



# Supply Chain Reimagined

## Digital Innovations for a Sustainable Petrochemical Supply Chain

Report of the Virtual Workshops held on 21 June  
and 8 September 2021

This initiative was commissioned by The European Petrochemical Association (EPCA) and carried out by Vlerick Business School in close collaboration with EPCA.

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## Reimagining the supply chain

Committed to making the petrochemical supply chain more circular and more sustainable, the EPCA Supply Chain Program Committee (SCPC) embarked on a journey - together with the team of Professor Ann Vereecke, Vlerick Business School - to reimagine the petrochemical supply chain<sup>1</sup>. A series of interviews with the EPCA Digital Advisory Body<sup>2</sup>, sounding boards with the SCPC Members and workshops with experts from within and outside the sector have been organised to explore how digital innovation can make the supply chain more eco-friendly and more circular.

This report shares the insights gained from EPCA and Vlerick Business School's initiative "Digital Innovations for a Sustainable Petrochemical Supply Chain"<sup>3</sup>. We hope it will inspire you to consider possible collaboration initiatives with players in your company's ecosystem and to launch initiatives that – through digital innovation – will lead to a more sustainable petrochemical supply chain.

## The need for change

Many regions in the world have been confronted recently with extreme climate conditions such as floods, droughts, and uncontrollable fires. Undeniably, climate change touches the lives of many people and impacts entire communities. It tells us that we have a **moral duty** to drastically reduce the ecological footprint of our supply chains.



In addition to the moral reasons, there are also **economic reasons** for making the supply chain more sustainable. With an increasing frequency of natural disasters comes a growing risk of supply chain disruptions, which negatively impacts the performance of the supply chain and generates a cost for companies across the supply chain.

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<sup>1</sup> EPCA and Vlerick Business School have been collaborating since 2017 to explore the impact of digitisation and innovation in the petrochemical supply chain. Previous research is available on the EPCA website

<https://epca.eu/Supply-and-Logistics-chains>

<sup>2</sup> The EPCA Digital Advisory Body is composed by **Arnoud De Meyer**, University Professor at the Singapore Management University (SMU), **Peter Hinssen**, Entrepreneur, Speaker and Author, Co-founder & Partner at nexworks, **Yair Reem**, General Partner at Extantia Capital, and **Frank Salzgeber**, Head of Innovation and Ventures Office at the European Space Agency (ESA). The DAB is coordinated by **Frederick Ronse** (Ovinto).

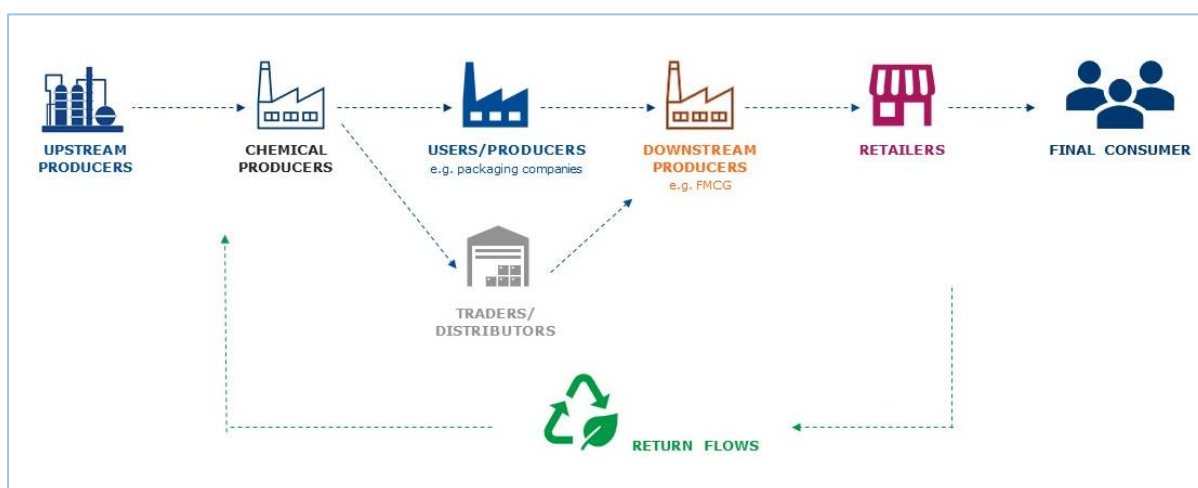
<sup>3</sup> The initiative was presented at the **Supply Chain Reimagined** session of the EPCA 55<sup>th</sup> Annual Meeting. The video of the session is available on [YouTube](#)

Pressure is therefore growing – from multiple stakeholders – to take much better care of the planet we live on. **Consumers**, and in particular the younger generation, are an important driving force for the change that is so much needed. They ask for greener products that are produced and transported using less energy and resources, out of material that will be re-used. Pressure is also coming companies downstream in the supply chain, the **customers of the petrochemical companies**, who sell their products to consumers, and from **investors**, who want to decarbonise their portfolio. And last but not least, pressure is coming from **regulators** in the form of policy initiatives and new legislations such as the European Green Deal.



## Eco-efficiency and circularity in the petrochemical supply chain.

To grasp the full potential of re-imagining the supply chain, it's key to take an end-to-end supply chain view (as shown in Figure 1): from the upstream petrochemical companies, over the chemical companies, to the downstream users of petrochemical and chemical products (such as FMCG<sup>4</sup> companies who rely on the petrochemical supply chain for raw materials or for packaging material), to the retailer, and finally to the end consumer.



**Figure 1 - End-to-end view on the petrochemical supply chain**

In this end-to-end perspective, two questions arise:

- The first question is whether we can **make the supply chain - as it is - more eco-efficient**. Not only by improving each of the steps in the supply chain and reducing its ecological footprint but also, and maybe even more importantly, by strengthening the link between partners in the supply chain. Connecting the dots is what can bring significant improvements, although it is a challenge.
- The second question is whether we can **change the structure of the supply chain, from linear to circular**: where can we create loops? can we re-use or recycle material, more than we already do? Knowing that to date, of all the plastic waste ever produced, only 9% has been recycled to date<sup>5</sup>, the concept of circularity reflects tremendous potential for change. We could consider this a threat: recycling more means producing less, therefore hurting profitability of the incumbent companies. However, it can also – and should - be looked at as an opportunity: the circular economy can be an engine for growth. It stimulates companies to develop new products that are recyclable or re-usable, it pushes companies to think about new ways of production and new modes of transportation, it makes companies think about new business models that could totally change the way of working and tap into new markets.

<sup>4</sup> Fast-moving consumer goods

<sup>5</sup> Source : <https://www.unep.org/interactive/beat-plastic-pollution/>

These two questions have been the subject of discussion in a set of workshops with participants representing all steps in the petrochemical supply chain, from upstream to downstream.

## Inspiration for re-imagining the supply chain

From these workshops, an interesting set of potential initiatives emerged. Two of these ideas, which we believe can inspire you to identify opportunities for action, are highlighted in what follows.

### 1) Smart emission simulator (eco-efficiency)

The first idea was to create a smart emission calculator and simulator that will provide visibility of the ecological footprint of the logistic flow of goods, across different modes of transportation and across transportation providers.

This emission simulator would allow companies to choose the route to go from A to B, not only based on the time and cost of transportation - the traditional trade-off - but also based on its ecological footprint.

To illustrate the potential of this idea, a mock-up of the smart emission simulator was built with the support of Ovinto<sup>6</sup>.

Let's assume, for example, that company X wants to ship a load of 12 containers from Southampton to the Port of Antwerp. The simulation tool searches for possible routes and identifies modes of transportation that have capacity available. It presents the following three options (See Figure 2):

- A. One option is to transport the load from Southampton to Le Havre by ship; for this route, the simulation tool has identified a small container vessel that has capacity available to carry the load of 12 containers. From le Havre, the load continues its journey to Antwerp by train
- B. A second option is to drive to Calais by diesel trucks, through the Eurotunnel, and to continue by train from Calais to the Port of Antwerp.
- C. And yet another option is to transport the load by truck, all the way from Southampton to the Port of Antwerp, through the Eurotunnel.

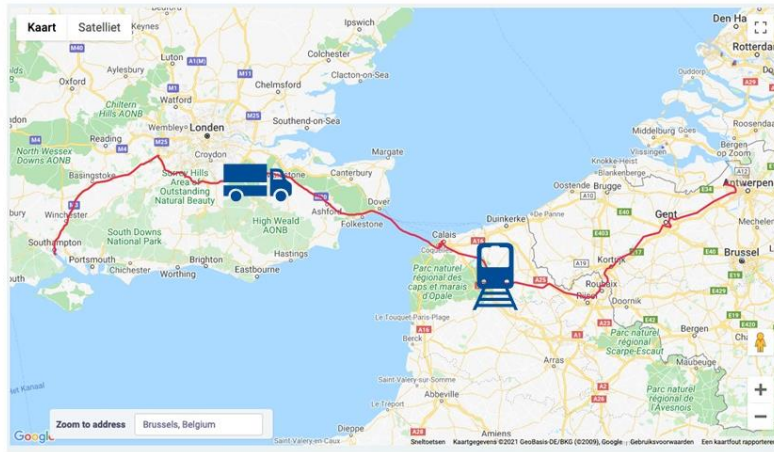
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<sup>6</sup> Ovinto is represented in the Supply Chain Program Committee (SCPC). More info: <https://www.ovinto.com/>

Option A  
Ship & rail



Option B  
Truck & Rail

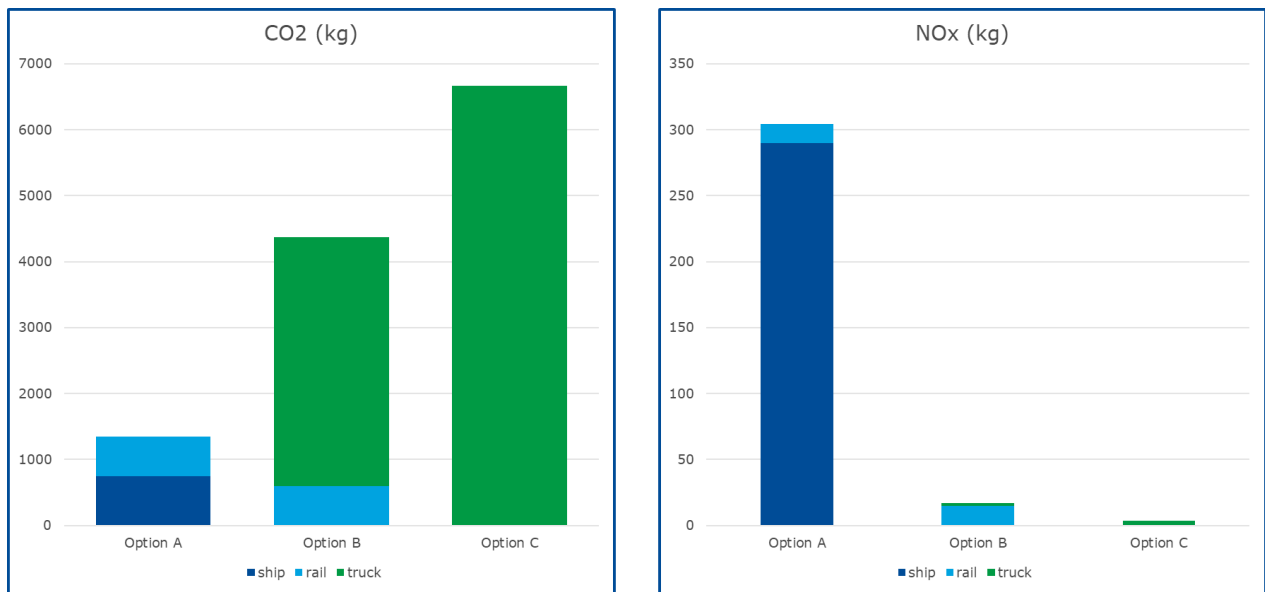


Option C  
Truck



Figure 2 - The smart emission simulator – routes suggested

For each of the options, the tool calculates and reports the CO<sub>2</sub> and NO<sub>x</sub> emissions, as shown in Figure 3, allowing company X to compare the ecological footprint of the different routes.



**Figure 3 – Illustration of the emission simulation report**

The outcome presented in Figure 3 is mainly for illustration purpose. For the emission calculations to be accurate, we would need a data platform offering real-time data on possible means of transportation, their available capacity and their CO2 and NOx emissions<sup>7</sup>. It does, however, show what kind of insights company X could potentially draw from a smart emission simulator.

- Firstly, the simulator would allow company X to make a more informed decision. In choosing the route to take, company X can now trade off transportation cost, transportation time and emissions.
- Secondly, it helps to raise some interesting questions. The results indicate, for example, that it could be interesting to search for a more green, clean ship, making option A more eco-efficient. Or why not join forces with a logistic provider who is willing to invest in a more clean fleet of trucks, which would improve option B or C.

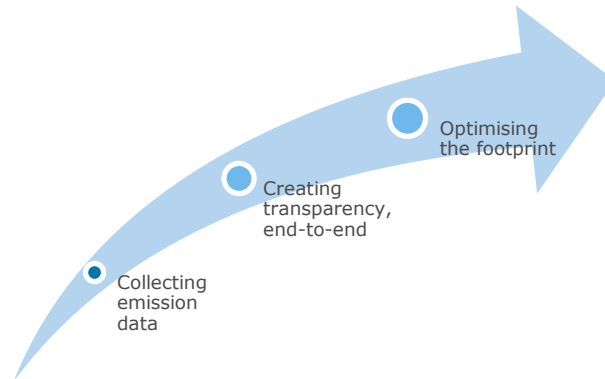
The introduction of the smart emission simulator is an ambitious project that consists of three main steps:

1. The first step is to build a data platform for collecting emission data for the available modes of transportation.
2. Once the data is available, a certain degree of transparency can be created: calculating the end-to-end emissions, and sharing that information with the consumer.

<sup>7</sup> Any platform of this sort involving data collection/exchange would need a careful competition law assessment.



3. Finally, it allows to optimise the supply chain, minimising its ecological impact.



The establishment of any simulation model will need to be done with careful consideration of the need to protect competitively sensitive information. This is likely one of the key challenges to effective implementation of this type of possible initiative.

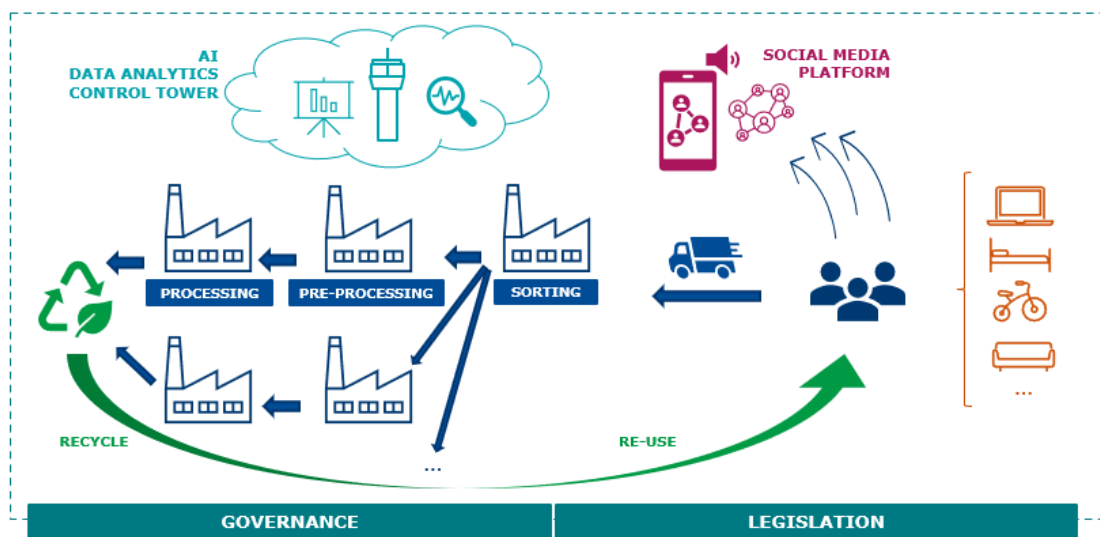
## 2) Connecting the dots (circularity)

The second idea revolves around bringing circularity into the chain. The idea was suggested by participants representing downstream players in the supply chain. As they are close to the consumer, they are well positioned to sense the need consumers have today.

The ambition of this potential initiative is to offer to the consumer an efficient and user-friendly way to dispose of items they do not need anymore - an old mattress, a set of worn-out tires, a discarded piece of garden furniture, etc. - with the guarantee that the item will be re-used or recycled in the most optimal way.

What would be needed to accomplish this? The potential project that emerged from the brainstorm was named “*Connecting the Dots*”, and aims to bring together many players in an ecosystem, as shown in Figure 4:

- On a social media platform, consumers would signal that they have a product they want to dispose of.
- A partner company would come to the home of the consumer to collect the product, making sure it ends up in the right return flow. For this, the product needs to be taken to a sorting centre, from where it would find its way into pre-processing and processing plants.
- At the processing plants, the product would be recycled into material ready to be re-used in the production of new products that then find their way to the consumers.
- AI and data analytics would be needed to make it work and to ‘connect the dots’.
- A governance structure and new legislation is needed to make it happen.



**Figure 4 - Connecting the dots: a graphical representation**

## Inspiration for re-imagining the supply chain

Throughout the interviews and workshops, it became clear that a lot of value comes from bringing together representatives from different stages - upstream and downstream - in the supply chain. This is where one plus one equals three: the upstream companies in the supply chain bring the expertise on material technology, manufacturing and logistics to the conversation; the downstream companies contribute with a wealth of innovative ideas. They are active in sectors such as the textile industry, the construction industry, FMCG and packaging, as well as retail. Sectors that are closer to the consumer than the typical petrochemical or chemical company, making them more or sooner aware of the need for a sustainable supply chain, and in particular of the need for circularity in the supply chain. Hence, they can be a source of inspiration for the upstream players in the petrochemical supply chain, and a partner in making it happen.

*“Start small, scale fast, dream big”*

To truly transform into a sustainable, smart supply chain, there is a need to build ecosystems that go beyond the traditional supply chain. We believe that the supply chain of the future will look more like the ecosystem pictured in Figure 5 than the linear chain pictured in Figure 1. This journey, for sure, will require investments; someone has to take the lead and create the **ecosystem** for others to join. This requires vision and ambition, so let’s “dream big”. At the same time, it requires action, so we need to “start small”.

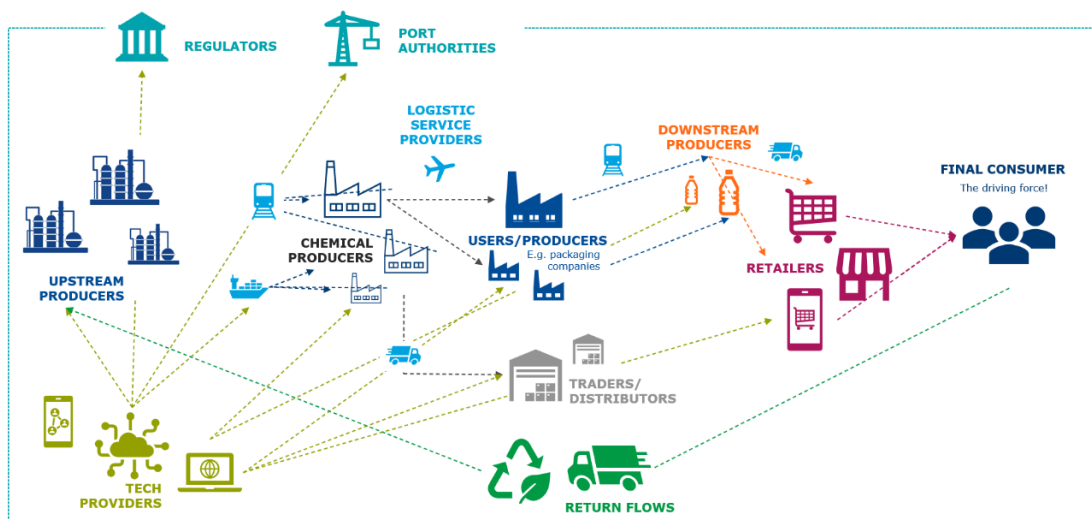


Figure 5 – The ecosystem view of a smart sustainable petrochemical supply chain

A first step in making it happen is to create transparency in the supply chain, down to the final consumer, on emissions, energy use, material use and asset use. For this, **access to reliable sustainability-related data** is crucial.

*“What is not measured, is not known; and what is not known, cannot be improved.”*

However, the reluctance to be open and share data is consistently mentioned as a major barrier. **Trust** and a **clear framework** (also to be provided by regulators) are requirements to overcome this reluctance, so the first step in the roadmap is to identify partners that can be trusted and to select tools<sup>8</sup> that allow to collaborate on a basis of trust. Once trust has been established, data can be collected and visibility will be created. This will provide the foundation for true ecosystem **collaboration**, which will generate opportunities for optimising the chain and making it smart and sustainable.

## Acting together for a better future

As one of the interviewees pointed out in a first stage preparatory interview, *“It takes vision and courage to move away from the traditional focus on the operational performance of the supply chain - balancing cost and service - towards a focus on designing the supply chain that serves the world best in terms of long-term, sustainable performance”*.

Our journey is far from over. EPCA will continue to promote innovation and encourage its Community Members to pursue solutions that will ultimately contribute to making the petrochemical supply chain more circular and sustainable, supporting the sector in achieving the UN Sustainable Development Goals and to contribute to Europe’s ambition for carbon neutrality by 2050.

<sup>8</sup> Ensuring competition on the merits and on innovation.

Photo credits

**Page 3**

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**Page 4**

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Infographics

**Figure 1, 3, 4, 5**

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**Figure 2**

Courtesy of Ovinto

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