 2023, the South Korean political authorities launched the CE 9 project for the circular economy, and this is likely to accelerate initiatives driven by the country's major ports such as Busan and Incheon, ports serving an export economy dependent on the availability of external resources. As for the so-called emerging nations, the steps taken in ports in the area of the circular economy are anything but aligned, pointing up discrepancies in decarbonisation and integrated waste management.

***"AI must become a tool to accelerate the possibilities of the circular economy."***

## BUILDING A GLOBAL COALITION FOR CIRCULAR PORT ECONOMIES

The most innovative port authorities transcend ideological differences and regulatory mismatches. The World Ports Climate Actions Program (WPCAP)[5] identifies the circular economy as one of the components enabling limitation of negative externalities linked to global port activities. The Getting to Zero Coalition[6] brings together port authorities, shipping companies and specialists in finance and energy for the joint construction of solutions for decarbonised navigation compliant with the UN goals for 2050.
If the world's ports are to be made into effective incubators for a large-scale circular economy, a supranational organisation needs to be designed to bring together major industrial groups and energy suppliers, tax experts and economists, R&D laboratories and leaders in innovation, all orchestrated by the most influential port authorities.

AI must become a tool to accelerate the possibilities of the circular economy. The definition of combinations of energy and industry, establishing parameters and hypotheses, is in itself a way of making AI an instrument for mitigating technical and technological constraints. AI must "build scenarios for every combination that marries circularity with ecology" on behalf of industry, energy suppliers and, of course, regional promoters and developers.

***"The most innovative port authorities transcend ideological differences and regulatory mismatches."***

*5. WPSP, World Port Sustainability Program, WPCAP, World Port Climate Action Program: https://sustainableworldports.org/wpcap/*
*6. Global maritime forum, September 2019, Getting to Zero Coalition: https://globalmaritimeforum.org/getting-to-zero-coalition/*

# ONE PERSON'S WASTE ...

... is another person's input. From 2025, Le Havre Seine Métropole will be heating the equivalent of 37,000 housing units by reinjecting lost heat from the TotalEnergies Normandy industrial facility into the district heating system. This programme, representing an investment of €179m, will replace the existing gas boilers.