



# Partnerships: cornerstone of the circular economy

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## EpE Chairman's message



The circular economy is one of the most important areas of ecological transformation. Everyone today recognizes its importance and urgency and expects it to lead to greater resource and energy savings, lower waste pollution, cost reductions, and new markets. For consumers, this is where ecology begins.

The French government has addressed the issue of the circular economy with a number of measures to accelerate its development, including the anti-waste circular economy (AGEC) law, the forthcoming climate and resilience law, and shortly a European directive.

Despite this mobilisation, the circular economy is flagging. In France, rates of incorporation of secondary raw materials in products are flat, and in some cases below 20%. The development of the circular economy continues to be hampered by real economic constraints and risks, market uncertainties, regulatory restrictions, psychological barriers, and technological and skill issues.

Feedback from EpE members who embarked on this more difficult than anticipated path has provided an insight into the conditions on which the success and mainstreaming of some initiatives depend. Partnerships among stakeholders is a common feature of many successful actions. This makes sense. Just as the linear economy operates across value chains directed towards, and by, an end market, so the circular economy requires coordination between economic groups acting independently of each other, and more or less dispersed sources of secondary materials and the end markets using them. The supply-demand match that occurs across value chains produces an economy that is too patchy to be viable. In this context, partnerships are designed to deal with temporal and geographic imbalances.

The circular economy thus demands unusual economic functions that are less reproducible than the linear industrial operations which have shaped the consumer society we know. It calls for more intelligence, more coordination between stakeholders, more operational flexibility, numerous technological and organisational innovations and breakthroughs, and new business methods. All these avenues are currently being explored and developed by EpE member companies.

Our brainstorming exercise to develop a more collaborative economy has prompted us to use a partner to deepen our analysis, namely the ESCP Circular Economy Research Team, whose invaluable work has allowed us to gain a better insight into how these partnerships operate and are governed.

We hope this publication will be useful to many stakeholders and give fresh impetus to the ecological transition of our society.

### **Jean-Laurent Bonnafé**

Chairman of EpE  
CEO of BNP Paribas



## Message from ESCP

The environmental crisis is a riptide posing major risks to businesses and our economic and social systems. This crisis also constitutes a major challenge for the entire higher education system, especially research and management training institutions. Indeed, our economic paradigms and management systems, largely inherited from the linear economy, clearly contribute to the upheaval we are now witnessing. Nevertheless, management remains at the heart of solutions, and is key for the invention of healthier development models and for ensuring an acceptable, sustainable, just, and desirable ecological transition.

Given the emergency, our responsibility as a business school is being radically challenged. ESCP Business School has thus placed the issue of ecological and social transition at the core of its mission, with the aim of training all its students and supporting stakeholders to transition towards new models. This year, more than 2,000 ESCP BS students have been trained in transition issues across our programmes, cross-cutting seminars and basic courses, from Bachelor of Management, through graduate school to Executive MBA. We are set to train 100% of our students in this discipline by 2023, thanks to the creation in late 2020 of an academic department dedicated to transition issues.

In addition to teaching, we contribute through our research to the development of knowledge on this subject. We also support the transition of companies and systems by mapping the pathway to an economically and socially sustainable ecological transition. The ESCP-Deloitte Circular Economy Chair is core to this mission in that it identifies the resources to be deployed to enable circularity. As this study shows, the complexity of the transformations involved means we must reinvent partnership rationales, introduce new collaborative approaches, and stimulate a joint effort from all stakeholders, be they companies, investors, public players, citizens, think-tanks, or experts. Accordingly, this study describes the keys to the success of vital partnerships in the drive to create a more sustainable future, and redefines how we should work together for our future.

I trust you will enjoy reading it.

**Frank Bournois**  
Executive President & Dean,  
ESCP Business School

# S U M M A R Y

The circular economy provides a desirable alternative to the prevailing economic model, which is based on the linear use of natural resources from extraction and harvesting to waste disposal, and the cause of major environmental disruptions.

The development of the circular economy is hindered by the dispersal of secondary material deposits, their variable quantity and quality, the lack of technology, poor access to information, the absence of an incentivising regulatory and fiscal framework, and the persistence of psychological barriers. The circular economy also presents specific risks that limit investment.

An analysis of twenty-seven circular economy approaches, initiated by businesses and collected over three years of discussions within EpE's Natural Resources Commission, has helped us to better understand the conditions for the successful implementation and mainstreaming of those initiatives.

Partnerships act as a necessary lever for overcoming obstacles and delivering solutions that make better use of local resources, secure supplies and outlets, organise circular economy pathways, experiment, and create new value chains.

A study of the various governance systems in place within the observed partnerships, conducted in collaboration with the ESCP-Deloitte Chair of Circular Economy, reveals three broad types of governance: centralised, distributed and digital.

The publication also highlights the role of public authorities in the development of these initiatives and underlines the complexity of measuring the environmental footprint of such projects.

# TABLE OF CONTENTS

EpE Chairman's message.....	3
Message from ESCP .....	4
Summary	5
Introduction	8
A circular economy alternative to the current model	8
Uneven development of the circular economy in France	12
The circular economy is hampered by a variety of constraints	13
Partnerships - key to the success of the circular economy	15
<b>Chapter 1</b>	
Partnerships with varied objectives .....	17
1) Make the most of local resources .....	17
2) Secure supplies and outlets .....	21
3) Organise circular economy schemes .....	26
4) Test and scale up .....	30
5) Create new value chains .....	31
<b>Chapter 2</b>	
Making the right governance choices .....	37
1) Centralised governance models .....	38
2) Distributed governance models .....	42
3) Digital governance models .....	53
4) Summary of governance models .....	55
<b>Chapter 3</b>	
Beyond partnerships .....	59
1) The key role of public authorities .....	59
2) The complex measurement of environmental benefits .....	61
3) Other public actions .....	63
Conclusion	64

## CONTRIBUTIONS

<b>AIRBUS:</b> Aircraft recycling with Tarmac and the Demeter territorial project .....	19
<b>AIR FRANCE:</b> Establishing a sustainable aviation biofuels industry .....	32
<b>AIR LIQUIDE:</b> Two industrial symbiosis use cases .....	48
<b>ARKEMA:</b> The MMAtwo Project .....	33
<b>BASF:</b> ChemCycling project .....	40
<b>BNP Paribas:</b> BNP Paribas 3 Step IT .....	28
<b>BNP Paribas:</b> The Re Users Booster .....	54
<b>CIMENTS CALCIA:</b> Partnership with SMITED for the recovery of household waste .....	25
<b>PAPREC and GERFLOR:</b> Floor to Floor by Paprec and Gerflor .....	45
<b>INVIVO:</b> The alliance with SEDE Environnement .....	44
<b>MICHELIN:</b> Bio-speed consortium .....	30
<b>MICHELIN:</b> The BioButterfly programme .....	49
<b>ORÉE:</b> The Industrial and Territorial Ecology (ITE) approach .....	60
<b>PAPREC:</b> A partnership with Raboni to optimize the waste flows .....	24
<b>RENAULT:</b> Boone & Indra Joint ventures .....	43
<b>RTE:</b> The Elec'tronc system .....	20
<b>SAINT-GOBAIN:</b> The Placo-Recycling channel .....	41
<b>SÉCHÉ ENVIRONNEMENT:</b> The ecological industrial platform of Roussillon .....	18
<b>SNCF and ORÉE:</b> FRIVEP project.....	26
<b>SUEZ:</b> Alliance with LyondellBasell .....	23
<b>SUEZ:</b> batiRIM® solution .....	27
<b>TotalEnergies:</b> Chemical recycling partnerships .....	31
<b>TotalEnergies:</b> Biofuel and biogas partnerships .....	39
<b>VEOLIA:</b> Osilub site .....	22
<b>VEOLIA:</b> Alliance with Eqosphere .....	29
<b>VEOLIA-YARA:</b> Closing the nutrient loop .....	46
<b>VINCI:</b> The Circolab association .....	51

# INTRODUCTION

## A circular economy alternative to the current model

**The prevailing economic model, based on the linear use of natural resources from extraction (minerals and fossil fuels) and harvesting (biomass) to waste disposal, is responsible for major environmental disruptions.** For example, Global Resources Outlook 2019<sup>(1)</sup> estimates that the amount of resources<sup>(2)</sup> extracted from nature has jumped from 27 billion tonnes in 1970 to 97 billion tonnes in 2017. This rise is due to the increase in world population and in estimated average per capita annual natural resource consumption from 7 tonnes in 1970 to 12 tonnes in 2017.

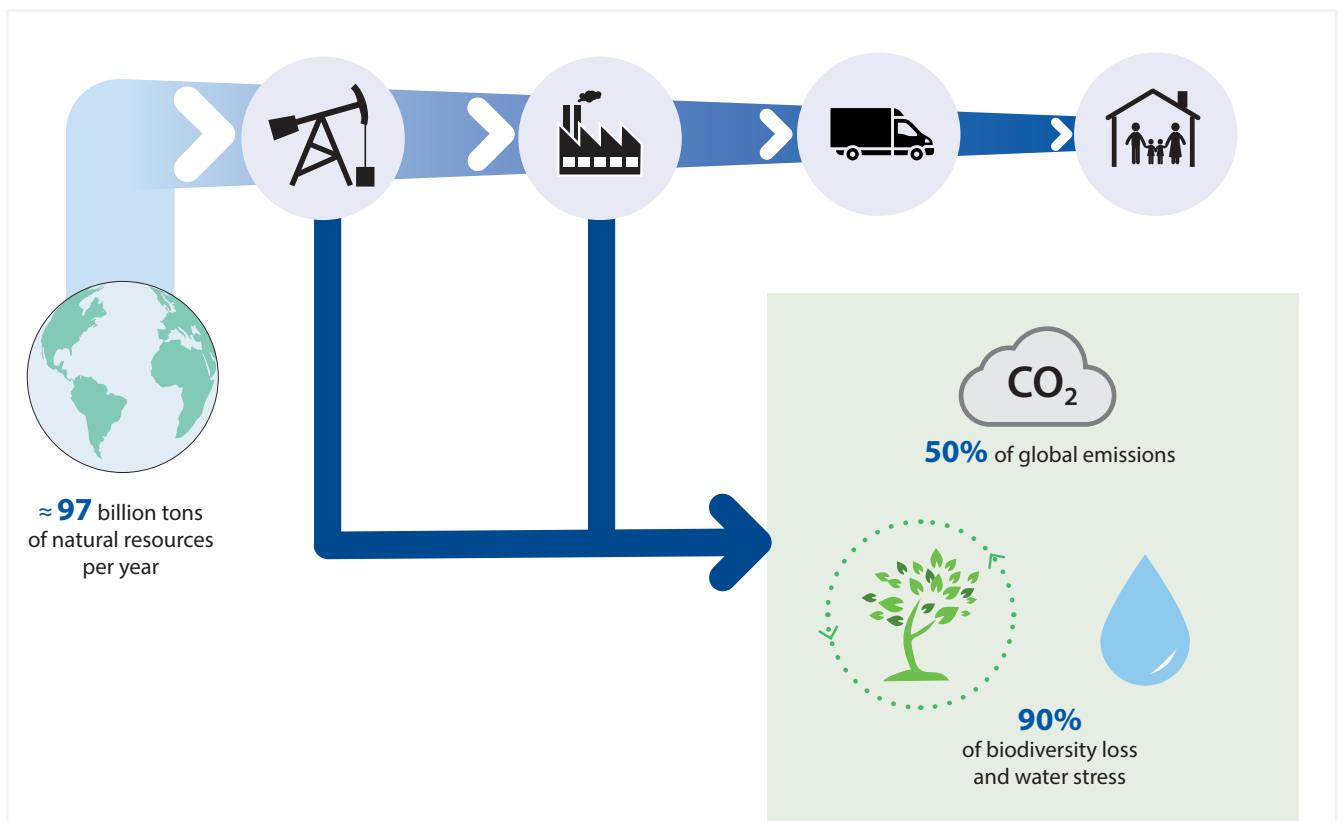
Through the overexploitation of natural resources, the dominant use of fossil fuels, and the release of waste and pollutants into the environment, the linear model is the root cause of climate change and biodiversity loss. The extraction and transformation of those resources alone (excluding use and end-of-life) contributes, according to the international panel of resource experts, to half the world's annual greenhouse gas emissions (excluding emissions from land-use patterns and changes) and more than 90% of global biodiversity loss and water stress.

Across the entire value chain, huge amounts of waste are generated. According to the IPBES Global Assessment Report on Biodiversity and Ecosystem Services published in 2019, more than 80% of the world's wastewater is released into the environment without prior treatment, while 300-400 million tonnes of heavy metals, solvents, toxic sludge and other waste from industrial plants are released into water every year. The World Bank has estimated that of the 2.01 billion tonnes of solid-waste production in 2016, some 40% had been discharged into often poorly managed landfills and only 19% had been reinjected into the economy through recovery and recycling. Without a change of trend, waste production could reach 3.4 billion tonnes by 2050.

The environmental impacts, summarised in Figure 1, and the scarcity of some resources are one of the reasons why the circular economy has, for several decades, appeared to many stakeholders as an unavoidable alternative. Its core principle is reusing waste from one activity as a resource for another activity. More broadly, it aims to learn how ecosystems function in Earth's finite environment, as they produce and grow without accumulating waste, while renewing living natural resources.

1 PIR (2019). Global Resources Outlook 2019: Natural Resources for the Future We Want. Oberle, B., Bringezu, S., Hatfeld-Dodds, S., Hellweg S., Schandl H., Clement, J., and Cabernard, L., Che, N., Chen, D., Droz-Georget, H. Ekins, P., FischerKowalski, M., Flörke, M., Frank, S., Froemelt, A., Geschke, A., Haupt, M., Havlik, P., Hübner, R., Lenzen, M., Lieber, M., Liu, B., Lu, Y., wrestling, S., Mehr, J., Miatto, A., Newth, D., Oberschelp, C., Obersteiner, M., Pfster, S., Piccoli, E., Schaldach, R., Schüngel, J., Sonderegger, T., Sudheshwar, A. Tanikawa, H., van der Voet, E., Walker, C., West, J., Wang, Z. Zhu, B. A report by the International Resources Panel. United Nations Environment Program. Nairobi, Kenya.

2 The resources taken into account in this estimate are biomass, fossil fuels, metals and non-metallic minerals.



**Figure 1**

*The linear economic model behind environmental degradation. Resource extraction and transformation are responsible for most of the environmental impacts in the value chain. Resources included in the estimates comprise biomass, fossil fuels, metals and non-metallic minerals.*

*Source: Global Resources Outlook 2019. Data estimates based on an analysis of the world economy in 2011.*

The transition to a circular model would offer many environmental, economic, and social benefits. In 2015, the Ellen MacArthur Foundation, the SUN Institute, and McKinsey & Company estimated<sup>3</sup> that, by 2050, a circular development model would reduce Europe's carbon dioxide emissions by 83%, its primary resource consumption by 53%, and its synthetic fertilizer consumption by up to 80%. It would also reduce urban congestion, not to mention air, water and noise pollution.

By securing local supplies and enabling companies to overcome dependence on fluctuating new commodity prices, circularity could become a driver of competitiveness. The adoption of circular economy practices would benefit reputation, strengthen team engagement and build loyalty among customers and partners.

At the macroeconomic level, the opening of new markets, repair, refurbishment, reverse logistics, and so on would generate significant economic value and create many local and sustainable jobs. For example, the MacArthur Foundation estimates that the adoption of the circular economy in Europe would save about €800 billion a year by 2030.

The circular economy would also help to reduce a country's dependence on imported energy and materials, and to strengthen the economy's resilience. The crises linked to the Covid-19 pandemic have underlined as much. France and Europe as a whole remain dependent on imports, including those of strategic materials.

ADEME (the French Agency for ecological transition) defines the circular economy as an «economic system of exchange and production which, at all stages of the life cycle of products (goods and services), aims to increase the efficient use of resources, reduce the impact on the environment, and promote the well-being of individuals».

It identifies three areas of action and seven pillars, set out in Figure 2 and described below:

→ **Sustainable procurement** means making sure that resources are used and extracted as efficiently as possible, with the lowest operating waste and environmental impact;

→ **Eco-design** strives for processes, goods and services having the lowest possible environmental impact throughout the product life cycle;

→ **Industrial and territorial ecology (ITE)** is a mode of inter-company organization based on exchanging flows and sharing needs. It aims to optimise resources in a territory by drawing on the ways ecosystems function;

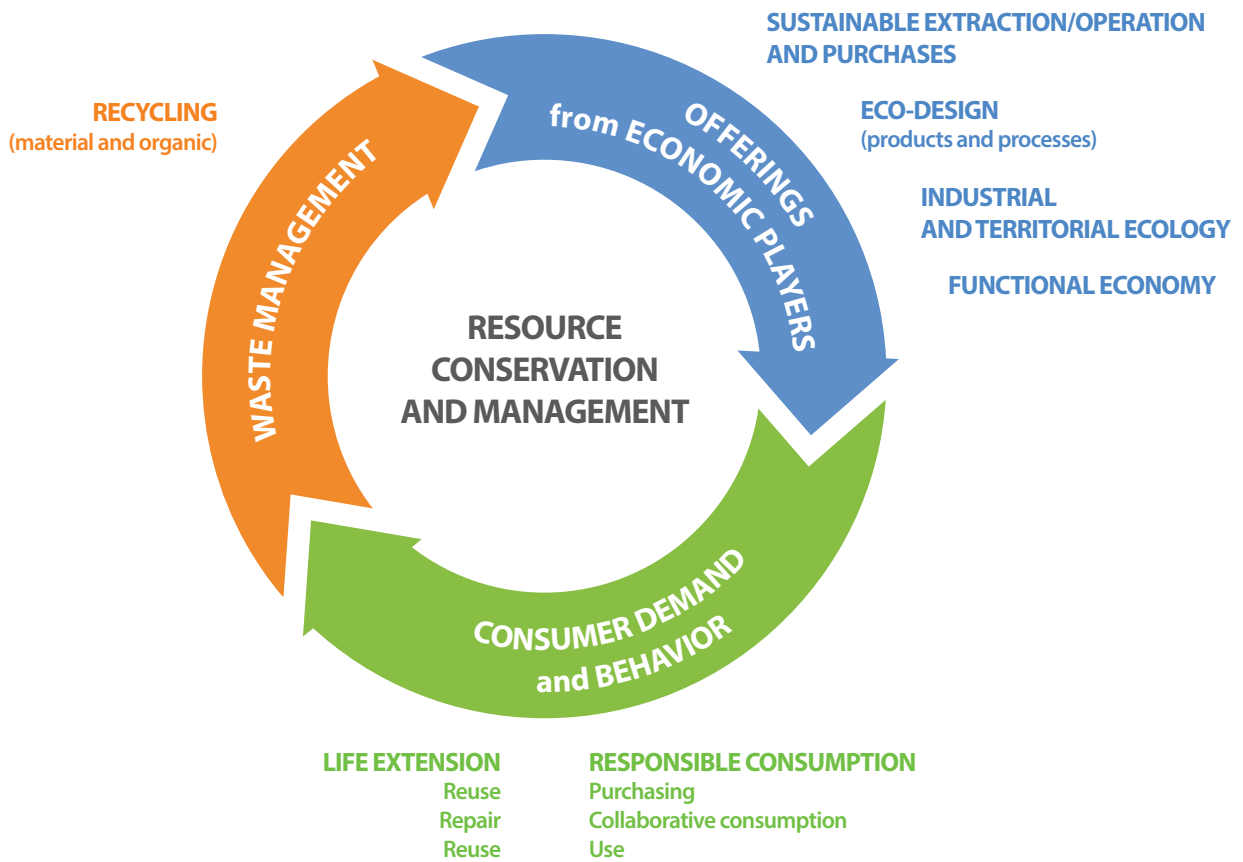
→ **The functional economy promotes** use rather than ownership and tends to sell product-related services rather than the products themselves;

→ **Responsible consumption** involves the buyer making choices that factor in environmental impacts throughout the buying life cycle;

→ **Life extension** by the consumer involves repair, resale or donation. Purchases serve the purpose of reuse or reutilisation;

→ **Recycling** aims to use raw materials from waste.

<sup>3</sup> Growth Within: A circular economy vision for a competitive Europe, 2015, Ellen MacArthur Foundation, Stiftungsfonds für Umweltökonomie und Nachhaltigkeit (SUN), and McKinsey Center for Business and Environment



**Figure 2**

Three areas of action and seven pillars of the circular economy.

Source: ADEME.



Depackaging machine for bales containing collected plastic bottles,  
Usine France Plastique Recyclage, Limay  
Photo Credits: SUEZ

## Uneven development of the circular economy in France

A measurement of eleven indicators covering the seven pillars of the circular economy<sup>4</sup>, published in 2021 by the Statistical Data and Studies Service (SDES) of the Ministry of Ecological Transition, characterises the circularity of the French economy and its development.

The results, illustrated in Figure 3, differentiates between indicators that are approaching national targets quickly

(material productivity, companies supported by ADEME in the functional economy), others that are lagging behind (domestic material consumption, material footprint, incorporation of recycled materials), and those that are stagnating (household expenditure on maintenance and repair, landfill waste).



**Figure 3**

*The circular economy in France: key trends and indicators.*

Source : *L'économie circulaire en France en 2021* - © CGDD / SDES

<sup>4</sup> Indicateurs clés pour le suivi de l'économie circulaire (Key indicators for monitoring the circular economy). 2021 edition. <https://www.statistiques.developpement-durable.gouv.fr/indicateurs-cles-pour-le-suivi-de-leconomie-circulaire-edition-2021?rubrique=39&dossier=237>

Despite some growth of the circular economy in France, the studies show there is significant room for improvement. A case in point is the reduction in per capita domestic material consumption, measured by the sum of flows of material extracted domestically and imported, less flows of exported material. While consumption fell by 4.7% between 2010 and 2018, it remains high at 11.6 tonnes per capita, i.e. a total of 774 million tonnes of material consumed in France, including over 66% of non-renewable material (minerals and fossil fuels).

The material productivity indicator (ratio of gross domestic product to domestic material consumption, expressed in €/kg) measures the transition to a more resource-efficient economic system. Although productivity increased by 12% between 2010 and 2018, it largely reflects a decline in building material demand during the 2008-2009 recession.

Finally, the rate of incorporation of recycled materials (waste that can replace entirely or partially new material after undergoing a recycling operation) into production processes leads to a similar conclusion: while it has increased by 1% on average between 2010 and 2017 for a selection of materials (paper/cardboard, glass, scrap, aluminium and plastic), it remains fairly low at 18.6%. The rate of incorporation of scrap metal has even fallen by 5%, particularly as a result of lower new raw material prices which have severely discouraged recycling. Similarly, at a mere 6.5% in 2014, the rate of incorporation of plastics remains low.

**The development of the circular economy thus continues to be hampered by real economic constraints and risks.**

## The circular economy is hampered by a variety of constraints

Businesses that want to implement circular models in a systematic way face many challenges.

Without claiming to be exhaustive, the most frequent are:

### 1 Heterogeneous, dispersed material flows of variable quantity and quality

#### Geographical dispersal of flows

Flows of material and energy that can be turned into a resource are scattered across the country. Collecting them is difficult, costly, and even resource consuming. This difficulty is well exemplified by the impossibility of collecting microplastics scattered in the oceans and nature.

#### Insufficient quantities of secondary materials

Secondary raw materials usable in recycling processes are generally produced in insufficient quantities to meet needs. For example, while iron is well suited for recovery and recycling (95% of scrap metal is recovered and recycled), only 40% of steel production comes from recycling recovered scrap metal<sup>5</sup>.

#### Variable quality of secondary materials

Secondary raw materials from co-products, by-products, or wastes from other activities are often of inferior quality to new raw materials, due among other things to product mixing. The quality itself varies according to the initial inputs, whose reuse may require prior material processing (at least initial sorting) and also be limited by poor quality.

## 2 Immature - or lack of - skills and technologies

#### Unavailable technologies

Some technologies are still at an early stage and too costly to deploy on a large scale, as a result of the competition between new and secondary raw materials, which puts prices under pressure and tends to act as a brake on investment. For example, the recycling of composites, which are complex by nature and derived from a combination of at least two different materials (fibres, polyester, epoxy, polyurethane, carbon, etc.) in order to give them specific properties, is limited by the lack of scalable recycling technologies that are still by and large at the development stage.

#### Lack of knowledge and skills

The development of the circular economy often involves technical, scientific and organisational expertise. For example, the creation of new circular business models can be based on scientific innovation, especially in the case of green chemistry, bioeconomics and waste treatment. The need for expertise is all the more demanding in recycling schemes that need to transform highly heterogeneous waste into a reusable raw material with constant properties. The emergence of new models can also depend on detailed knowledge of industrial processes and operations across different industries, prior to opportunities being identified and developed for the circular economy.

5 Information report prepared on behalf of the information mission on the challenges facing the steel industry in 21st century France: opportunit  de croissance et de d veloppement. Val rie Letard. July 2019

### 3 Evolving markets and regulations

#### Unstable regulatory framework

Despite the gradual implementation of public policies and a favourable regulatory framework, which now includes the Anti-Waste Circular Economy Law (AGEC), the support provided by the stimulus package, the announcement that the sale of combustion-engine vehicles will be banned by 2040, the draft law on combating climate disruption, and forthcoming studies on the circular economy pillar of the European taxonomy for sustainable activities, many companies deplore the absence or delay of certain regulations, the persistence of blocking legislation and the absence of an overall incentive framework. The study published by OPEO and INEC<sup>(6)</sup> (French National Institute for Circular Economy) in 2021 underlines, for example, the difficulties in reclaiming grey water in buildings without authorisation, which is hindering the development of FGWRS, a water recycling company. In the building materials industry, the national RECYBETON<sup>(7)</sup> project highlights the cap on the incorporation rate of recycled aggregates into new concrete.

Strengthening enforcement of existing and future regulations would therefore help to offset the risk of misleading advertising by some manufacturers, and to better distinguish between repairable and recyclable products. Finally, factoring the price of negative externalities into the price of conventional products would provide a competitive advantage to products and services derived from the circular economy.

#### Market uncertainties

More durable or refurbished equipment, secondary raw materials, and bio-sourced energy are at times more expensive than their conventional alternatives. The earlier example of the decline in the incorporation rate of scrap metal, which is more expensive than its new-material equivalent, is a case in point. For household appliance refurbishment, labour costs related to diagnostics and repair may compromise the cost-effectiveness of operations. Paper and cardboard recycling in France is another iconic example of an industry weakened by the saturation of recycled product supply and inadequate local demand. While 80% of paper/cardboard used in France<sup>(8)</sup> is recycled, the market today is stunted by weak French demand. Poor prospects for paper recovery and recycling in France and internationally have led several recycling plants to close.

### 4 Persistent psychological barriers

Within companies, attempts to factor in the circular economy face internal obstacles, with some departments (marketing, distribution, commercial development) at times viewing it as a threat to the expansion of their business. Consumers may also be reluctant to change their consumption habits in favour of products whose consistency may be less reliable than that of new products. Lastly, products from the recycling, recovery, repair and refurbishing industries may suffer from a persistently poor image.

### 5 Higher risks

Developing projects that promote new economic models requires heavy investment. This can be difficult to achieve because of the perception that the economic viability of circular business models at times depends on external factors.

The recovery of perishable products requires very strict procedures. This constraint is particularly relevant to players seeking to combat food waste.

### 6 Inadequate access to data

The lack of easily accessible data and information on secondary material deposits hampers their collection and reincorporation into the economy. Collection, processing, repair and refurbishment are enabled by sharing information (on geolocation, quantity, quality, etc.) between stakeholders.

6 Pivoter vers l'industrie circulaire. Quels modèles ? Comment accélérer ? OPEO, INEC, avril 2021.

7 <https://www.pnrecybeton.fr/en/>

8 Information report submitted in accordance with article 145 of the Rules of Procedure by the Information Mission for the Paper Recycling Industry on behalf of the Commission on Sustainable Development and Spatial Planning, 27 January 2021.

## Partnerships - key to the success of the circular economy

Observation of successful circular economy policies, however, shows that in many cases it is possible to overcome these risks and obstacles. It also reveals that the success of those policies is based on specific working methods. Supply and sales flows are not governed by the «invisible hand of the market» alone, but by partnerships between large and small highly diverse stakeholders across the value chain, or rather around «value loops» that have extensive geographic coverage. Short supply chains rely on strong links between producers, small distributors and customers. In this process, environmental organisations bring together market makers, local authorities, and recyclers around the table, while industrial ecosystems bring together players at plant level.

These and several other partnerships can even act as a driver of the circular economy locally. The diversity of stakeholders gathered in such partnerships and the pooling of their resources can help overcome the obstacles to the mainstreaming of the circular economy.

Partnerships change many traditional circuits and unveil different markets and supply chains undergoing structuring and development, sometimes involving stakeholders of the social and solidarity economy, at times public authorities ([the European Green Deal, and local public-private partnerships), and often suppliers of new (renewable and/or recycled) raw materials.

In light of their clear importance in the development of the circular economy, our study has focused on how such partnerships are formed, what benefits they provide and how they operate. Our insights should also enable stakeholders to define the most appropriate governance arrangements on a case-by-case basis.

This publication is the result of three years of discussion, debate, brainstorming and research among EpE members within the Resources Committee, under the chairmanship of Rachel Kolbe Semhoun, CSR Director at InVivo Group. Our collaboration with Aurélien Acquier and Valentina Carbone from ESCP's dedicated research team has allowed us to collectively analyse the governance systems adopted by those partnerships.

Our discussions have led us to assess many partnerships serving the circular economy. Accordingly, this publication proposes an initial classification of partnerships according to the objectives pursued. With the support of the research team from the ESCP Chair of Circular Economy and Sustainable Business Models, section two of this paper proposes a second classification according to the different types of governance observed. Lastly, the publication highlights the role of public authorities in the development of those initiatives, and points out the complexity of measuring the environmental footprint of such projects.



*Partnerships help to overcome obstacles to the deployment of the circular economy*



# Chapter 1

## Partnerships with varied objectives

The variety of situations in which a circular economy approach can be adopted, the diversity of stakeholder involved and the differences in project maturity account for the broad range, indeed heterogeneity, of partnerships observed in the circular economy. We set out below the various goals pursued by companies engaged in those partnerships.

### 1 MAKE THE MOST OF LOCAL RESOURCES

One of the primary goals of circular economy strategies is undoubtedly economic, particularly the economic development of those local resources that manage to make the most of the near environment, and nearby agricultural and industrial activities and to reuse excess fluid, energy, materials, and co-products generated by local companies, including market waste. For example, when assessing a new project, a company can set itself the supplementary objective of limiting its environmental footprint, and factoring the resource dimension into its decision on plant location. Under this approach, partnerships help to optimise local resource management.

Local circular economy projects can be part of industrial ecology, which mimics natural ecosystem function and establishes an organisation based as much as possible on closed-loop in terms of energy and material supplies at plant or regional level. The Roussillon industrial hub is an interesting example. The plant is run by Séché Environnement who treats non-recyclable waste from local plants before redistributing to them the heat generated by waste thermal treatment in the form of steam.



## The ecological industrial platform of Roussillon

Séché Environnement, through its subsidiary Trédi, operates a facility in Isère specialized in thermal treatment and energy recovery of hazardous industrial waste. The site is committed to establishing sustainable partnerships with local stakeholders according to the principles of industrial ecology.

The Séché Environnement site is involved in the development of organisational synergies aiming at the optimization of resources within the local industrial ecosystem, whether it is energy, water, materials, waste, but also equipment, and expertise.

The site processes most of the non-recyclable waste produced by nearby companies, specially those located on the Roussillon chemical platform (waste from the manufacture of silicone, aspirin, etc.), some of which is transported directly by pipeline. The site sources its raw materials for the waste treatment and incineration (industrial gases, reagents used in the treatment

of flue gases...) from the manufacturing processes of neighboring companies (lime milk) that produce mainly by-products.

As a player in the local energy transition, the site is a major producer of thermal energy, thanks to the recovery of the heat released during waste combustion. The steam is distributed to companies on the chemical platform, which use it as a heat transfer fluid in their production processes.

At the end of 2020, Séché Environnement commissioned a new network enabling it to triple the volume of steam delivered to OSIRIS, the Economic Interest Group of the chemical platform. This approach limits the use of fossil fuels and greenhouse gas emissions: 120,000 tons of CO<sub>2</sub> are avoided each year, the equivalent of the emissions linked to the electricity consumption of 80,000 households.



*Ecological industrial platform of Roussillon*

Exploiting local synergies to promote the circular economy can also include non-industrial players.

The Demeter project, set up in late 2017 at Toulouse airport, brings together more than 30 partners, including

companies, public authorities, and state, regional and municipal agencies, in order to develop local resources and reduce their overall environmental impact, starting with the reduction of home-to-work transport emissions.

The Airbus logo is displayed in a bold, blue, sans-serif font. It is positioned to the left of the main title, with a light green decorative bar above it that features a speech bubble icon.

## Aircraft recycling with Tarmac and the Demeter territorial project

Circularity is already very well established within the aviation industry. Air transport is essentially a service industry where aircraft have an extended lifespan, without planned obsolescence. This together with repairability and the use of second-hand spare parts are at the heart of the business model. Also the use of high-value raw materials are optimised to reduce aircraft weight and waste production and these are key factors for optimising performance and competitiveness.

Recycling rates are also high: in 2006, Airbus pioneered the «responsible» dismantling of commercial aircraft. This was an innovative partnership between Safran, Suez, local authorities and the EU. Through the PAMELA project (Process for Advanced Management of End-of-Life of Aircraft), TARMAC Aerosave was created which today recycles up to 92% of the total weight of the aircraft. This demonstrates the advantages of a close collaboration between an aircraft manufacturer, an engine manufacturer, a recycling company and the authorities.

The dismantling industry also offers enormous potential for recovery and recycling. «A Piece of Sky» is a one-of-a-kind interior design furniture collection born out of a collaboration between Airbus intrapreneurs and design professionals. It is an interesting example of the creative reuse of decommissioned aircraft parts. Other aeronautical raw materials, such as metal alloys, benefit other industries.

The Demeter project goes further. The partnerships initiated around the DEMETER meta-project group more than 50 private or public organisations around the Toulouse airport platform. This has enabled the emergence of several other circular economy projects. As a Commitment for Green Growth, Air France, Suez, Safran and TotalEnergies supported by Airbus, have joined forces to enable sustainable aviation fuel production and distribution. This has therefore shown how aviation could benefit from resources, such as biomass or waste oil, generated by circular models developed by other industries.

The Elec'tronc system deployed jointly by Réseau de Transport d'Électricité (RTE) and Forestons! showcases the benefits generated by improved exploitation of wood resources in France. Well-established nationwide, the electricity transmission requires constant maintenance

at a historically very high cost. The ingenuity of this partnership lies in its ability to turn the frequent and expensive maintenance work needed into an opportunity to create local environmental and economic value that can be shared between stakeholders.



## The Elec'tronc system

In keeping with the theme «Reinvent practices» of the EpE review from October 2020, the electricity transmission network (RTE) experiences the Elec'tronc system since 2018 as an alternative to vegetation rotary grinding under high-voltage lines. This operation aims at securing the network electric lines and ensuring better biodiversity conservation under the lines

The principle is indeed simple: include forest owners in this process when the conditions (accessibility, quantity, and quality of wood to be harvested, territorial needs) are met to ensure the recovery of their woods. The system offered by RTE includes a turnkey service of forestry and logging site advice gathering all affected owners.

Therefore, since 2018, RTE works in partnership with forest holders to study the technical-economic aspect of sites realised in a constraining environment (presence of an electric structure, site linearity, cadastral subdivision). Then, from 2020 it approaches experts and forests managers to build a system in accordance with society's expectations regarding forest sustainable management, short circuits, and energy transition.

In the actual system, RTE finances exclusively the forest manager (Forestons!) who is responsible for advising the owners and organise the sale of standing timber to an operator.

Carrying out a maintenance project is declined into these successive stages:

1. RTE assigns to the partner the management of electrical security projects when the wood to be cut can be valued
2. The partner gets onto the owners then asks local forests loggers.
3. The interested forest loggers make an offer to purchase standing timber.

4. The partner oversees logging work realised by the selected logger.
5. RTE pays the forest manager based on the cost of maintenance works and avoided logging. The owner is paid in accordance with quantity and quality of sold standing timber and the forest logger makes money from the resale of timber that he has bought then exploited.

This solution allows the owners to be aware of the sustainable management of their forest patrimony and get an income due to the sale of their timber. It allows, thanks to the involvement of local actors, to contribute to the mobilisation of French wood, the first renewable resource in France and the main lever to reach carbon neutrality for 2050. Finally, it contributes to the territory's economical dynamism by the local job creation in the forest industry.

The example of a project realised in 2021 in the Loiret (one owner concerned) allows to measure performance:

- 800 tons of wood-energy harvest and 90 m<sup>3</sup> of construction wood;
- A power generation of 1 500 MWh and 60 tons CO<sub>2</sub> storage;
- 10 000 € of revenue for the owner and 30 000 € turnover for the forest logger;
- 4 200 € of partnership expense for RTE (funding of forest logger missions), saving 70% compared to a more «classical» logging operation without wood value.

A system that has ambition and a future: RTE maintains each year 10 000 ha of woods to secure the electric lines that are located less than 500 meters from 8,5% of the French forest!



*Power line maintenance site carried out in 2021 in the Loiret*

## 2 SECURE SUPPLIES AND OUTLETS

Another frequent goal of circular economy partnerships is securing, through cross-commitments, energy and waste-resource flows that close the loops of the circular economy. Partnerships in this case address the issue of variations in the flow, quality and price of secondary raw materials, often determined by external factors, as the circular economy makes previously disconnected markets and industries interdependent. For example, the use of sugar in ethanol production results in sugar prices being closely indexed to oil prices, even though historically the two markets have obeyed very different rationales.

That is why some recyclers speak of a «stuttering economy», because their activity is profitable only when the prices of one or other raw material are above a certain threshold. This results in stop-start plant operations, and consequently in additional equipment depreciation costs, partial unemployment, inactive employees, and an ever more vulnerable circular economy. Securing outlets through long-term partnerships is conducive to stabilisation, economic viability and, therefore, business sustainability.

Moreover, a manufacturer who buys from a recycler may run out of raw material if the supplier chooses to sell it at a higher profit in another market, and thus be forced to buy more expensive new material. Partnerships significantly reduce this risk.

Quality and performance monitoring of traded secondary materials is another reason for long-term partnerships. The quantities and physical, chemical and biological characteristics of co-products or waste from an industrial process are indeed likely to be highly variable since they are, by definition, unmanaged. It is therefore difficult, or even impossible, for a player seeking to develop this flow to design a suitable industrial process and make it profitable through continuous, high-performance operation. A partnership agreement can help secure supply for the downstream player, for example through contractual commitments on buying volume or material specification guarantees. In return, the upstream player finds an outlet for its co-products and waste that enables it to limit or eliminate related collection and treatment costs, benefit economically and reduce its environmental impact.

A good example of how such an arrangement works is the partnership between Veolia and TotalEnergies at the Osilub plant for recycling used engine oils. Veolia's undertaking to supply a sufficient volume of waste oil has enabled TotalEnergies to invest in R&D with the aim of achieving high recycling rates and ensuring that its co-investment in the reprocessing plant remains profitable.

*How can we develop the recycling and recovery industry in France? By joining the upstream and downstream links of the country's value chain: Osilub transforms used oil into high-end lubricants (upcycling).*

### What was needed?

Previously, due to a lack of regeneration capacity in France, half of all used motor oil was burned as fuel, with the other half exported for reclamation. To reduce the resulting environmental impact while keeping the value within France, the Osilub facility was created in a partnership between Veolia (65% owner through its specialist waste subsidiary, SARP Industries) and Total Lubrificants (35% owner).

### What is the basic principle?

This is a partnership between the recycler and the buyer of the recycled product, linking the ends of the value chain.

The used oil recovered in garages is collected by Veolia and treated at the Osilub facility. TotalEnergies then buys the regenerated oil, and following one final treatment by Total Lubrificants, the regenerated oil is transformed into high-quality motor oil for industrial use.

Following several years of research, the vacuum distillation-based process patented by TotalEnergies makes it possible to eliminate most impurities, leaving behind only oil molecules. This innovation allows the regeneration of 75% of the oil by volume (three liters of new base oil from four liters of used oil), compared with the 40% yield from traditional processing.

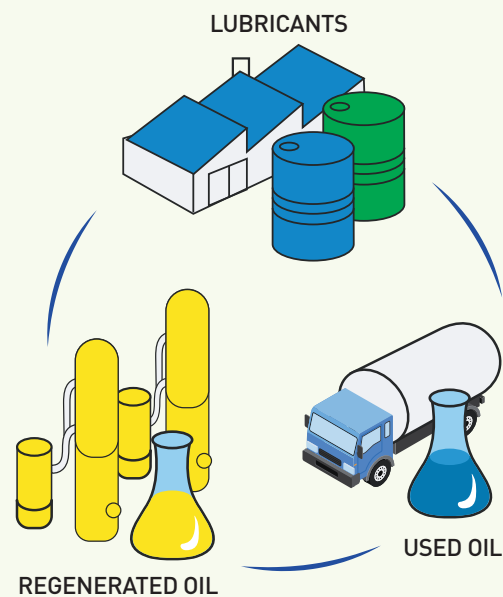
This solution offers an improved carbon and resource footprint: oil regeneration using this method consumes 10 times less energy and generates half as many GHG emissions over its entire life cycle. Ninety percent of used oil entering the site is re-refined, which equates to a capacity of 120,000 metric tons.

### What are the other key success factors?

The companies involved are established locally. Located in the port area of Le Havre, the Osilub facility enjoys a pivotal position within an international industrial and logistical hub, with excellent prospects at the heart of European oil and industrial lubricant production chains. It also benefits from access to rail and river transport and the European maritime network, offering a range of transportation alternatives.

This partnership offers a sustainable alternative to standard industrial hydraulic oils, because the properties of the regenerated oil are similar, if not superior, with improved environmental, economic and social impacts.

[www.osilub.fr](http://www.osilub.fr)



*Illustration of how the partnership works at the Osilub facility*

The price of secondary raw materials dependent on external factors is usually determined by the price of a competing raw material. The most famous and iconic example is that of recycled plastic resins. While their cost is essentially fixed, determined by the costs of collection, sorting, and recycling of household and industrial waste, they compete with virgin resins derived from petrochemicals at prices indexed to oil prices, which are particularly volatile. In the

absence of an agreement, therefore, recycling operators may periodically find it difficult to sell their products at an adequate price and safeguard their economic model.

The partnership between SUEZ and LyondellBasell meets the objective of price security. It overcomes the problem of price variability for secondary raw materials through the creation of a joint venture.



## Alliance with LyondellBasell

### HIGH-QUALITY RECYCLED PLASTICS FOR THE EUROPEAN MARKET

In 2017, SUEZ and LyondellBasell signed an agreement to set up a joint venture dedicated to the production of high-quality recycled polymers. Within this entity, named QCP for «Quality Circular Polymers», the two groups pooled their respective skills to supply the European plastics industry with recycled raw materials in the polyolefin family (polyethylene, polypropylene, etc.) with a level of quality equivalent to virgin materials: SUEZ supplies post-consumer plastic waste and LyondellBasell markets the secondary raw materials produced by QCP.

This cooperation is the only one of its kind in Europe. It is the first time that one of the biggest companies specialising in plastic and chemical production and refining has come together with a benchmark environmental player to achieve the goals of the circular economy.

Plastics recycling is a fast-growing market due to the growing demand from manufacturers and the constantly tightening regulations – the European Union is now targeting recycling levels of 50% by 2025 and 55% by 2030. The challenge in Europe is significant: every year, European countries produce nearly 25 million tonnes of plastic waste, of which only a quarter is recycled. Moreover, only 7% of the 50 million tonnes produced every year comes from recycled plastic, while 93% is still virgin material of fossil origin.

At its Sittard-Geleen site near Maastricht in the Netherlands, QCP produces two types of high-density polyethylene (HDPE) and eight types of polypropylene (PP) copolymer. The current production level stands at 30,000 tonnes a year, with a short-term target of 50,000 tonnes. This level of production capacity is unique in Europe.



QCP (Quality Circular Polymers), a joint venture for plastics recycling

Such partnerships are also of interest because they enable the sustainable development of material flows whose quality fluctuates over time. For example, the partnership between Paprec, a recycling company, and

a building materials distributor makes the most of the return trips of vehicles delivering materials to a building site by ensuring construction waste is efficiently collected and vehicles do not return empty.



## A partnership with Raboni to optimize the waste flows

Since 2004, PAPREC and RABONI have forged an extremely strong partnership to collect and recycle construction waste.

They have developed a solution to facilitate both collection and recycling of this waste in RABONI sell points: this partnership makes it possible to achieve a recovery rate of 75%.

Unique and exemplary, this collaboration offers the most effective solution: thanks to double freight, construction craftsmen can drop off their waste in the same place and leave with new construction materials. A local network of 13 waste collection centers adjacent to Raboni material storage platforms covers a dense urban area and helps reduce transport between construction sites and recycling facilities. At each

place, a PAPREC employee welcomes and ensures the smooth progress of the pre-sorting of the site waste brought in.

In more than 15 years, Paprec then developed inland navigation: among these sites which have a quayside, waste reaches the PAPREC treatment facilities by barge. Each barge avoids the circulation of 45 trucks in built-up areas and demonstrates the relevance of short-distance river transport. Beyond the ecological aspect, the collection is technically easier by barge because it remains at the dock for a long time to be gradually loaded. This partnership is a way for Paprec to secure the flow of waste arriving at its facilities when the construction waste market is particularly fragmented among craftsmen.



*Inland navigation of construction waste by Paprec barge in Ivry-sur-Seine*

The partnership between Ciments Calcia and SMITED illustrates the benefits of developing recovery fuels from landfill-sourced waste that offer a substitute for fossil

fuels. Securing fuel supplies is the main objective of this partnership.



## Partnership with SMITED for the recovery of household waste

In line with its strategy to promote a circular economy at the local level, the century-old Airvault cement plant, which undergoes regular upgrades and modernisation, entered into a partnership in 2012 with SMITED, the Deux-Sèvres Waste Treatment Association, on the basis of the complementary objectives of each organisation.

For the Airvault cement plant, this entails having a regular source and supply of alternative fuels in terms of both volume and quality in order to be able to increase their contribution to replacing fossil fuels.

For SMITED, this involves improving waste recovery and reducing the tonnage buried.

This agreement allows Ciments Calcia to cover a wider range of alternative fuels, thus completing the system and the list already authorised for the site, and to strengthen the role of the Airvault cement plant as a channel for the energy recovery of pre-treated and crushed dry products from pre-sorted household waste. This mainly concerns sorting waste.

Beginning in 2008, a long process of research and preparatory work was carried out to characterise the waste from the communities, plan the necessary treatments to make the waste compatible with the requirements of the cement business, and finally to define the respective investment projects.

**For Ciments Calcia:** an installation for the reception, storage and transfer to the firing line, as well as specific development for the transport of this waste.

**For SMITED :** the technical evolution of its installation to produce, in compliance with strict and precise specifications, waste that meets the specifications in terms of composition, shape, grain size, calorific value, moisture content and density.

The partnership agreement between the two parties sets out the terms of governance, supply and receipt of this alternative fuel source, and provides for regular audits to ensure that the products meet the requirements of the specifications.

For seven years now, the Airvault site has been recovering several thousand tonnes of solid recovered fuel (SRF) per year. New collaborative developments are being researched to increase the volume, optimise their composition, develop their recovery and thus limit the residual volume of community waste.

### 3 ORGANISE CIRCULAR ECONOMY SCHEMES

In some industries, closing material loops in an effort to move towards a more circular economy requires more than securing upstream and downstream material flows. It involves inventing new viable professions and business models to manage identified flows, creating a structure, company, or organization that supports a hitherto uncovered stage of the material cycle, and developing well-grounded practices to reduce waste. Even if the technologies already exist, it means ensuring the emergence of players that can fill a gap in the value chain or devise new interactions which combine lower negative environmental impacts with long-term economic viability.

The following two examples demonstrate that constraints on the cost-effectiveness of a recycling process can be successfully overcome and elicit interest from a recycler.

The first example is the FRIVEP initiative to improve material recycling not with technological innovation, but with organisational innovation. Coordinated by the Orée association, and involving SNCF, other major buyers of professional clothing, public authorities, recyclers, and technical experts, it sought to test the implementation of a scalable solution for recycling professional clothing.



#### FRIVEP project

##### FRIVEP - A PIONEERING PARTNERSHIP AND STRUCTURE.

SNCF has been deputy chair of Orée, a French non-profit dedicated to improving environmental management since 1992. We are also an active contributor to its sector-specific clubs, including one focused on reclaiming foams and textiles.

When we suggested a recycling programme for end-of-life workwear—a challenge faced by many companies—other members responded favorably. Extended producer responsibility (EPR) is currently lacking in this area, as are channels capable of delivering secure uniform disposal on an industrial scale.

Secure systems are needed because uniforms confer a particular status and certain rights to those who wear them. To maintain public trust, they can be worn only by authorized staff, which means any alternative to simple disposal and destruction must meet stringent security guarantees.

The project took form in 2014. Several manufacturers then worked together to launch a project they called FRIVEP. FRIVEP is unique in that it is a full-scale industrial effort coordinated by a not-for-profit organization. The structure came at participants' request; it ensures that they retain control over an initiative financed in large part by them.

In April 2016, the French Ministry of Economy and Finance awarded FRIVEP an eco-friendly label under its *Engagement pour la Croissance Verte* initiative, and in June 2016, the project's stakeholders signed a consortium agreement. Participating companies and ADEME, the French agency for ecological transition, co-financed an initial assessment phase and pilot study for 27 tonnes of clothing to identify the needs of businesses involved. Further trials examined how clothing could be sorted and disassembled—removing logos, buttons, and non-textile trimmings. This preliminary research led to modifications in the design phase.

A proposal for next-stage testing called FIREX has now been submitted to ADEME following the agency's call for projects. Using a much larger sample—20,000 tonnes of clothing in all—this will assess market size and conditions for re-using fibers and insulating felt made from recycled garments.

Developing a new channel for recycling workwear in France is a win/win: it will not only reduce wastage but also creates new jobs and consolidates existing ones.



End-of-life SNCF workwear

The second example concerns highly composite flows of technical products, such as building waste, that are difficult to recycle without specific materials expertise.

The collaboration between SUEZ and Resolving to develop a tool for modelling the material resources available in a building earmarked for deconstruction is also a partnership

project to characterise and capture previously untapped material flows. The success of this partnership comes from pooling skills that are seldom present within a given organisation, such as knowledge of the properties of materials that can be reused in a building, and expertise in fine-scale 2 or 3D modelling of structures.



## batiRIM® solution

### **batiRIM®, the first digital solution for the selective deconstruction of buildings.**

In partnership with Resolving, SUEZ has developed a solution for public and private urban development professionals enabling the selective deconstruction of large buildings to maximise reuse and recycling rates. Known as batiRIM®, this forward planning, and advisory solution calls on the unique RIM® (Resource Information Modelling) digital modeling tool, bringing the circular economy to the heart of deconstruction sites. It helps quantify and qualify resources and flows as part of the «Products, Materials and Waste» diagnostic required by the new French AGECE law of 10 February 2020.

batiRIM® makes it possible to quantify, qualify and map all the flows of products and materials from buildings undergoing renovation, redevelopment, or deconstruction, and to evaluate their potential for reuse or recycling even before work begins.

The building plans are integrated into a 2D or 3D digital interface on a touch-sensitive tablet.

The audited information is returned and securely stored in an interactive database that can be shared with all

the stakeholders in the project. Thanks to this forward-looking approach and digital modeling techniques, the materials identified on deconstruction or renovation sites (e.g., windows, door handles, carpets, etc.) are sent to reuse contractors and, in the future, can be used in new building programmes, encouraging a short-loop circular economy.

Pilot schemes currently underway with public and private contracting authorities have shown that the use of this solution enables selective deconstruction projects to meet their cost targets and deadlines, which are two major levers for professionals in the construction industry.

This solution also improves safety on deconstruction and renovation sites, thanks to the precise mapping carried out in advance of the works and the identification of all the flows. It creates local jobs and boosts the development of the socially responsible economy, in particular through the reuse of products.

**batiRIM®**  
Resource Information Modeling

This example illustrates the need for vast amounts of detailed information to replicate recycling and circular economy initiatives. Waste and resources can be exploited only if their location and characteristics (nature, quantity, quality, etc.) are known so that a decision can be made whether they are worth recovering. Making such information available to a network of recyclers requires investment in geolocation tools and digital platforms.

One condition for the viability of a project is alignment of waste acquisition and treatment costs with the value created by their recycling, i.e. added value or pollution avoidance.

New business models for the circular economy are also present in corporate equipment management practices.

By integrating sustainability criteria into purchasing, improving maintenance, and organising equipment repair, refurbishment and resale, the lifespan of equipment can be quite significantly extended. This reduces the frequency of equipment renewal and the associated pressure on resources.

One way of improving management is to outsource it to a partner whose core business is to optimise the use of its assets over time, such as a leasing company. BNP Paribas' partnership with a Scandinavian specialist in technology equipment management is an illuminating example.



**BNP PARIBAS**

## BNP Paribas 3 Step IT

In October 2019, BNP Paribas Leasing Solutions and 3stepIT created a joint venture, «BNP Paribas 3 Step IT,» which offers comprehensive and sustainable solutions for managing the lifecycle of technological equipment (computers, smartphones, servers, etc).

This new entity combines the strengths, know-how, and geographical coverage of the two partners: 3stepIT is the Finnish specialist in technology lifecycle management (management, refurbishment in their own logistics centers, and re-marketing) and BNP Paribas Leasing Solutions is the European leader in equipment finance. BNP Paribas 3 Step IT combines the financial skills of BNP Paribas Leasing Solutions with the technical expertise of 3stepIT and aims to deploy the latter's approach in Europe, beyond the Scandinavian countries where it is already well established.

BNP Paribas 3 Step IT provides companies with a comprehensive service for managing their technological equipment:

- analysis of their needs to propose a fleet management plan;
- support in choosing and acquiring equipment, via adapted financing;
- monitoring and management of equipment used: location, cost, billing, date of replacement, etc.
- handling equipment returns at the end of the contract, followed by the secure destruction of data, refurbishment, and resale of equipment; resale value helps reduce rental costs.

This integrated approach across the entire equipment lifecycle has many environmental benefits:

- 97% of the assets received at the end of the contract are refurbished and remarketed, with the remaining 3% being recycled responsibly;
- prolonging the life of equipment makes it possible to delay the production of a new one, helping divide the carbon footprint associated with its production between two users;
- remarketing previously used equipment enables companies to help reduce CO2 emissions by around 36%.

BNP Paribas 3step IT was awarded the «Solar Impulse - Efficient Solutions» label.



Lastly, partnerships can also lead to more profound changes in corporate activities and bring about a change in the business model. In the example below, the partnership

between a recycling company and a start-up helps the latter to develop a new activity that is central to the circular economy: the reduction of upstream waste.



## Alliance with Eqosphere

### **Driving improved performance and economic models in waste management through an alliance between a startup and a leading group.**

According to the FAO, one-third of worldwide food production is wasted across all stages of the value chain. Creating local loops for recovering unsold products and organic waste can reduce waste and save resources.

Eqosphere is a social and solidarity economy (SSE) company engaged in developing the circular economy alongside other players in the sector. Veolia is the world leader in environmental services.

At the heart of this partnership, the «Global Unsold Stock and Waste» service offer, aimed at medium- and large-sized distributors and agribusiness, is dedicated to:

- reducing upstream wastage and waste generation, thanks to Eqosphere's expertise: diagnostics, recommendations, employee CSR training, assessment of new on-site processes, reporting and continuous improvement,
- recovering unsold goods through solidarity associations and innovative circular economy channels—handled by Eqosphere,
- collecting, treating and recovering any waste not dealt with by Eqosphere – handled by Veolia.

This solution includes an assessment of the partnership's impacts on the waste volumes produced by customers and on their waste recovery performance, as observed for example at the Auchan hypermarket in Gap in 2019, in the presence of representatives from the Provence-Alpes-Côte d'Azur region.

This partnership between the Veolia Group's strategic know-how and the Eqosphere startup's pioneering disruptive services goes further in transforming commercial practice and the economic model: the recycler's income, which was historically based on the volume of waste processed, now also depends on upstream waste reduction and global service performance.

The key success factors for these two complementary companies are the startup's capacity to grow and innovate with environmental impacts linked to unsold products and waste, and the responsiveness of a market-leading group in supporting the evolution in how sales teams' commissions are calculated, and in the service-based solutions offered to customers..

Backed by that considerable experience, this national partnership has:

- expanded into other business sectors (for example, making major sporting events eco-responsible),
- strengthened with support from Veolia's regional teams, to innovate and develop synergies in waste, climate, biodiversity and resource conservation,
- become an integral part of responses to calls for tenders: the two companies reach out to each other to suggest innovative regional collaborations with partners attuned to their shared vision.

The next step for this partnership could be to build innovative regional collaborations in response to public procurement contracts, to ensure greater integration of circular economy principles.

## 4 TEST AND SCALE UP

Some circular-economy partnerships not only meet a market objective, but also the need for joint investment, scientific and technological innovation, and innovative solutions emerging at scale.

At an exploratory stage, partnerships can be used to pool the costs of technological monitoring and exploration. For example, companies from different industries, which do not compete against each other but use the same raw

materials, may have an interest in working together to find more sustainable supply alternatives. This is the choice made, for instance, by companies in the Biospeed consortium, which brings together businesses as different as Michelin, L'Oréal, Danone, Lego, BIC and Faurecia for the purpose of identifying promising avenues for the development of bio-sourced alternatives to the plastic resins they consume.



### Bio-speed consortium

Six large companies (Michelin, BIC, LEGO, Danone, L'Oréal and Faurecia) have joined forces to accelerate the development and market adoption of biosourced products.

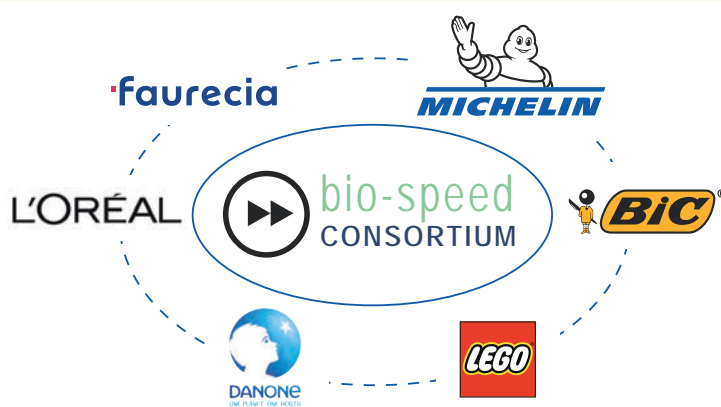
The Bio-Speed consortium was founded in 2014 on the desire of several major European groups to speed up the development of technologies enabling the production of so-called «biosourced» materials, as well as their conviction that collective action brings faster and more significant results than isolated individual initiatives.

The six companies forming this partnership have several objectives, including:

- sending a clear signal to the market in order to attract more technology developers, industrial partners and investors, while strengthening institutional support for the schemes;

- giving visibility to project developers and investors in an effort to secure partnerships;
- developing collective intelligence, and leveraging the complementary skills of players;
- sharing knowledge on key polymers (PE, PP, PET, PEF, PLA, PBS, PA, etc.) in terms of both second generation biomass supply (biomass not intended for food) and technology selection (polymer manufacture, use of microalgae and gas from industrial emissions);
- delivering valuable, concrete results to its members by allowing them to share best practices.

Bio-speed, which dates back to 2014, is a unique initiative due to its collaborative approach and its objective of developing new biosourced technologies.



*The Bio-speed consortium's stakeholders*

At a later stage in the innovation process, building partnerships is a means of pooling resources to fund the feasibility tests of the solutions being considered, such as the creation of a demonstrator, followed by the development of a first, small-scale pilot site incorporating all the functionalities, and finally the construction of a full-scale site. In addition to financial burden-sharing, pooling helps

to limit the risks taken by individual companies when deciding what technologies to develop or use.

TotalEnergies' efforts to partner with large consumers of virgin plastic resins, an eco-organisation, and/or providers of innovative technological solutions have led it to explore and scale up the chemical recycling of plastics.



**TotalEnergies**

## Chemical recycling partnerships

Three examples of chemical recycling partnerships.

TotalEnergies is strongly committed to plastics recycling and aims to produce 30% of recycled polymers by 2030. Three recent partnerships are starting to deliver on this aim.

→ In December 2019, TotalEnergies partnered with Citeo, Recycling Technologies, Nestlé and Mars to study the feasibility of developing a chemical recycling industry for plastics in France, based on the technology developed over the last 10 years by the English start-up Recycling Technologies.

→ In May 2020, TotalEnergies signed an agreement with PureCycle Technologies, Procter & Gamble's American spin-off, on setting up a strategic partnership to recycle plastics, in particular polypropylene. The start-up is able to remove smells, contaminants and colours from used plastics and turn them into a material with the same properties as virgin polypropylene. Under

the agreement, TotalEnergies undertakes to purchase a proportion of the production of the future PureCycle Technologies plant in the United States, and to assess the opportunity to develop a new joint plant in Europe.

→ Lastly, in partnership with Plastic Energy, a British company specialising in plastic recycling, TotalEnergies will build a plant in France for the chemical recycling of plastics (TotalEnergies 60%, Plastic Energy 40%). This unit will be able to transform plastic waste using a pyrolysis process that melts the plastics to obtain a liquid called Tacoil, which will be subsequently used as a raw material to manufacture polymers with qualities identical to those of virgin polymers. The polymers are food compatible, a key criterion for food packaging companies. The plant is due to come on-stream in 2023 and will be able to process 15,000 tonnes of plastic waste a year.

## 5 CREATE NEW VALUE CHAINS

On a bigger scale, building large-scale partnerships at national or continental level is key to the efficient and in-depth transformation of some sectors of activity. Supported by public authorities, they bring together manufacturers from different sectors, all levels of government and the research community. Building broad consortia helps to harness the diverse skills needed to develop alternative value chains based on the use of renewable resources and the supply of recycled raw materials.

At national level, one such partnership is the project to establish a subsidiary to produce sustainable aviation fuels. Supported by the French government within the framework of the «green growth commitments» (ECV), the initiative has defined a shared vision of development opportunities, strengths and limitations.

## Establishing a sustainable aviation biofuels industry

The commitment to green growth in the «establishment of a sustainable aviation biofuels sector in France» stems from a partnership project that has brought together, on a regular basis over a two-year period, five French private companies (Airbus, Air France, Safran, TotalEnergies and SUEZ) and three government departments (Ministry of Transport, Ministry of Ecological and Solidarity Transition and Ministry of Economy and Finance) around the issue of aviation biofuel deployment in France.

Signed in December 2017, the partnership agreement committed under a distributed governance model various public and private players who contributed resources to highlight existing knowledge and expertise that can help collectively identify the constraints and drivers related to the deployment of alternative and sustainable fuel schemes across France.

Each partner thus provided input consistent with their field of expertise on issues such as deployment of raw material deposits in France, production technologies and processes, environmental impacts, logistics patterns in airport procurement, the scheme's economic model, and relevant public policies that could be implemented.

The project steering committee, comprising all partners' staff involved in the project, has met four times. The working groups, consisting of one person per partner, have adopted agile work methods, based on fortnightly audio conferences and quarterly face-to-face meetings. This flexibility has achieved optimal levels of responsiveness from all participants.

The work method adopted calls for consensus among all stakeholders. On specific issues, third-party partners whose expertise was required were called upon subject to approval by the project steering committee. The challenge is to build a common understanding of issues and joint positions on the solutions to be developed. The results, therefore, reflect a vision shared by all the project partners.



*Biofuels synthesised from biomass can replace fossil fuels*

At European level, a series of projects have been launched as part of the Horizon 2020 research and innovation programme. Necessarily transnational and structured by the rules for obtaining European grants, these projects are very special partnerships. For example, the MMATwo

project (pronounced Matou - / matu: /) brings together thirteen partners from six different countries to develop a viable chemical recycling project for PMMA, a plastic more transparent than glass but particularly difficult to recycle mechanically.



## The MMATwo Project

MMATwo is a European project bringing together 14 partners from six different countries covering the entire value chain of PMMA, or «acrylic glass»: collection, sorting, pretreatment, depolymerisation, purification and reuse for optical and non-optical applications.

This development project – with a budget of €9 million over four years and €6.6 million of financial support from the European Union – is now more than halfway through.

The first phase aimed to locate and characterise approximately 27,000 tonnes of PMMA per year in Europe that would be available for recycling, thereby justifying the construction of depolymerisation units. To date, more than 75% (20,000 tonnes) of the target has been reached.

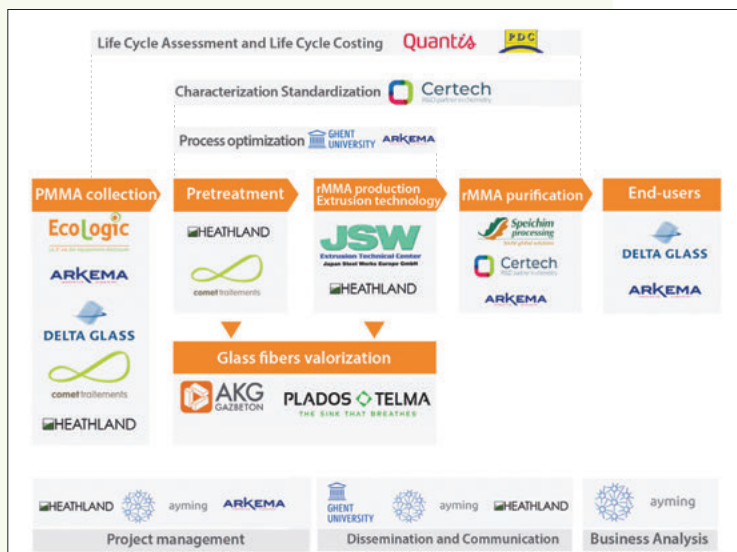
This phase has also led to the development of sorting and pre-treatment solutions aimed at eliminating contaminants that could be present in «pre-consumption» (or «post-industrial») and «post-consumption» waste – such as PVC and polyethylene – and would contribute to the formation of impurities during depolymerisation.

The first pilot tests were conducted in the spring and then in the autumn of 2020, on a significant volume of PMMA waste that was properly selected, then treated and depolymerised with a very high mass yield. The raw monomer thus recovered was then purified, up to a purity very close to that of the virgin monomer. The recovered and purified monomer was then sent to the partners for the production of transparent PMMA cast sheets, caravan windows, and composite kitchen sinks. The resulting product qualities are comparable to those of virgin products. The same approach will now be applied to other PMMA waste grades, with increasing difficulty.

Existing PMMA sourcing sites and depolymerisation technologies around the world have been mapped since the technologies are far from equivalent. The second phase of MMATwo now aims to confirm the relevance of the selected extruder technology, which recyclers know well, to depolymerise all types of PMMA waste – post-industrial, pre-and post-consumption – regardless of their degree of «cleanliness», and then purify it, paving the way for its industrial application.

In parallel with this work, a multi-criteria life cycle analysis is underway, the first results of which indicate a significant reduction in energy consumption and greenhouse gas emissions of up to 70%, depending on the samples treated.

Since its launch, the project team has organised periodic meetings, including one in mid-September 2020 that brought together nearly 100 participants. Indeed, the project is generating great interest, and final contractors are making numerous requests for recycled monomers, which augurs very well for the establishment of the recycling industry in Europe in the next two to three years. Arkema will continue to manage this recycling project together with Heathland.



**In short, players come together for five main reasons:**

**To exploit local resources better.** The presence of a local deposit or a region-wide recycling opportunity impels the project's development.

**To secure their supplies and outlets** and so ensure the sustainability of circular business models.

**To organise circular economy schemes** Closing material cycles sometimes requires new players to «complete» a missing link in value «circles» and connect multiple entities.

**To explore new solutions, conduct research projects and test the scalability potential** of circular economy solutions. Association makes it possible to pool knowledge and sometimes to share major investments.

Finally, **to create new value chains** at national or international level by involving all members of the value chain. The aim of these broad partnerships is not only to supplement poorly structured industries, but to drive the creation of new value «circles».

The table below lists partnerships by objective and sector of activity of stakeholders. It highlights the diversity of the industries involved in circular economy initiatives. Not surprisingly, the waste-treatment industry is central to partnership dynamics, with materials (cement, glass, plastics) and energy (heat, fuel) also playing an important role. But there are also players from sectors such as banking and finance, information technology, building and transport whose association with the circular economy does not readily spring to mind. Partnership initiatives are regularly supported by the public authorities.

NAME	STAKEHOLDERS	SECTOR	SUMMARY	OBJECTIVE	PAGE
Roussillon Industrial Ecology Hub	Séché Environnement Industrial ecosystem	Waste treatment	Heat generation and redistribution from waste thermal treatment from neighbouring industries.	Make better use of local resources	18
Aircraft recycling with Tarmac Demeter Project	Airbus, Safran, SUEZ, public authorities Private and public bodies	Aerospace Waste treatment Public authorities	Tarmac Aerosave recycles up to 92% of the total weight of aircraft for local use. The Demeter project is developing a sustainable aviation fuel production and distribution industry.		19
Osilub plant	Veolia TotalEnergies	Waste treatment Petrochemicals	Waste oils recovered from garages are collected by Veolia, treated at the Osilub plant for regeneration, purchased by TotalEnergies and marketed as high-end engine oil for industrial use.	Secure supplies and outlets	22
Quality Circular Polymers (QCP)	SUEZ LyondellBasell	Waste treatment	SUEZ supplies post-consumer plastic waste to the plant and LyondellBasell markets secondary raw materials produced by QCP.		23
Partnership with Raboni to optimise construction waste flows	Paprec Raboni	Waste treatment Building materials	Customers bring waste to Raboni outlets for recovery and return with new material (75% of waste collected is recovered). Development of river transport to relieve congestion on roads.		24
Cement partnership between Airvault and SMITED	Ciments Calcia SMITED	Cement industry Waste treatment	Thanks to the treatment of household waste by SMITED, Airvault's cement works use recovered solid fuels (RSF) to replace some of the conventional fuels used and to reduce landfill waste.		25

NAME	STAKEHOLDERS	SECTOR	SUMMARY	OBJECTIVE	
FRIVEP project	SNCF Orée	Rail transport Association	Recycling of end-of-life professional garments, and use as recycled yarn or insulating felt. The partnership is run by an association.	Organise circular economy schemes	26
batiRIM®	SUEZ Resolving	Waste treatment Information technology	Rim® (a unique digital modelling tool jointly developed by the partners) enables quantification, qualification and mapping of product and material flows from buildings undergoing renovation, refitting or deconstruction, and forward planning of their potential for recovery, reuse and recycling.		27
BNP Paribas 3 Step IT	BNP Paribas 3 Step	Banking and finance Advice and support	BNP Paribas 3 Step IT offers companies a complete financing and sustainable management service for their technology hardware. The purpose of the partnership is to combine financial and technical competencies and deploy the service in Europe.		28
Alliance with Eqosphere	Veolia Eqosphère	Waste treatment Advice and support	The partners are developing a service to assist companies in reducing upstream waste production, using up unsold waste and collecting, treating and employing the remaining waste.		29
Biospeed consortium	Michelin, BIC, Danone, LEGO, L'Oréal, Faurecia	Cosmetics, agri-food, automotive	The partners have pooled their resources and knowledge to accelerate the development and adoption by the market of biosourced products.	Test and scale up	30
Chemical recycling partnerships	Citeo, Recycling Technologies, Nestlé, Mars, PureCycle Technologies, Plastic Energy	Petrochemicals, waste treatment, agri-foods	Feasibility study of the development of a chemical recycling industry for plastics in France.  Recycling of end-of-life polypropylene using new technologies.  Commissioning in 2023 of a plastics recycling plant in France.		31
Establishment of a sustainable aviation biofuels industry	Airbus, Air France, Safran, TotalEnergies, SUEZ, French Ministry of Transport, Ministry of Ecological Transition and Solidarity, Ministry of Economy and Finance	Air transport, petrochemicals, waste treatment, public authorities	Identification of constraints and drivers in the deployment of alternative and sustainable fuel schemes across France.	Create new value chains	32
MMATwo project	Arkema, Ecologic, University of Ghent, Certech, Suster, Heatland, PDC, JSW, Delta Glass, Comet treatments, Plados telma, AKG Gazbeton, Quantis, Ayming	Waste treatment, advice and support, petrochemicals, metal industry, glass, cement industry	Location and characterisation of PMMA deposits in Europe, development of sorting and pretreatment solutions, identification and testing of PMMA depolymerisation technologies, multi-criteria life cycle analysis.		33

The diversity of partnership objectives observed in the above examples is naturally reflected in the plurality of legal and economic arrangements, such as trade agreements, co-investment initiatives, specialist companies, economic interest groups (EIG), and joint research projects and associations. Various types of structure are being

developed to manage disparate flows and technologies, with organisational criteria conditioning the success and sustainability of a partnership. Chapter 2 of this publication explores the different forms of association and assesses their effectiveness relative to the context and objectives pursued.

## Chapter 2

# Making the right governance choices

A business that undertakes a circular economy project in partnership with other companies or stakeholders must identify the main issues raised by this collaboration and define a governance model tailored to the project's specific features. Aurélien Acquier and Valentina Carbone, scientific codirectors of ESCP's Chair of Circular Economy, drew on their discussions with EpE members to propose a framework of analysis which distinguishes between several types of partnership in the circular economy sector and identifies the most appropriate governance models on a case-by-case basis.

There are three broad governance models for partnerships in the circular economy sector. The term «governance» here refers to issues related to organisation, management, and the exercise of power. Each governance model generates specific costs and benefits. Identifying the challenges and risks of a project allows companies to come together and adopt one or other of those models for maximum value and impact.



**Figure 4**

*Three major partnership models in the circular economy*

*Source: ESCP Chair of Circular Economy & Sustainable Business Models.*

## Centralised governance models

In this type of partnership, a player, often with a central position in its industry, exercises strong leadership over how the partnership is managed and constitutes the linchpin of the model. This player bears the bulk of the investments, coordination costs and risks, and enjoys most of the related benefits.

## Distributed governance models

In this model, several players collectively invest and manage the partnership on a federal and pooled basis. Given its more complex and political nature, this governance model may involve the creation of dedicated organisations whose role is to manage the partnership and mobilise it operationally. Solutions to issues of sharing investments, costs, risks, and benefits based on partners' contributions vary according to the number of players involved.

## Digital governance models

In this third configuration, there is no deliberate partnership among players, but the creation of a new market, structured around a digital platform that fosters new transactions and relationships within an ecosystem.

A study of the partnerships developed by companies is helpful for understanding the benefits, risks and characteristics of each type of governance.



*Defining the appropriate governance model is key to the success of a partnership.*

# 1 CENTRALISED GOVERNANCE MODELS

For a company that initiates a centrally-governed partnership, the move involves a commitment. As well as leading the partnership, it bears most of the risks and costs and, of course, taps most of the benefits.

There are reasons behind a company's commitment to this model: perception of a significant short- or medium-term market opportunity; strategic differentiation; or the need to prevent reputation risk when stakeholder expectations are high, the company visible and its industry exposed.

## Examples of partnerships based on centralised governance

SEB, a benchmark company in the small household appliance market, is a typical example of a centralised approach, with its ambitious circular economy policy now a key aspect of its marketing strategy. The company seeks to increase the life of its products by promoting their repair, reuse and recycling. In an industry where low-cost, not very durable products dominate, it is an important differentiating factor and a core aspect of its brand image. The change in offering has led the company to re-engineer its relationships with its ecosystem (suppliers and repairers) in an effort to commit them to a long-term strategic partnership model. The aim is to improve the design and manufacture of products, allow their effective repair for at least ten years after purchase, and multiply or extend consumption cycles.

SEB comprises a global network of 6,200 authorized repairers with extensive local coverage, and maintains a stock of spare parts, including for older models that are no longer in production.

TotalEnergies' partnership initiatives referred to in chapter one, such as those for biofuel and biogas development, are also broadly based on a centralised governance model.



## Biofuel and biogas partnerships

### Biofuels

For over 20 years, TotalEnergies has been a leader in biofuel research, production and distribution. As part of its new energy strategy, the TotalEnergies group is seeking to become a major player in biomass energy, with sales projected to grow by more than 10% a year by 2030.

To achieve this goal, TotalEnergies is looking to develop synergies with its existing assets, such as the Mede refinery which in 2019 was transformed into a biorefinery, with an annual capacity of 500,000 tonnes of renewable diesel derived from hydrogenated vegetable oils (HVO). This unit is designed to use 30%-40% of raw materials from waste reprocessing (animal fats, used edible oils and residual oils), and will be run in partnership with waste collection and agri-food companies, as well as local authorities.

In September 2020, the group announced plans to transform its Grandpuits refinery into a «zero-oil» platform consisting of a biofuel plant. The plant, due to be commissioned in 2024, will mainly serve the aviation industry, and will treat 400,000 tonnes a year of agricultural or recycled raw materials, two-thirds of which will come from the circular economy.

TotalEnergies is also working on the emergence of second-generation biofuels from crop residues and non-agricultural biomass, in an effort to limit inputs and impacts on arable land. Accordingly, it has entered into a partnership with five companies (Axens, CEA, IFP EN, Avril, ThyssenKrupp IS), backed by ADEME, FEDER and the Hauts-de-France region, on a project entitled BioTfuel to convert lignocellulosic biomass (straws, forest residues, dedicated crops, etc.) into «advanced» biofuels using thermochemical processes. While expanding the range of first-generation biofuels, these solutions still pose many technological and economic challenges.

### Biogas

TotalEnergies designs and operates plants for the production of biogas recovered from landfills and the methanisation of agricultural and industrial residues, in partnership with local authorities, farmers, waste operators, agri-food and agricultural sector players, and public authorities.

In 2020, TotalEnergies announced its intention to expand its biogas production by several terawatt hours by 2030, a move which will lead it to develop new partnerships.

In all these examples, TotalEnergies bears the bulk of the industrial investment costs, although each partner has also invested.



Refuelling of Air France Lab' Line with Total Amyris Aviation Biofuel. Toulouse Blagnac Airport. © BLONDEAU Manuel - TotalEnergies

The ChemCycling initiative launched in 2018 by BASF for the chemical recycling of plastics also illustrates the concept of centralised governance. BASF is a key player in the global chemicals industry and, therefore, a driving force in addressing the crucial issue of global plastic pollution.

**BASF**  
We create chemistry

## ChemCycling project

### ChemCycling™: turning plastic waste into raw material

ChemCycling is the name of BASF's chemical recycling project, launched in 2018. This chemical process aims to transform plastic waste into oil or gas products, to be used in the chemical industry. These products offer a new source of raw materials, which can replace fossil resources and be used in the manufacture of new products with identical properties. Chemical recycling is indeed an end-of-life option for complex materials that currently have no recycling solution - for example, multilayer packaging or mixed plastic waste. BASF aims to increase its supply of renewable raw materials and to contribute to closing the loop of the circular economy by meeting the recycling targets in France and the European Union.

As part of the ChemCycling project, BASF is working with various partners along the value chain; upstream, BASF has signed a Memorandum of Understanding (MoU) with Quantafuel and Remondis to develop the pyrolysis technology, which aims to convert plastic waste into oil. Under this agreement, Remondis, one of the world's leading waste management companies,

will supply mixed plastic waste to Quantafuel. Quantafuel carries out the pyrolysis of this waste and the purification of the resulting oil, which processes are developed and owned jointly with BASF. Finally, BASF uses this pyrolysis oil as a raw material in its production.

Downstream of this project, BASF has worked with Schneider Electric, one of the world's leading energy management companies, to develop a circuit breaker made of chemically recycled material that meets the same high-quality standards as well as the strict safety regulations for electrical appliances. While respecting these technical criteria, this collaboration contributes to the circular economy in the Electrical and Electronic Equipment (E&E) sector by promoting the use of recycled materials.

Through these partnerships, BASF is taking an important step towards establishing a broad supply base of non-fossil raw materials and a comprehensive product offering from chemically recycled materials that meet the same criteria as conventional materials.



*A BASF employee holding a sample of pyrolysis oil produced from plastic waste.*  
© BASF SE

The French scheme for recycling plaster-based waste set up by Saint-Gobain has a unique centralised governance structure, as one player, Saint-Gobain, continues to exercise leadership in networking operations. As the world's leading manufacturer of gypsum board and a key player in the French construction industry, Saint-Gobain has taken steps to build a network of more than 170 partners for the collection of plaster waste nationwide, while investing in reprocessing plants to reuse gypsum collected from its production process. Chemically, plaster can be recycled indefinitely. Its recycling helps slow down the exploitation of existing deposits and prolong their life.



## The Placo-Recycling channel

### **Placo Recycling, the recycling channel for plaster-based waste**

The plaster industry, a pioneer in the recycling of construction materials, has been taking a voluntary approach for more than 10 years in France. Placo® Recycling, a recycling channel developed by the Saint-Gobain group, has been at the origin of this approach since 2008

An environmental ambition and a desire to secure supplies of secondary materials and better control their costs have motivated the development of this initiative, which also offers a differentiating service on the market.

This organization was set up thanks to the strong involvement of the various stakeholders, supported by teams dedicated to supporting intermediary stakeholders (notably waste management companies), to promote the service to architects and project owners

Over the years, the Group has built up a network of nearly 170 waste management companies partnering throughout the country. Their mission is to collect plaster waste, remove any impurities or contaminants that may be present (plastic, metal, wood, ceramics, aggregates, polystyrene, etc.), and provide this sorted material so that it can be reprocessed to become gypsum powder, a secondary raw material that can be reintroduced into the gypsum board manufacturing process. Each year, the contract with these partners is reviewed, allowing waste management companies to secure their business. Regular audits are carried out to verify compliance with quality specifications.

This local network, combined with the three reprocessing workshops and the three outlets provided by the three Placo® plants located in the Paris region, Cognac and Chambéry, allows Placo® Recycling to

reintroduce more than 50,000 tons of recycled plaster into its production every year, either it comes from waste generated during installation phase or waste generated during the renovation or selective demolition of buildings. These volumes represent nearly 10% of the estimated volume of gypsum waste generated on job sites every year in France.

The commitment to green growth signed by plaster companies foresees a significant increase in the use of this secondary raw material in the plasterboard process over the next few years, based on the natural and infinite recyclability of gypsum. The objective is to develop a more sustainable management of natural gypsum reserves while limiting the environmental impact of landfilling related to the burial of gypsum waste. But this commitment also involves a necessary change in practices and culture on construction sites, such as the waste separation at source by material fraction, which is necessary to achieve the level of quality required for a virtuous closed-loop recycling approach, as well as selective demolition of buildings rather than demolition. For gypsum, transforming today's buildings into a material bank for the buildings of tomorrow has become a reality, but much remains to be done. The introduction of Extended Producer Responsibility (EPR) in this construction sector should help to accelerate the change in practices and modes of collaboration towards more circularity for the gypsum industry.



*Plasterboard waste for recycling*

### Advantages and limitations of the centralised governance model:

The centralised governance model has several potential benefits for the core company:

- internally, it facilitates corporate strategic and decision-making commitments;
- it promotes strategic control and quicker decision-making processes;
- externally, if successful, it delivers corporate-image and economic benefits.

However, there are two limitations:

- investments and risks are focused on the core company;
- the project's partners (who develop technologies, participate in service delivery, etc.) are likely to find themselves hugely dependent on the core company, which must consequently pledge its commitment to its partners and design mechanisms for equitable sharing of the value generated among them.

Centralised governance partnerships tend to emerge more naturally in vertically integrated industries where one company is the primary player.

## 2 DISTRIBUTED GOVERNANCE MODELS

Alternatively, companies often turn to more collective and distributed solutions offering more balanced sharing of risks and benefits. More complex, more political, and often slower and more expensive, this approach is appropriate where strategic resources for a successful project (materials, energy, knowledge, know-how) are distributed between multiple players, where risks and investments are too heavy for a single player, or where the partnership has long-term potential. Chapter one contained several examples, including Osilub, Paprec-Raboni, SUEZ-LyondellBasell, Frivep, Biospeed and the Sustainable Aviation Fuel project.

Distributed governance arrangements can take two broad forms depending on the number of companies involved: an alliance between a small number of players (strategic alliance), or a network of players (pooling/networking) who collectively invest and manage the partnership on a federal and pooled basis.

### a) Strategic alliances

The most integrated partnerships are those in which the partners have complementary assets or expertise that can be pooled to provide unique benefits, along with substantial strategic leverage for all parties and risk sharing. In such cases, the partnership may take the form of an enduring joint venture built on a balance of initial contributions from partners in the new company.

For example, Renault set up joint ventures with SUEZ very early on in order to maximize the use of metal waste from its plants and of spare parts from recycled end-of-life vehicles. Governance models are defined in shareholder agreements that lay down the precise scope of the relationship and common decision-making procedures.

The integration of the circular economy into the Renault group's activities has been achieved through two major partnerships with the Ellen MacArthur Foundation for disseminating the principles and with SUEZ for putting them into practice.

→ **An integrated system across the entire value chain**

Renault Environnement, a wholly-owned subsidiary of Renault, created in 2008, holds or co-holds shares with SUEZ in three subsidiaries: Gaïa (100% Renault), Indra (a joint subsidiary with SUEZ 50/50), Boone Comenor Metalimpex (joint subsidiary with SUEZ, 33% Renault).

Renault Environnement and its subsidiaries are involved in:

- the recovery of parts and materials through recycling channels, the repair or renovation of electric vehicle batteries and reused parts business (Gaïa subsidiary)
- the recycling of end-of-life vehicles and the marketing of guaranteed reused parts (Indra company)
- the treatment of industrial metal waste from factories (Boone Comenor Metalimpex company).

→ **Co-governance for the co-creation of value shared**

Within Indra, the «rights and duties» of each shareholder are defined in a shareholders' agreement, a document drafted voluntarily at the shareholders' initiative, and defining the framework of the relationship. The chairmanship of the company changes every two years

alternating between Renault and SUEZ. Decisions are taken jointly during regular Shareholders' Committees (generally monthly) on the proposal of the Chief Executive Officer, to create value for each of the stakeholders; a performance scorecard is used to support the discussions.

In the case of Boone Comenor Metalimpex, governance is also based on a shareholders' agreement defining the framework of the relationship and the level of involvement of each partner.

During the shareholder committee (usually every 2 months) the items to be decided jointly, as defined in the shareholders' agreement, are discussed and formally decided.

→ **Lever for competitiveness and sustainability**

All the operations of these subsidiaries contribute to secure supplies of strategic materials (recycled polypropylene, aluminum, copper, platinum, palladium, rhodium, etc.), to make better use of waste, to integrate margins, and to support the development of new activities. For example, Indra's offer of reused parts enables the vehicles that would not have been economically repairable using only new parts, thus extending their life span while significantly reducing the environmental footprint associated with the repair or replacement of vehicles.

In 2019, these three Renault Environment activities generated revenues of €562 million. Each of these activities recorded a positive net result in 2019.

Strategic partnerships sometimes appear as a new step in a long history of commercial relations between two players. In that respect, the strategic alliance between Agrosolutions (InVivo subsidiary) and SEDE Environnement (Veolia) has transformed a consulting relationship into a partnership to develop innovative technological solutions and new service offerings derived from the cross-fertilisation of their respective expertise in agronomy and hydrology. The solutions implemented promote savings of a territory's water resources.



## The alliance with SEDE Environnement

AgroSolutions is the consulting subsidiary of InVivo, France's first agricultural cooperative union. Its activities include engineering and design, project management assistance and strategic advice on linking agronomy and the environment.

In its wastewater treatment business, Veolia is repeatedly faced with the task of managing residual pollutants in water treatment operations. It has traditionally used AgroSolutions to characterise pollution risks from agricultural sources (plant protection products) and, where appropriate, to design, deploy and monitor action and performance measurement plans.

For example, where the content of a toxic element exceeds the regulatory limit in the waters of a catchment point, Agrosolutions uses agronomic and hydrogeological modelling tools to locate the source of pollution in the watershed, provides information on the risk of pollutant persistence, and proposes solutions for adapting agricultural practices and supporting farmers to use plant protection products differently.

Given the number of issues shared between the farming and water treatment sectors from water resource depletion, to increasing regulatory constraints, and the need to treat agricultural effluents, in 2018 this historical relationship gave rise to a framework agreement between SEDE Environnement (Veolia) and Agrosolutions (InVivo) setting out the common objective of developing solutions to optimise water management at the wider local level. The goals include:

1 Contributing expertise in agronomy and modelling (AgroSolutions) for the assessment and measurement of environmental risks;

2 Expanding the service offering with a view to answering calls for tenders issued by local authorities (Veolia);

3 Developing innovative solutions for agriculture and water management.

More specifically, the sharing of knowledge and resources has led to the following operations being implemented:

- design of various pollution risk assessment tools, based on coupling of soil/subsoil models for groundwater and mapping analysis for surface water;
- drawing up of ad hoc risk prevention and reduction plans, supported by technical and economic advice to farmers in the catchment area concerned by the transformations (modification of growing programmes, awareness of best practices);
- establishment of urban farming projects near sewage plants to recover the water and heat generated;
- experimentation with reuse of wastewater and treated water for agricultural irrigation, in this instance the irrigation of vines at a farming cooperative in InVivo's network;
- deployment of decision support tools in InVivo's network of cooperatives to promote the use of organic inputs from sewage sludge, and to manage irrigation through fine monitoring of crop water requirements by means of tensiometric probes.

A shared asset can differ from investment and know-how. In the partnership between Raboni and Paprec, Raboni contributes its network of sites and Paprec its sorting and logistics facilities. In the case of Frivep, the contribution of financial resources to the association are commensurate with the flows to be processed.

The Floor to Floor project run by Paprec and Gerflor illustrates another form of alliance between a manufacturer and a major recycling operator. Here the primary aim is to remove the technical and economic barriers associated with the recycling of PVC contained in floor coverings.



## Floor to Floor by Paprec and Gerflor

In 2017, PAPREC, the French recycling leader, joined forces with GERFLOR, one of the world leaders in the design and manufacture of floor coverings.

The ambition of this joint-venture called «Floor to Floor» is to develop collection, recycling and reincorporation of recycled PVC.

The choice of such an alliance made it possible to calmly consider the investments (the two companies invested € 2.5 million in the dedicated recycling line) without any immediate profitability constraint, nor dependence on the volatility of market price. It allows both companies to make long-term choices. Gerflor has recently invested in a new production line allowing the integration of 100% recycled materials. It is also key in the holistic approach to the establishment of a circular economy in this sector.

Indeed, if pure PVC is a technically easy material to recycle, many technical and economic challenges had to be overcome to deploy a viable solution for PVC floors. The first constraint for their recycling is due to the very wide variety of formulations, to the fact that PVC is often mixed there with other materials essential to the performance of the products.

The second constraint is linked to soil collection from installers, which must be generalized, efficient and economical. Ecodesign is one of the fundamental axes of the development of GERFLOR products, with a preference for products that are easy to recycle and rates of incorporated recycled materials of up to 60% on certain ranges.

PAPREC's geographic coverage ensures the three conditions for success:

- collection;
- transformation into quality raw materials from recycling, thanks to the complementarity of skills and close technical collaboration between PAPREC and GERFLOR;
- a massive reincorporation of these materials in products specially designed to integrate them, therefore where they can be used.

The initial ambition to set up a true circular economy for PVC floors is being realized in a sustainable way thanks to this partnership and is proving to be beneficial for each actor, as well as for the environment.



Collection of PVC flooring at Tremontines site

The organisation of distributed governance can become more complex in proportion to the number of partners involved and their type of involvement. For example, the collaboration between Veolia and Yara, a manufacturer and distributor of agricultural fertilisers, allows new circular agricultural models to be developed and tested by recycling nutrients from urban, agricultural and industrial waste into high-quality fertilizers, and by aligning several partners around the core formed by the two historical partners.



## Closing the nutrient loop

How can the circular economy be developed on a large scale with all stakeholders in a sector? Here we have an example in the agrifood sector, with the partnership between Veolia and Yara to create nutrient recycling loops across Europe.

According to the FAO (United Nations Food and Agriculture Organization), around 60% of arable land is currently degraded, requiring \$490 billion of supplementary agricultural inputs annually.

Depleted soil will increasingly require additional nutrients. Veolia (environmental services) and Yara (plant-based nutrition) signed a partnership in 2019, with the aim of developing the circular economy for nutrients across the food and agriculture production chains. The issue is essentially one of scale: only 2% of the nutrients contained in food waste from cities are currently recycled.

Within this partnership, Veolia and Yara created the Nutrient Upcycling Alliance (NUA), an alliance of stakeholders in the food value chain to promote a complete overhaul of the chain and recycle nutrients in the agricultural and food sectors.

The large-scale recovery of nutrients requires new ways of working and an unprecedented level of collaboration within the food production systems in urban

and peri-urban areas to meet the needs of all stakeholders in the food chain, from farmers to consumers via distributors and agribusiness firms.

The NUA works with partners to collect food waste and transform it into high-quality fertilizers and soil improvers (compost), to encourage the use of these products in peri-urban agriculture, and to promote the resulting produce across the entire food chain.

This approach allows the recovery of food waste, the recycling of nutrients from foodstuffs directly into agriculture, and the use of regenerative agricultural practices with benefits for health, the environment and a more resilient food production system. It also helps to make agricultural businesses profitable during their transition to regenerative practices.

The NUA is currently being trialed in London to demonstrate the cost effectiveness and reproducibility of nutrient upcycling.

To succeed, it will require specialist expertise to ensure health security across the entire loop and avoid any accumulation of other chemical inputs present in food.

### Advantages and limitations of strategic alliances

This governance model delivers several benefits to the partners involved, as it:

- fosters in-depth learning between allies;
- enables real synergies to be developed, and financial risks of the projects undertaken to be shared.

However, it raises two issues:

- the increased risk of codependency between two parties on a type of flow that is difficult to direct towards other uses;
- the need to maintain a joint approach and continue with the pursuit of common objectives.

Strategic alliances tend to emerge when partners identify common strategic opportunities and have complementary resources whose pooling ensures the success of the partnership.

#### b) Pooling and networking

Where the number of players is greater, or where the involvement of each partner is at a less advanced stage, partnership governance has a more federal or shared form and a cross-cutting and dedicated organisation whose role is to coordinate the «system» and to manage and implement the partnership. The Frivep association (described above) and the Demeter meta-project in Toulouse are good examples.

This governance model is naturally preferred in industrial ecology projects involving many players. A typical example

is the Kalundborg industrial ecosystem in Denmark, which is built around the smart management of coproducts, waste, and the raw material and energy needs of several industries. The Danish case is iconic in that it suggests a kind of “food chain” between neighbouring industries. In this type of project, which has strong local roots, the emergence of an orchestrator is often necessary to coordinate the whole. This is no easy task, particularly from an organizational and legal standpoint.



*The pooled governance model is appropriate when there are many partners.*

Gas production and distribution industries, often at the heart of such projects, are familiar with the problem. Air Liquide, for example, has developed proper contract engineering expertise that allows it to form complex partnerships tailored to various situations.



## Two industrial symbiosis use cases

Air Liquide is pursuing its technological developments for the circular economy, through the recovery of organic waste into biomethane and bio-fertilizers, the supply of hydrogen for clean mobility, the development with its customers of products and services for the preservation of fresh products, and via the treatment of wastewater or recycling of materials. These activities rely on investments in gas production and distribution equipment, technical expertise, and the ability to establish business synergies with local players.

The Bazancourt biorefinery, located 15 km from the city of Reims in France illustrates Air Liquide's contribution to the development of a circular economy. This site brings together a sugar factory (Cristal Union), a shared research center (ARD), a starch and glucose factory (Chamtor), a cosmetic active ingredients production unit (Soliance), an ethanol production unit (Cristanol), an industrial demonstrator (Biodemo), a pilot plant for biofuels (Futuro1), and a CO<sub>2</sub> collection center operated by Air Liquide. The site recently became home to the European Center for Biotechnology and Bioeconomy (CEBB).

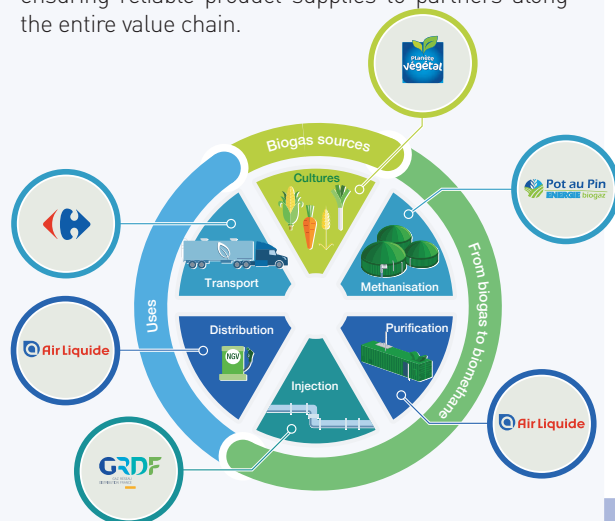
Air Liquide's capture of CO<sub>2</sub> in the distillery's fermenters (Cristanol) makes it possible to transform the by-products of a neighboring industry into a recoverable resource: since 2009, Air Liquide has been capturing, purifying, liquefying, and recovering between 50,000 and 70,000 tonnes of CO<sub>2</sub> every year to regulate the acidity of water treatment sites or to maintain the cold chain during food transport.

The originality of this industrial site lies in its operation similar to that of an ecosystem in which the multitude of exchanges and interactions (water, steam, effluents, products, energy, R&D) aims to optimize the economic and environmental efficiency of the whole system for the benefit of all partners.

These interdependencies and synergies have led to the evolution of partnerships, where the analysis and sharing of values and risks are the subjects of open discussions involving the project's stakeholders, including public authorities.

### Pot-au-Pin Énergie

The activity developed jointly by Air Liquide with Carrefour and the company Planète Végétale, in conjunction with GRDF, in the Cestas region of France from 2016 to 2018 is another illustration of a symbiotic approach. As an example, 45 Carrefour trucks are fueled with biomethane for their daily rounds, which reduces fine particle emissions by 85%, carbon dioxide by 90%, and noise by half, compared to diesel-powered vehicles. This biomethane is transported from a production site a few kilometers away to the station via the existing natural gas network. It is produced in three methanizers using intermediate crops for energy purposes (CIVE), including rye, from Planète Végétale, a vegetable producer who is also a supplier to Carrefour. The biofertilizer digestates generated at the end of the organic matter degradation process in the methanizer are used locally by Planète Végétale to nurture the soil, in a sustainable agriculture approach. This activity was made possible by the public support mechanisms specific to the biomethane sector (feed-in tariff), but also by the long-term commitment of the three companies, a commitment anchored in sustainable development strategies. Regarding the Pot-au-Pin site, Air Liquide operates the digester, the biomethane unit, and the station, ensuring reliable product supplies to partners along the entire value chain.



Schematic view of the Pot au Pin project

The distributed governance model is also appropriate where planned innovation developments involve substantial investment and risk-taking to address technological challenges, which no player wants to assume alone. This was the thinking behind the establishment of BioTFuel by TotalEnergies and its partners, and behind Michelin's team-up with Axens and IFP Energies Nouvelles in the BioButterfly programme to explore biosourced ways of producing butadiene. The governance arrangements defining the responsibilities of each partner, cost sharing and marketing were determined at the earliest stages to ensure balanced sharing of risk and value.



## The BioButterfly programme

The BioButterfly project aims to produce butadiene from bio-ethanol as a substitute for fossil butadiene, thereby promoting the production of more environment-friendly elastomers.

Supported by ADEME as part of the Future Investment Program (PIA), it builds on the strengths of three key research and industry players by leveraging their complementary competencies:

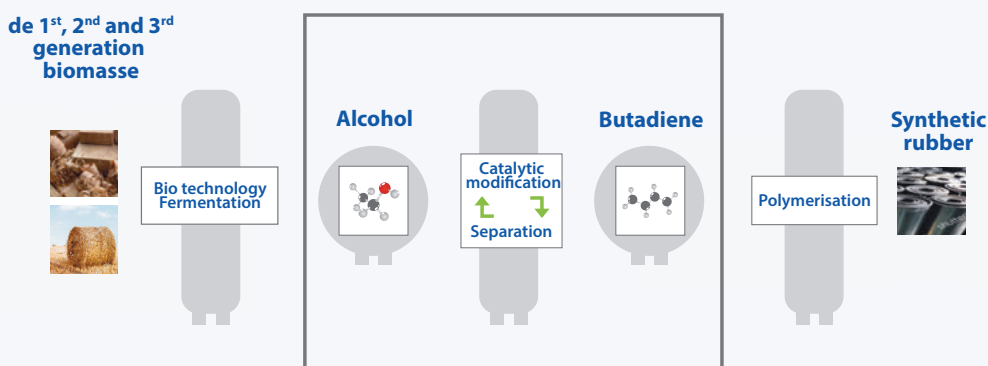
- IFPEN's leading-edge innovation research expertise in the field of industrial processes and catalysts;
- Axens' know-how in the industrialisation and commercialisation of new technologies for processing sustainable materials and catalysts;
- Michelin's long-standing innovative materials development experience.

Project governance comprising an executive committee for strategic decisions, a steering committee for technical and financial decisions, and an operations committee ensures fair power sharing.

The programme's cost is shared among the partners, with an annual expenditure update. The objectives and deliverables of the research programme are clearly defined, along with the responsibilities of each party and the resources allocated. Future sales and marketing terms and conditions were agreed upon from the outset to ensure balanced value sharing.

The success of this programme is based on transparent and constructive exchanges between partners, through the above governance bodies, so that joint decisions can be taken to overcome such difficulties as deadline or unbudgeted project requirement issues. The complementarity between the parties' skills and business models has been a key development asset.

The distributed governance model works well in this case, even if it at times requires protracted and complex contractual changes to achieve consensus. Finally, the impetus provided by government assistance under PIA significantly reduces risk, and helps in anticipating problems and finding solutions.



*Illustration of the butadiene production process from bio-ethanol*

A final example illustrates a broader form of partnership that brings together many different players in an industry to undertake collective work at scale.

Pursuant to the goal of no-net-land take, increasing numbers of city-within-the-city reconstruction initiatives focus on the redevelopment of entire neighbourhoods. The rise in the supply and use of deconstruction materials offers increasingly attractive opportunities. Indeed, this practice

is age-old. Many structures and buildings were built with materials from destroyed buildings, even the old ramparts of our towns. Many castles have served as quarries for city builders. The challenge today is to repeat the process by observing far more rigorous construction specifications and getting complex economic forces to participate in the construction process. Hence the importance of partnerships driven by a dedicated coordination structure.



*The selective deconstruction promotes the reuse of materials in new buildings*

A case in point is Circolab, an association created in 2018 with the aim of developing the reuse of building material. Initially consisting of a few building owners, including Vinci, it has brought together dozens of highly diverse operators in the real-estate value chain. In 2019, it released several operational and methodological tools and guides designed to remove obstacles to the use of recovered products and the insurability of projects using them.



## The Circolab association



Almost half of total greenhouse gas emissions and more than 90% of biodiversity loss and water stress consequences are due to the extraction of resources and materials, fuels, and foodstuffs transformation. The European Commission published in September 2020 a list of 30 raw materials which could represent a supply risk in the coming years. Among them, 50% concern the construction sector, however only 12% of used materials today are recycled materials. As a solution to this issue, a circular economy could create 700 000 jobs in Europe.

Circolab members are convinced that a linear economy is not sustainable and that a circular economy has both environmental benefits, and also social and economic ones.

This is why Circolab was created in February 2018 by project owners. More than 70 public and private stakeholders from the construction sector are part of this association today. It aims to promote circular economy broadly in the property sector and to build an « ecosystem » of actors representing the entire property value chain.

The members of this association are materials manufacturers, architects, property developers, construction companies, project owner assistants, engineering and design firms, waste treatment companies, evaluation experts, lawyers, public and private project owners.

They aim to lift the barriers and obstacles to materials reuse after deconstruction, and to produce operational tools for stakeholders. They have been working in particular on the reuse materials insurability, reuse taxation, and on a methodological guide about the reuse topic; they also developed with the Scientific and Technical Centre for Building (CSTB) environmental and socio-economic indicators to evaluate the reuse benefits, as well as requirements specifications to carry out a resources' diagnosis for a building or an infrastructure.

The association is currently working on the integration of circular economy into exploitation workforce, on the traceability of reusable products, on the added value of circular buildings, or on using the BIM to optimise building materials.

Circolab is based on the idea that current environmental issues are systemic and as such involve a systemic response, putting in motion simultaneously all the real estate actors. This can be done with new tools, new project organisations, new skills but above all a new mindset and new governance:

- A new mindset to end with the construction materials accelerated social obsolescence, which is out of phase considering their real technical performance;
- New governance for a model change, with a territorial approach, multi-sectorial, associating all the property value chain. This is why Circolab collaborates with public sector representatives, in particular Ile-de-France communities, such as the Ile-de-France region, Plaine Commune, and Métropole du Grand Paris. The professional organisations FFA, EFGBTP, architect associations are also associated, in order to raise awareness amongst stakeholders and start a common reflection to adapt, or even to renew current habits.

Circolab's work aims also to be pragmatic and operational: within the working group «Pilot operations», the stakeholders share the results of more than twenty projects, coming from the members, that implement materials reuse, to test the tools developed, and accelerate the teams' skills development.

### Eco-organisation - a special type of shared governance partnership

Citeo is an illustration of a special partnership stemming from the public obligation created by extended producer responsibility (EPR), under which many private players team up ultimately to form a partnership.

Resulting from the merger in 2017 of two eco-organisations, Eco-Emballages and Ecofolio, Citeo is a private company specialising in the recycling of household packaging and graphic paper. In addition to recycling, Citeo operates at all stages of the circular economy, from eco-design, awareness raising and selective collection

financing to market development of recycled products. In this, Citeo follows the distributed governance model as well. With its packaging and paper recycling activity tightly organised and controlled by public authorities, Citeo plays an active part in a complex ecosystem of 30,000 contributors, including packaging producers, recycling operators, local authorities, citizens, and a set of players with often divergent rationales for action that have to be organised and coordinated.

### Advantages and limitations of pooled governance models

Pooling offers multiple advantages:

- it brings together the broad skills and resources necessary for the initiative's success;
- it secures long-term commitments from the parties involved, by combining complementary resources and sharing necessary investments;
- because of its multi-player and collegial structure, it facilitates the gradual integration of new stakeholders, such as eco-organizations that bring together and mobilise local authorities, producers, recyclers, and citizens.

The natural counterpart of these benefits is the following disadvantages and risks:

- high coordination costs, especially where the scope of the initiative expands and the number of players increases;
- increased opportunism risks and policy debates as the network expands, or when the required investments become significant and have to be shared between public and private players, as in the case of waste collection and treatment;
- lengthy and complex collective decision-making processes usually based on consensus.

This model tends to work best where cost pooling maximises a project's profitability, where an industry is subject to regulations requiring private players to adopt certain

initiatives (e.g. EPR schemes) in the face of complex technical and organizational challenges, or where there is a strong need for investment and policy coordination.

### 3 DIGITAL GOVERNANCE MODELS

A player (often a new entrant or one at the intersection of several fields) or a dedicated player like an eco-organisation transforms an industry through platform innovation that creates new market transactions. The platform supports investments and risks. It links on both the supply and demand sides diffuse communities of players which were previously difficult to connect, and supports key players to develop transactions.

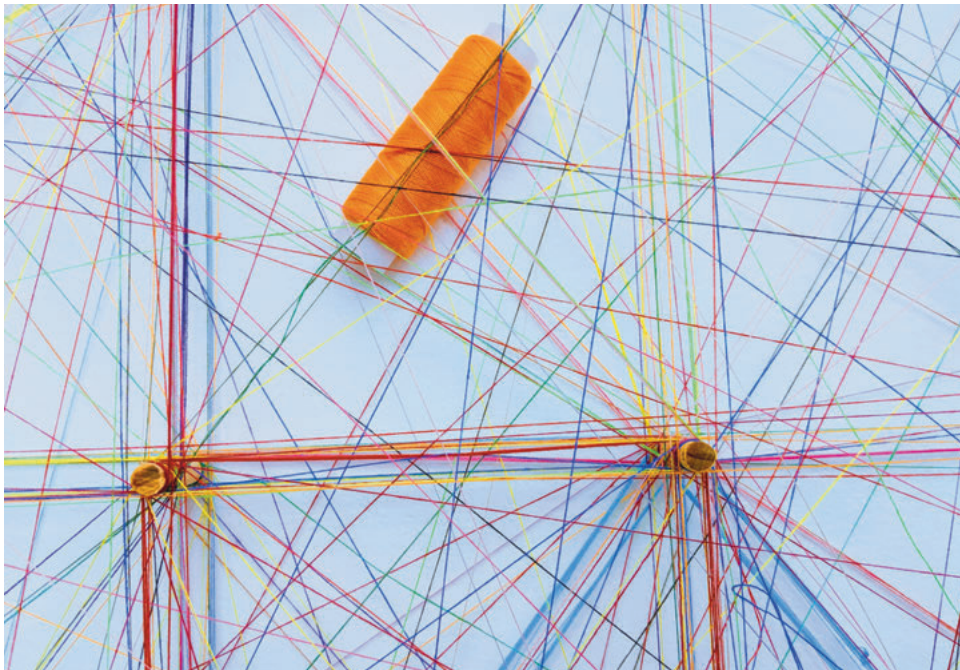
This model is necessary where the material flows to be aligned are dispersed and have a low or very heterogeneous unit value. In this case a digital solution helps to create, at lower cost, new markets that match supply and demand and generate new transactions. The model itself is long-established. Digital development has simply transformed and multiplied it. For example, PAP (the French property advertising magazine) has replaced classified ads of the same name with a digital version. Platforms for smaller transactions such as Le Bon Coin and more recently Vinted have emerged as psychological barriers among consumers begin to fall away and make way for a readiness to adopt product reuse solutions.

While the relations that develop across a platform are not a partnership in the traditional sense of the term, platforms create new relationships and play a significant role

in their governance. Depending on the rules defined by it, a platform can promote relationships of gifting, reciprocity and sharing, encourage non-monetary transactions or contrariwise monetise them, and maximise and share the economic value created. Ultimately, this is a rerun of the centralised governance model for the benefit of a new player, the platform operator.

Many such platforms form part of the circular economy because they enable better sharing - and use - of assets. In the field of mobility, various carpooling platforms typically fall into the functional economy (BlaBlaCar, or the home-to-work carshare platform Karos). In food sector, a typical example is Phenix, which acts as an intermediary between players offering unsold food (distributors, manufacturers, organisers of festive events, shopkeepers) and charities or individuals seeking low-cost food. This platform has significantly reduced the time it takes to allocate products to recipients, which is critical for short-shelf-life or cold-chain foods.

Digital platform outreach initiatives are also being undertaken by more established companies. For example, The Re-users Booster brings together real-estate buyers in a digital platform that facilitates reuse by construction sites of waste from other construction sites.



*Digital platforms can facilitate multiple transactions by arranging a link between supply and demand.*



**BNP PARIBAS**

## The Re Users Booster

The construction sector accounts for 30% of France's CO<sub>2</sub> emissions, is a major resource consumer, and generates 40 million tons of waste a year. Yet when renovated or demolished, most potentially reusable materials are thrown away, and less than 1% are reused. Reusing waste to use it as a raw material in other construction sites seems to make a lot of sense from the point of view of the circular economy. But practical implementation is complex: How can waste production and resource needs be adapted, without the need for huge storage?

To address this difficulty, the Re Users Booster was launched on 16 September 2020: It is a grouping of real estate players (property developers, investors, project managers, general companies) brought together to generalize and streamline reuse in the construction and renovation of real estate assets.

The principle of the Re Users Booster is to create a digital platform that consolidates demand for reuse materials from operations so that it can connect to existing supply. Value-added involves analyzing and processing project input data through the use of artificial intelligence, to formalize contract prescription documents. To ensure the platform's operational capability, each member undertakes concrete real estate transactions on which lots will be prescribed for re-use.

It is estimated that the Re Users Booster avoids, on a surface area of 1,000 m<sup>2</sup> of office space:

- 67 tCO<sub>2</sub>e;
- 1.15 million liters of water;
- 44 tons of waste.

The Re User Booster includes:

- Groupama Immobilier, founding member;
- A4mt, project manager;
- Over 35 property developers, investors, users of the Booster, including BNP Paribas Real Estate;
- Contractors, who bring their expertise in architecture and prescription of reuse materials;
- Utilities and startup companies in the circular economy, providing technical expertise and best practices on reuse;
- Construction21France, the media for building and sustainable cities;
- IFPEB (Institut Français pour la Performance du Bâtiment) of which BNP Paribas Real Estate is a member.

Thirty real estate companies (including BNP Paribas Real Estate) finance the project for three years and contribute to the platform by integrating ongoing projects and real material offerings and applications.

### Advantages and limitations of digital governance models

These models have manifold advantages:

- to the extent that a single player sets up the platform to connect many other players, coordination costs are low since rules are set unilaterally by the platform provider and operator;
- innovation processes are extremely focused on new uses;
- a platform has strong growth potential once its business model is established as sustainable and profitable.

The disadvantages and risks include:

- market fragmentation, which limits the networking impact required for the platform's development;
- conversely, extreme concentration around a dominant player (winner takes all) who, once established, uses market power to gain advantage;
- difficulty in designing a business model that will sustain the process and make it financially viable.

The platform model tends to emerge when its value potential is dimly perceived by established companies, but more easily by end users. It is able to prosper where assets are dormant and transactions scalable with digital technology that allows small transactions to be made on a large scale. Legislative measures, too, can create opportunities for digital entrepreneurs. France's first food-waste laws have fostered the emergence of platforms like Phenix, Eqosphere, and To Good to Go. Lastly, successful platforms often go beyond pure digital intermediation, by offering services that compete with those provided by more mainstream players.

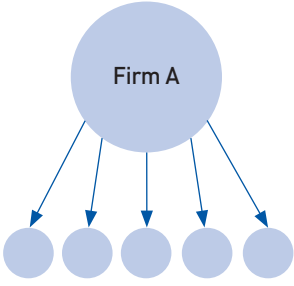
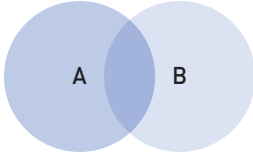
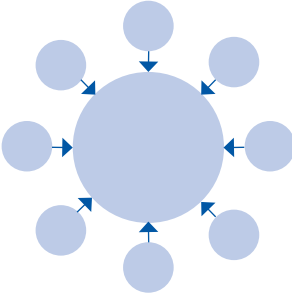
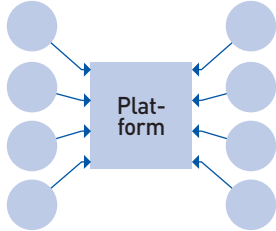
## 4 SUMMARY OF GOVERNANCE MODELS

In short, can we recommend organisational or governance arrangements for a partnership that appears necessary for the success of a circular economy project?

The table below summarises the different governance models identified and illustrates them through several examples. It can be used as a brainstorming tool to better understand how each type of governance works, and what the related advantages, disadvantages and risks are.



*Different governance models have specific operations and present their own risks and benefits.*

	1	2		3
	CENTRALISED GOVERNANCE	DISTRIBUTED GOVERNANCE		DIGITAL GOVERNANCE
		Peer alliances	Pooling / Network	
				
<b>Definition</b>	One player («the core company») exercises strong leadership in driving partnerships. It bears most of the coordination costs and risks, and enjoys most of the related benefits.	Two or more partners with complementary assets (skills, materials, markets, financial resources) establish a strategic partnership offering mutual benefits.	Several public and/or private players collectively invest and manage the partnership on a federal and pooled basis. This mode of governance can lead to dedicated organisations being set up to manage and implement the partnership.	A player transforms an industry through a platform innovation that creates new market transactions. The platform «arranges a link» between players that were previously unconnected.
<b>Objectifs</b>	For the core company, it means: <ul style="list-style-type: none"> <li>- differentiating itself from the competition</li> <li>- developing a corporate innovation or monitoring capability</li> <li>- protecting reputation in response to public challenges.</li> </ul>	<ul style="list-style-type: none"> <li>- collectively exploring new opportunities for innovation</li> <li>- seeking joint benefits.</li> </ul>	<ul style="list-style-type: none"> <li>- acting at industry or regional level</li> <li>- pooling costs / infrastructure</li> <li>- developing common standards within an industry</li> <li>- collaborating with diverse players</li> </ul>	<ul style="list-style-type: none"> <li>- building new markets</li> <li>- creating a new player (the platform) that arranges and controls exchanges.</li> </ul>
<b>Advantages</b>	<ul style="list-style-type: none"> <li>- simplified coordination and management</li> <li>- strategic corporate commitment</li> <li>- strong image and financial benefits in the event of success.</li> </ul>	<ul style="list-style-type: none"> <li>- in-depth learning among partners</li> <li>- unique advantage conferred on partner companies</li> <li>- financial risk sharing.</li> </ul>	<ul style="list-style-type: none"> <li>- cross-cutting and collective action</li> <li>- investment sharing among several players</li> <li>- easier to open up to multiple stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>- limited coordination costs for players</li> <li>- innovative and flexible structure</li> <li>- high potential for growth or reproduction of model.</li> </ul>
<b>Disadvantages and risks</b>	<ul style="list-style-type: none"> <li>- concentration of assets and risks on core company</li> <li>- dependency position of other players involved.</li> </ul>	<ul style="list-style-type: none"> <li>- risks of codependency and opportunism of one or other parties</li> <li>- challenge of maintaining collaboration and common interest over time.</li> </ul>	<ul style="list-style-type: none"> <li>- policy complexity in management of partnership</li> <li>- high collaboration costs</li> <li>- long and complex decision-making processes.</li> </ul>	<ul style="list-style-type: none"> <li>- supply fragmentation (no winner)</li> <li>- platform power (winner takes all)</li> <li>- low profitability per transaction.</li> </ul>

	1	2		3
	CENTRALISED GOVERNANCE	DISTRIBUTED GOVERNANCE		DIGITAL GOVERNANCE
		Peer alliances	Pooling / Network	
<b>Tends to prevail if...</b>	<ul style="list-style-type: none"> <li>- strong strategic potential perceived by company</li> <li>- strong concentration of industry around a few companies</li> <li>- significant investments.</li> </ul>	<ul style="list-style-type: none"> <li>- complementarity of assets between sectoral players</li> <li>- significant project-specific investments</li> <li>- strong strategic potential perceived by potential partners</li> </ul>	<ul style="list-style-type: none"> <li>- industry's willingness to adopt a collective approach</li> <li>- need for common industry standards</li> <li>- need for coordination between public, private and civil society players</li> <li>- very low profitability for a single player.</li> </ul>	<ul style="list-style-type: none"> <li>- latent opportunities perceived by business people</li> <li>- micro-transactions possible at scale</li> <li>- regulatory incentives.</li> </ul>
<b>Examples</b>	BNP Paribas 3 Step IT, TotalEnergies (chemical recycling), BASF (chemical recycling), Total Biogaz (bioTfuel), Seb, Saint-Gobain (Placo-Recycling).	Veolia & Yara, Paprec & Gerflor, Paprec & Raboni, Veolia & Total Lubrifiants, InVivo & Veolia, RTE & Forestons!, SUEZ & LyondellBasell; SUEZ & Resolving (batiRIM@), Veolia & Eqosphere, Renault & SUEZ.	Vinci (Circolab), Airbus (Demeter), Air France (Sustainable Aviation Fuel), Arkema (MMAtwo), Séché Environnement (Roussillon platform), SNCF (FRIVEP), Air Liquide (Bazancourt and Pot-au-Pin), Michelin (BioButterfly).	PAP, Le Bon Coin, Vinted, BNPP (Re Users Booster).
<b>Coordination mechanisms</b>				



## Chapter 3

# Beyond partnerships

Encouraged by the promising prospects of the circular economy, businesses are ready to cooperate in an effort to overcome the obstacles to its development. The French business association Afep notes the growing involvement of thirty-eight of its members in «green growth commitments» that drive a substantial part of their value chains<sup>(8)</sup>.

Whether they pursue varied objectives of a local or global nature, or act as a twosome or with dozens of others through structures ranging from «1901 associations» to international joint ventures comprising partners such as public authorities, associations, research institutes and other businesses, companies are creative in finding partnership solutions that enhance the opportunities of the circular economy.

The previous examples show that the type of partnership chosen mainly depends on circumstances and the shape of markets and pre-existing structures. Each player anticipates the development of this economy and strives to find a place and added value among other players through their specific assets and expertise. However, much still remains to be done. While end-of-life vehicles and tires are now widely recycled (to the tune of 90%), the proportion of recycled food, electronic, and building waste remains very low and stagnant. How can the momentum of the circular economy be kept alive?

On the other hand, many examples studied by the EpE commission suggest that public-private partnerships are accelerating the development of industrial and territorial ecology (ITE) models, one of the seven pillars of the circular economy defined by ADEME.

### Industrial and territorial ecology approaches

In its publication «*État des lieux de l'écologie industrielle et territoriale en France*»<sup>(9)</sup>, the Orée association has released the findings of a study, carried out from 2017 to 2019, of 64 industrial and territorial ecology (ITE) projects in France. It appears that 93% of the projects have political support or are backed by a local player. The study confirms the importance of support from public authorities, whose contribution can exceed 90% of the total budget of ITE projects.

## 1 THE KEY ROLE OF PUBLIC AUTHORITIES

Indeed, partnerships often depend on difficult, cyclical local circumstances and do not seem capable of resolving on their own merits the wider question of the circular economy's economic model.

8 Trajectoires économie circulaire. Suivi et nouveaux engagements 2020 des entreprises de l'Afep. January 2021.

9 For a definition of industrial and territorial ecology, please look up <https://www.ecologie.gouv.fr/lecologie-industrielle-et-territoriale>

### Assessment of ITE in France

The Industrial and Territorial Ecology (ITE) initiatives, from their planning phase to the implementation of synergies, mobilize a multitude of actors, thus, encouraging the development of partnerships of various natures. In its report «État des lieux de l'EIT en France» (Assessment of ITE in France), the association ORÉE observed, among all governance models in place, approaches that are co-sponsored by several structures. This type of support generally implies, for the partners, a shared role in the leadership and the financing of the initiative.

Partnerships between public and private actors seem to be an interesting way of maintaining the initiatives over time. Existing issues in the initiatives are numerous and are not necessarily shared by all actors. While public structures (collectivités - local authorities) are interested in the reduction of resource consumption and the attractiveness of the territory, private actors (companies) are vigilant about the economic benefits of the initiative. To be lasting in the long term, the project must be able to accommodate all these issues. Moreover, when we look at the economic model of the initiatives, we see that most of the funding comes from the public sector (ADEME, regional authorities) and that it is allocated in the short term (3 years) and is decreasing. Thus, a public/private partnership seems to be an interesting option to reinstate more private funding into the process and guarantee it lasts in the long term.

Finally, partnerships become important during the implementation phase of synergies. Indeed, the structures in charge of the organisation do not always have the necessary abilities to carry out actions.

For example, the structure in charge of the organisation can partner with research actors, consulting firms, centers, or federations to study the technical feasibility of certain synergies.

<https://www.ademe.fr/etat-lieux-lecologie-industrielle-territoriale-france>



Cover page of the publication «Etat des lieux de l'écologie industrielle et territoriale en France».

In fact, governments have long played a role in the emergence and sustainability of circular economy operations. Waste disposal is one area of government responsibility, with significant budgets allocated to it. Yet it is difficult to get waste-generating citizens to bear this cost using the polluter pays principle. That is why the actions of public authorities are so important. These can take various forms, including the gradual definition of frameworks for private initiative. In France, the implementation of such frameworks is mainly based on the principle of extended producer responsibility.

### **The central role of extended producer responsibility (EPR) and eco-organisations**

The extended producer responsibility (EPR) principle, codified in Article L. 541-10 of the Environment Code, led to the introduction of the first EPR schemes back in 1993. «*Les filières à responsabilité élargie des producteurs – Panorama*», a report on extended producer responsibility schemes published by ADEME in 2017, describes how they work.

The initial objective of such schemes is to save resources, relieve local authorities of waste management costs, and build end-of-life management costs into the sales price of new products in order to encourage manufacturers to engage in eco-design initiatives. Partnerships under these schemes are different from what we have seen so far, because they are set up and controlled by the government.

Producers, importers and distributors who market products generating certain end-of-life waste are required to take preventive measures, along with responsibility for their management. They may set up individual systems for the collection and treatment of waste from their products, or collectively set up eco-organisations to whom they make a financial contribution and transfer their obligations. An eco-organisation may act as «funder» by providing financial support for public treatment schemes. It may also act as «organiser», mobilising private providers of waste collection and management services. A «mixed» organization reconciles funding and organisational support for collection and sorting operations.

Public authorities play an organising role in such schemes, which are defined by their regulatory framework (definition of objectives, distribution of responsibilities between players, approvals, etc.). They ensure proper implementation of the scheme (quantities placed on the market, quantities collected and processed, etc.), check compliance of eco-organisations' actions with their authorisation and, where appropriate, punish offenders.

The role of eco-organisations has expanded, particularly in France. As well as collecting and centralising the eco-contributions of players subject to EPR, thereby

ensuring the economic viability of circular economy business models, they support players in the implementation of preventive actions (eco-design approach), raise public awareness, and contribute to the financing of research and development projects. With 7.8 million tonnes of waste recycled through EPR schemes in 2018, eco-organisations have become drivers in the growing deployment of the circular economy across all relevant value chains.

To this end, the AGEC law provides for the creation, from 2021 to 2025, of a dozen EPR schemes, and extension of the fourteen existing schemes (more products and waste used). The new schemes will include building and construction materials, tobacco products, and single-use hygiene fabrics.

Lastly, there are economic incentives for a project's environmental performance. These can be used to boost the market, but performance assessment is complex due to the difficulty in measuring environmental footprint reduction across partnerships.

## **THE COMPLEX MEASUREMENT OF ENVIRONMENTAL BENEFITS**

Reality is more complex than the measures provided for in a project, and unanticipated indirect effects can reduce or even wipe out the expected environmental benefit of a recycling operation. These are the now well-known rebound effects. Using less polluting raw material, because it comes from recycled material, or using a shared service can encourage growth of its consumption and thus offset any expected positive effects. For example, ADEME found that carpooling at Blablacar reduced journey emissions by only about 12%<sup>10</sup>, as a result of the shift of some flows from trains to cars and the additional trips generated by the reduction in the price of transport.

The quantification of benefits is, at the best of times, an uncertain exercise. For example, the environmental footprint assessment of recycled materials through the life-cycle analysis made by ADEME and FEDEREC<sup>11</sup> in 2017 shows the positive effect of recycling on the reduction of greenhouse gas emissions from scrap metal, aluminium and recycled textiles. Recycled cardboard had a slightly positive GHG emissions outcome compared to new cardboard. The result, however, depends on the composition of the energy mix used for new cardboard production (increasingly based on electricity from biomass) and recycling, and does not factor in biogenic carbon emissions from biomass.

10 Survey of long-distance carpool users. ADEME. September 2015.

11 Évaluation environnementale du recyclage en France selon la méthodologie de l'analyse de cycle de vie. FEDEREC, ADEME, 2017.

This example illustrates the complexity of environmental footprint measurement, which is highly dependent on the quality of available data and built-in assumptions. Often, there are methodological difficulties. What limit does one set for the system under study? What is a legitimate benchmark for comparing the proposed solution? What do we measure, and how do we prioritise very different environmental impacts? How do we interpret the results? How do we take into account other - economic and social - impacts? These measurement issues have been dealt with extensively in a previous EpE publication entitled «Circular Economy Indicators»<sup>12</sup>. The methods set out focus on measuring the environmental benefits of circular economy projects, even where the calculated benefit of a project has yet to be shared among the players.

Indeed, greenhouse gas emissions assessments alone are not sufficient to quantify the environmental benefits that such initiatives supposedly bring. To be comprehensive, assessments should include measurement of the impact on each component of the environment, as illustrated by the concept of planetary boundaries, including measurement of the effects on biodiversity, on the consumption of finished raw material resources, on biomass, on land use, on biogeochemical cycles, on ocean acidification, and on the deterioration of the ozone layer.

How does one match the economic interests of players with necessarily nuanced environmental judgements? Trade-offs are local and negotiated between various players, while the effects of an activity can be measured only through experience.



**Figure 5**

*The planetary boundaries concept presents a set of nine planetary boundaries within which humanity can continue to develop and thrive for generations to come.*

© J. Lokrantz/Azote based on Steffen et al. 2015.

<sup>12</sup> <http://www.ep-e-asso.org/en/circular-economy-indicators-for-businesses-february-2019/>

## 3 OTHER PUBLIC ACTIONS

Companies interviewed in this publication acknowledge that several types of public action can stimulate the circular economy.

### **Raising awareness and building a shared vision of the circular economy.**

The circular economy suffers from lack of visibility among consumers, businesses, their employees and regional players. Its deployment requires renewed focus on education and mobilisation, largely driven by public authorities. Yet the issue is often pushed aside within companies in favour of direct emissions reduction or actions to promote biodiversity.

### **Strengthening the organisation of the economy along circular lines.**

Market uncertainties, limited access to finance or information, and lack of insurability often hamper the development of the circular economy. Governments use various methods to address these issues.

### **Defining an incentive-based fiscal and budgetary framework could remove some of those obstacles.**

In particular, factoring environmental externalities into the price of raw materials and thus of consumer products would give recycling products a competitive advantage over conventional offerings. The forthcoming investment programme earmarks significant amounts towards this end.

The inclusion of circular economy criteria in public tenders would enable governments to lead by example and encourage the provision of circular products and services.

By **developing insurance products that promote the circular economy**, insurers have a valuable role to play in reducing the risk profile of projects and ensuring better access to private investment.

As part of the European Commission's Sustainable Finance Action Plan, **the taxonomy** of sustainable activities under development includes a «circular economy» pillar aimed at standardising measurement indicators at European level and, consequently, better channelling financial flows into the circular economy.

Government support for the development of **new technologies** is also a lever. For example, the setting up of a strategic committee on the circular economy by SUEZ and the French Federation of Blockchain Professionals (FFPB) is supported by the Ministry of Ecological Transition.

What follows is a concrete example of how blockchain can be applied to the circular economy. SUEZ recently announced the launch of CircularChain<sup>13</sup>, a technology dedicated to the traceability of transactions of sewage sludge used as organic correctives in agriculture to replace some mineral fertilisers. The storage and instant sharing of sludge analysis results among all players has enabled farmers to feel confident about the quality of the correctives and the absence of a possible health risk, treatment plants to gain better visibility of their recovery prospects, and public authorities to have easier access to traceability data in the event of an audit. The improved recovery of sludge for agricultural purposes offers opportunities to reduce the consumption of both nitrogen fertilisers (whose synthesis is very energy intensive) and phosphorous fertilisers (derived from the exploitation of limited reserves).

13 <https://www.suez.com/fr/actualites/communiqués-de-presse/suez-lance-circularchain-blockchain-economie-circulaire-et-accompagne-la-transition-agricole-clef-de-voute-alimentation-durable>

# CONCLUSION

The circular economy offers a much-needed alternative to the dominant linear model behind major environmental disruptions. In France, despite its clear advantages, its development continues to be hampered by a series of obstacles stemming from the disparity of material flows, lack of technology and access to information, market and regulatory instability, and persistent psychological barriers.

For three years, EpE has fostered wide-ranging discussions between member companies and circular economy experts in its «Natural Resources» committee, chaired from 2017 to 2020 by Rachel Kolbe Semhoun, CSR director at InVivo group. The initiatives undertaken demonstrate the potential of partnerships to overcome obstacles to the deployment of the circular economy. By collecting and analysing evidence, we have been able to list the partnership by broad groups of objectives pursued and main types of governance, as defined in the conceptual model developed by the research team at the ESCP Chair of Circular Economy and Sustainable Business Models.

In addition to the ingenuity of the players interviewed, it has become clear that governments often play an indispensable role in organising economically viable circular economy systems by providing financial support during the early stages of development, or establishing a regulatory framework for the circular economy, in particular through extended producer responsibility schemes.

The findings confirm the opportunities for the circular economy created by alliances between players. By pooling needs, knowledge, resources, risks and investment, it is possible to get the most out of resource flows at local level, reduce market instability, and promote new players to organise schemes. Furthermore, alliances enable deployment in new value chains of disruptive innovations stemming from extensive research.

Our analysis of different types of partnerships in this publication suggests that establishing governance structures to ensure equitable sharing of value over time between partners is key to the success of joint operations, be they centralised, distributed or digital.

In sum, partnerships are both the outcome and the means to strengthen collaboration among players in support of the circular economy and, more broadly, the ecological transition.

The landscape of the circular economy is constantly changing. In France, enactment of the circular economy's anti-waste law will accelerate some transformations and, at European level, the «circular economy» pillar in the taxonomy of sustainable activities could set international standards. The question is will these developments suffice to establish the circular economy as a new way of life and a solution for preserving our environment?



*Partnerships are both the outcome and the means to strengthen collaboration among players in support of the circular economy and the ecological transition.*



## About EpE

Founded in 1992, Association Française des Entreprises pour l'Environnement (EpE) comprises some 60 large French and international companies across all sectors of the economy that share the vision of the environment as a driver of transformation, and work together to better factor the environment into their strategies and day-to-day management.

The main activity of EpE takes the form of permanent or temporary committees and working groups focusing on issues such as climate change, the links between environment and health, biodiversity, natural resources, oceans and digital technologies. Some of its works are available as publications on the EpE website:

<http://www.epe-asso.org/en/documents-and-reports>



## About the ESCP-Deloitte Chair of Circular Economy

Founded in September 2018, the ESCP-Deloitte Chair of Circular Economy was conceived as a platform for collaboration between academics, students, companies and institutional players to create sustainable and circular business models. The chair has three complementary fields of action: research, teaching and holding conferences and events. Training provided by the chair shapes the curricula at ESCP. In 2019, 500 students were trained in ecological transition issues under Master in Management and Executive MBA programmes. In the circular economy specialist courses, about 130 students work on entrepreneurial projects and programmes proposed by Deloitte and other partners.

Several prizes are awarded each year by the ESCP-Deloitte Chair in recognition of students' work related to the circular economy and sustainable development, including a prize for the best dissertation and one for the best sectoral study in the Designing Tomorrow course.

Twelve events and conferences have been held by the chair, with over 1,500 attendees - a number way above the ESCP community. As well as producing numerous academic publications and papers, the chair's participation in the R2Pi European research project reflects its research drive.

The Chair team: Aurélien Acquier, ESCP Professor and Scientific Co-Director of the Chair; Valentina Carbone, ESCP Professor and Scientific Co-Director of the Chair; Pierrick Drapeau, Manager at Deloitte Sustainable Development; Anne-France Mariacher, ESCP programme manager of the Chair; Philippe Kuch, Manager at Deloitte Sustainable Development; Marie Georges, partner at Deloitte Sustainable Development.



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**Claire Tutenuit,**  
Managing Director of EpE

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# Partnerships: cornerstone of the circular economy



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