CLIMATE INNOVATION INSIGHTS | Series 2, No. 8
Accelerating the Transition to Sustainable Production Systems

INSPIR'ECO: Applying Circular Economy Principles to Industrial Parks

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Key messages

- Increasing the competitiveness of eco-industrial parks (EIPs) is an important driver for the adoption of industrial and territorial ecology (ITE) initiatives, which are underpinned by circular economy principles.
- Early and ongoing commitment by local governments, combined with 'quick-win' approaches that offer immediate, low-risk returns on investments, help EIPs to become established.
- Public-sector involvement and risk-sharing are strong incentives for private stakeholders to get involved in ITE initiatives, and help to increase their success.
- Digital services help make ITE initiatives more successful by highlighting the impact of existing and potential symbioses, but they require data-sharing agreements.

Introduction

The global growth of industrial and territorial ecology (ITE) initiatives[1] over the last 50 years has led to the emergence of eco-industrial parks (EIPs). ITEs are based on the principles of the circular economy, where the waste from one industrial process becomes an input to another, cycling materials and creating by-product exchanges locally, so reducing costs and lowering greenhouse gas emissions. Successful examples include Kalundborg, Denmark, established in the 1970s,[2] and Tianjin Economic Development Area in China,[3] although other EIPs, such as Porto Marghera in Venice, Italy, have failed.[4]

These mixed results suggest that stakeholders in EIPs – either established parks or potential ones – cannot rely on a universal recipe for success.[4] It appears that to be successful, EIPs must consider the local context, for example competition for physical resources[5] and the extent to which the ITE approach is socially embedded.[6] Economic benefits are some of the main drivers for establishing ITE initiatives,[7] while the extent to which 'life-cycle thinking' is embedded in legislation and regulation, particularly within the European Union, also influences their development.[5]

This *Insight* shares the lessons learned from INSPIRA, an industrial inland port located on the Rhône River in France (about 60 km south of Lyon), from the perspective of ENGIE, a key actor within INSPIR'ECO and a French Climate-KIC partner. The INSPIR'ECO project, which is underpinned by an ITE approach, is used as a case study to examine the determinants of success, which include the role of digital services in accelerating stakeholder collaboration and attracting new businesses.

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Climate-KIC is supported by the EIT, a body of the European Union

The emergence of INSPIRA

The first company – a gas producer – moved to the INSPIRA EIP in 1976, followed a few years later by a chemicals company. By the 1990s, the area included the first chemistry platform in France.[8] INSPIRA evolved into a multi-purpose hub accessible by canal, railway and road and, during this period, several interdependencies or symbioses were established, such as heat by-product exchanges. In 2009, Syndicat Mixte INSPIRA (SM INSPIRA) was created to organise, manage and further develop the site, soon recognising an opportunity to incorporate sustainability into its development to become a leading European EIP. ITE has been a key component in the site's development ever since.

Today, INSPIRA covers 330 hectares and includes 23 companies, predominantly in the chemistry, glass and construction sectors; 70 per cent of these are members of the recently created association, INSPIRA Enterprises. Another 160 hectares remains open for further industries. Figure 1 illustrates the development of INSPIRA since 1976.

INSPIR'ECO: the evolution of ITE at INSPIRA

In February 2015, SM INSPIRA launched the research–innovation project INSPIR'ECO in partnership with ENGIE, TREDI (Group Séché Environnement), Compagnie Nationale du Rhône (CNR) and Ideas Lab with the aim to identify synergies among the different industries on the site. The project included workshops for on-site enterprises, an inventory of industrial flows within the park (e.g. energy, water, materials) and a benchmark study of international port-based ITE initiatives. This study identified success factors for establishing EIPs, which include having an EIP manager and implementing 'quick wins' for short-term, low-risk returns on investment. It also illuminated some potential pitfalls, such as lack of stakeholder cohesion or communication on the benefits of the EIP or the ITE approach.

Figure 1. INSPIRA's development (1976–2018)

1976	• First company moves to the INSPIRA inland port site, which is situated in the Rhône Valley, approximately 60 km south of Lyon
1980s–90s –2000s	• Other enterprises move to INSPIRA and the industrial port is established • Industrial interdependencies are formed
2009	• SM INSPIRA is established • INSPIRA becomes the second-most important industrial site in the Rhône Valley
2015	• The INSPIR'ECO project kicks off, funded by the Region Auvergne Rhône Alpes, the Grand Projet Rhône-Alpes Rhône-Médian and SM INSPIRA • INSPIRA Enterprises is launched
2016	• Proof of concept for INSPIRA's digital service is established by the INSPIR'ECO project • In April, ENGIE launches Climate-KIC's 'PLACE'in' project, in partnership with Centre de Recherche en Gestion of the Ecole Polytechnique and Provadis School of International Management and Technology
2017	• The 'BE CIRCLE' project begins, funded by Climate-KIC
2018	• INSPIRA aims to make its digital service live

Source: SM INSPIRA

The project established that a digital platform to visualise EIP material flows and associated costs and benefits would be a valuable contribution. This would optimise synergies between the companies already on site and new industries moving there in the future. The key parameters were identified as: a) available land and potential locations within the site for new businesses; b) compatibility of inputs and outputs; and c) potential cost reductions. This led, in 2016, to a proof of concept for the digital service in the form of a web-based interface.

Proof of concept and challenges of developing digital services

The technical specifications were refined further through an iterative process, working with all INSPIR'ECO partners. This resulted in a web-based interface highlighting the optimal locations and management of resources together with potential symbioses. The algorithms used consider the investment and operational costs of establishing a new symbiosis over ten years, while further indicators are used to inform the contribution of each industry to the EIP's overall environmental performance. This interface facilitates the assessment of the potential contribution of a new enterprise to industrial symbioses, and the resultant environmental benefits, before it moves to the INSPIRA EIP. In addition to benefits, the digital services raised two main challenges.

Representing the needs and interests of diverse stakeholders: Failure to represent all stakeholders could result in a service with limited relevance and thus little added value. To combat this, the project developed profiles for six types of user, each with differing needs: an EIP manager, an economic development officer, a utilities operator, a land planner, a consulting engineer and an industrialist. This helped develop six value propositions consistent with potential markets, refining functionality of the digital platform.

Accessing data: Some of the data required to populate the digital interface were difficult to collect, due largely to the newness of the initiative and the absence of a proper

data-sharing agreement among on-site enterprises. This highlighted two gaps that a subsequent project, BE CIRCLE, would seek to address: a) establishment of appropriate non-disclosure agreements with data owners; and b) development of a database to address data gaps. See box for more information on the relevant projects and partners.

Fostering social interconnections around ITE

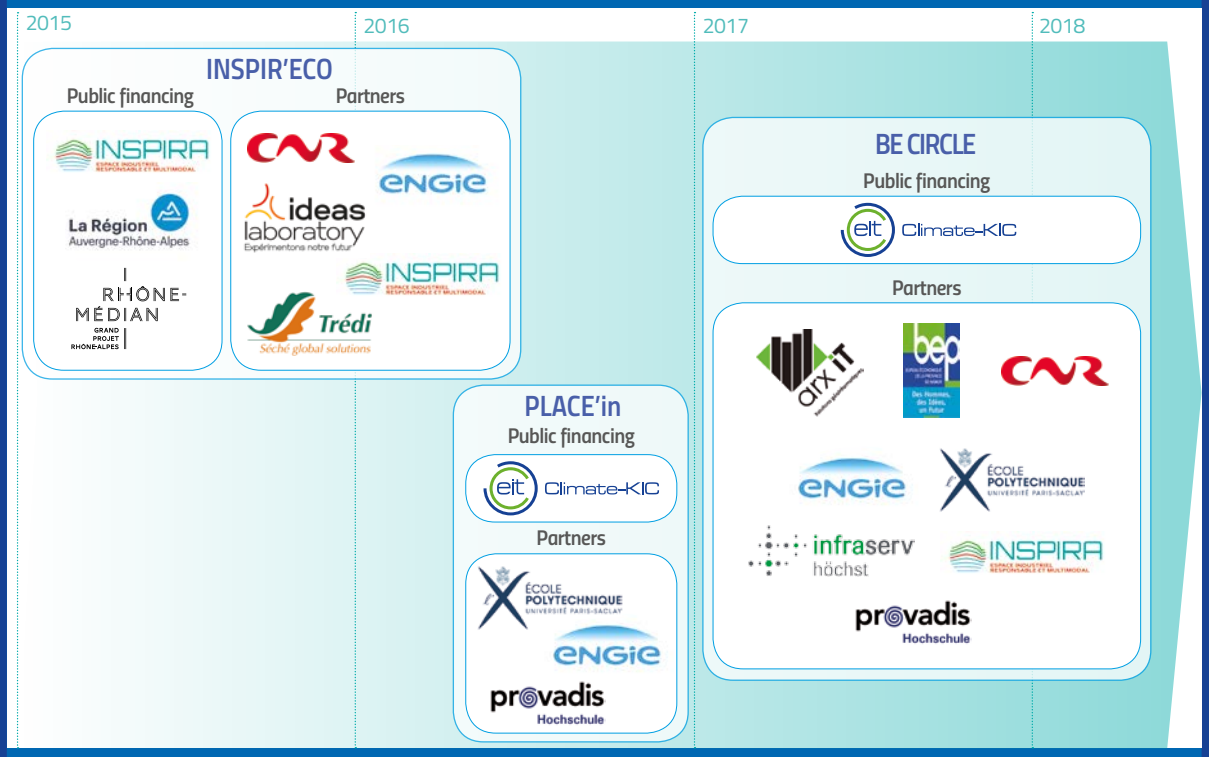
SM INSPIRA, which represents local governments through its members the Département Isère (Presidency), the Région Auvergne Rhône Alpes (Vice Presidency) and the Communauté de Communes du Pays Roussillonnais (Treasury), played a crucial role in instigating the transformation of INSPIRA into an EIP. Firstly, having a clear development and communications strategy, and giving INSPIRA its own identity based on a sustainable multimodal development, created transparency and helped to build trust between the various partners. Secondly, it invested in an ISO 14001 certified environmental management system and joined the Association PALME,[9] a national 'best practice' network of sustainable industrial parks. This illustrated the EIP's commitment to an ITE approach and enhanced its credibility. Furthermore, SM INSPIRA also sought stakeholders to form the INSPIR'ECO consortium, which it then co-funded to accelerate the development of an ITE

INSPIRA inspires beyond its boundaries

To determine the relevance of the digital services interface beyond INSPIRA and assess the wider market, in April 2016 ENGIE launched the Climate-KIC project PLACE'in, in collaboration with the Centre de Recherche en Gestion of the Ecole Polytechnique and the Provadis School of International Management and Technology. This project showcased the web-based interface when interviewing 15 managers from eight industrial parks, ports and public authorities across France and Germany.

The interviews confirmed the value of the digital service and highlighted an important requirement among end-users: the service needed to enable EIPs to differentiate themselves and market their relative comparative advantage. These findings informed the development of a value proposition and business model for the digital services interface. The current phase of development, funded by Climate-KIC through the BE CIRCLE project, aims to deliver an operational digital service during 2018. Figure 2 illustrates how partners from INSPIR'ECO have remained engaged in the subsequent PLACE'in and current BE CIRCLE projects respectively.

Figure 2. Partners in the INSPIR'ECO, PLACE'in and BE CIRCLE projects



Source: ENGIE

at INSPIRA. These strategic decisions provided a solid base for building further local initiatives based on the circular economy.

Another important factor in INSPIRA's transition to an EIP was the development of the digital services interface. This maintained motivation among stakeholders by providing an early tangible result. It encouraged them to remain united around the original vision – an EIP based on the circular economy – and even won over those who were initially sceptical.

The mixture of public and private sector members in the team developing the digital services concept allowed most stakeholders' interests to be accommodated. Sharing costs and risks among contributors allowed parties to work together. They were able to deliver outputs that provided a return on investment and increased the likelihood of success.

Conclusions

EIPs are being promoted as an important policy mechanism for more sustainable management of industrial resources in light of climate change and increasing resource volatility.[7] While ITE is not a new concept, it plays a pivotal role in circular economies. This case study highlights three factors that are essential to establishing or making the transition to an EIP: a) communicate a clear development strategy and build the EIP's identity; b) implement quick wins; and c) identify or develop tools to support ITE initiatives.

Managers of industrial parks embarking on the transition to becoming an EIP need to recognise the need for middle- and long-term visions, since project development and realisation followed by implementation of results can take several years. The authors believe that the local government's unwavering commitment, both politically and financially, to INSPIRA's transition to an EIP enabled the processes discussed in this *Insight*.

In terms of the climate impacts of INSPIRA, an early estimation suggests that, if successful, implementing ITE initiatives enabled through the digital services interface could reduce greenhouse gas emissions by 14 per cent.[10] Given the relative infancy of the transformation of INSPIRA with respect to industrial symbioses established at the site, the impact is too early to gauge. However, in addition to putting the digital service into operation, a key deliverable of the BE CIRCLE project is to refine this estimation.

Endnotes

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About Climate-KIC

Climate-KIC is Europe's largest public–private partnership addressing climate change through innovation. With a focus on sustainable production systems, Climate-KIC is building a new foundation for industry in Europe – developing climate-friendly and economically viable circular models of manufacturing for a zero-carbon economy. Climate-KIC is supported by the European Institute of Innovation and Technology (EIT), a body of the European Union.

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About ENGIE

ENGIE is a global energy player in electricity, natural gas and energy services. Its business models are based on responsible growth and tackle the major energy challenges in the transition to a low-carbon economy.

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Editing, design, and layout: Green Ink (www.greenink.co.uk)

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