

Low Carbon Industrial Manufacturing Parks



The challenges facing the European Industrial Parks

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More information

Public LOCIMAP reports will be available through its website at www.locimap.eu

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1. Summary

This is the first of a series of short papers setting out how Europe can look to build on its existing energy intensive industrial complexes. These can be developed in new ways to secure essential improvements in economic and environmental performance. If these complexes are supported and developed they offer a way for Europe to meet the challenges of competition and energy costs whilst maintaining employment and environmental standards.

2. Introduction

In 2010 a group of 14 European companies and organisations responded to the European Commission's call to examine the future for low carbon manufacture at integrated industrial complexes (Parks).

The LOCIMAP - Low Carbon Industrial Manufacturing Parks - project is the result and has been looking critically at the way European Industrial complexes might develop strategies and technologies to meet the challenges foreseen.

The energy & resource intensive sectors which lie behind the development of the parks we have in Europe are a very significant part of the economy. Nearly 7 million jobs and over 450,000 companies are involved¹.

The project team comes from these sectors and represents 4 industrial parks and a number of sectors all with intrinsically high energy demands. The commitment of the members to novel and sustainable approaches is absolute. Driven by the need to improve competitiveness in the face of global competition from regions with lower energy costs and different regulatory regimes but responding also to emerging public, legislation and taxation pressures, the parks have already made great progress in improving the internal operating efficiencies. However, more is needed.

The LOCIMAP project aims to provide fresh insights into the technical and organisational changes needed to secure the future for the partner sites and others like them across Europe.

Tarragona Industrial complex



Wilton International



Kokkola Industrial Park



Kalundborg Industrial Park



Figure 1. LOCIMAP partner sites

¹ Spire Roadmap 2012. Found online at <http://www.spire2030.eu/>

3. The challenges facing the European Industrial Parks

Industrial parks are the backbone of the European industry.

The existing parks and their occupants today face possibly the most serious challenge since their foundation in the early years of last century.

In Europe, each park is usually focused on a single industrial sector (Chemicals, Iron & Steel, etc.) for historical reasons. The development was often initiated by a single owner which led to integration and optimisation of the processes directly associated with their business. Other models where significant cross sector integration is achieved are much smaller in number.

LOCIMAP work shows that there are a handful of locations in Europe where for example Iron & Steel and Chemical plants are adjacent. In none of these has significant integration occurred. A notable exception – and a LOCIMAP project partner – is at Kalundborg in Denmark where significant benefits have been seen from efforts to identify opportunities for integration between different industry sectors over the last 20 years (Fig. 2).

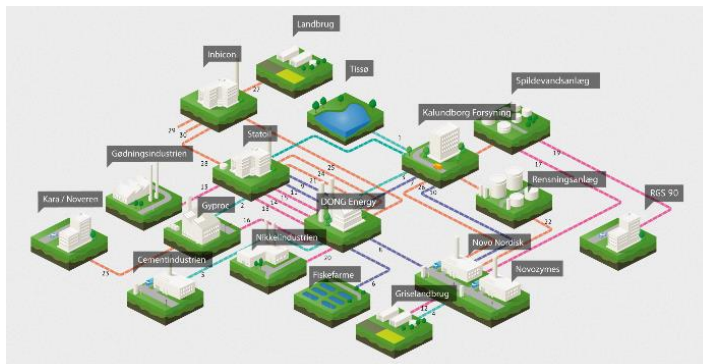


Figure 2. Kalundborg Industrial Symbiosis

Europe's industrial parks have to deal with enormous changes in global supply chains, markets and competition in each of the industry sectors. They also face challenges to keep a balance between their own objectives, industry objectives and citizen needs, especially in regard to environmental constraints.

These challenges fit into 3 broad areas:

Physical resources

During the past decade, international markets have seen prices of all major commodities including energy and non-energy resources (i.e. metal, mineral) to be increasingly volatile. At the same time, resource scarcity in the European Union (EU) has raised concerns of access and reliable supply of energy and non-energy resources and its potential consequences to economic growth.

EU largely depends on energy and feedstock sources, especially oil and natural gas, coming from abroad. The recent crisis in Ukraine is a further example of the uncertainty facing EU energy intensive industries.

The public debate on the controversial issue of shale gas exploration in Europe only complicates matters further, and Fig. 3 shows the impact of this on investment plans².

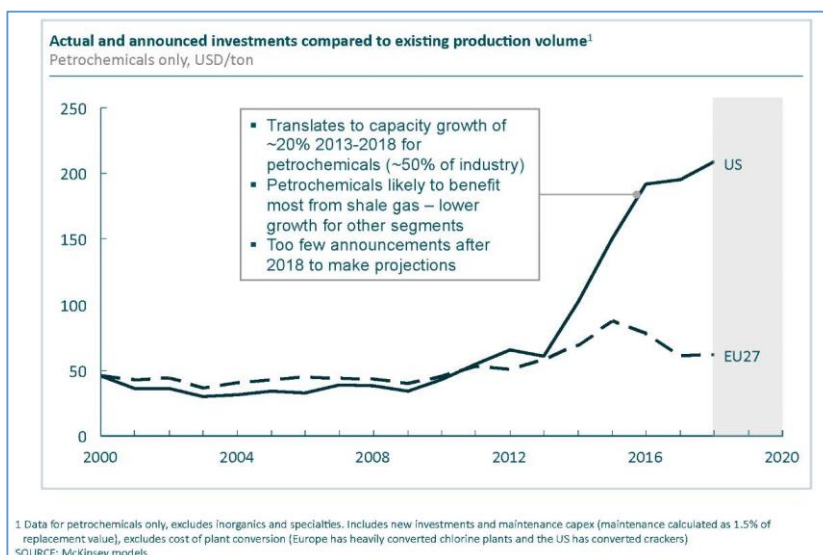


Figure 3. Investment trends for Europe and the US

² "Europe's low-carbon transition: Understanding the challenges and opportunities for the chemical sector", European Climate Foundation, March 2014.

Environment

The general concern over climate change mobilised the European Commission (EC) to set a thorough climate policy framework. Within this framework, the EC has set several targets on future greenhouse gas (GHG) emissions and has also published an energy roadmap for decarbonisation of many of the sectors by 2050. The EU industrial sector, with processes which are energy intensive for the foreseeable future, is looking to adapt into new conditions and follow the decarbonisation pathway to 2050. Several scenarios have been developed in this regard, all of which include:

- increase in energy efficiency
- increase in energy use from renewables, at least 55% of total energy use even in scenarios with high nuclear or fossil fuel with CCS consumption.
- flexible power systems and market rules, smart and interconnected grid systems and energy storage systems
- -83 to -87% GHG reductions compared to 1990 levels

The EU emissions trading system (EU ETS), the cornerstone of the EC's climate policy, aims to help member states achieve GHG emissions targets for 2020 in a cost-effective way. However, there is a concern that industries may decide to relocate production facilities outside of Europe when carbon prices rise (carbon leakage) and if abatement costs prove prohibitive.

Social & Economic Issues

The expectations of European citizens from EU industrial parks and the industry in general, go beyond employment and economic growth. They embrace environmental issues and other community needs, such as affordable district heating and cooling, waste management and waste water treatment utilities, etc.

It is clear from the interest in resource efficiency across the member parks' local communities that practical steps to use the parks' waste resources – generated in part through the same competitive pressures described above – are very much in the frame.

The evidence from the project is that this integration is at a very modest stage but projects can be identified. For example, the expanding proportion of renewable energy leads to long term opportunities for parks to develop their infrastructure and processes to take advantage and potentially support communities in making better use of the variable supply.



Figure 4. Energy from Waste Facility now under construction at Sembcorp Wilton Park. Source: www.pennenergy.com

4. A way forward

It is obvious that there is a need for the EU industry to address these challenges in a collective manner. EU industry has already taken action through the SPIRE Public-Private Partnership (PPP) which aims to develop *enabling technologies and best practices along all the stages of large scale existing value chain productions that will contribute to a resource efficient process industry*³. The ambitions of SPIRE for 2030 are to reduce energy intensity from fossil fuel and non-renewable, primary raw material intensity by up to 30% and 20% respectively from current levels. It is expected that the contribution in CO₂ emissions reduction will be about 40% compared to current levels.

The LOCIMAP project, aligned with the SPIRE concept, is developing answers on the challenges by focussing on the role and opportunities facing the EU industrial parks.

The conventional routes for improving resource efficiency, e.g. improving process technologies, face the problem that this process has been in place for decades. The capital intensity of the sectors involved mean that change is slow unless attractive investments can be identified. This is where cross-sector process integration within the concept of Industrial Symbiosis (IS), as examined within the LOCIMAP project, comes into play. The fact that this area has been underplayed is confirmed by other work (see ref. 2).

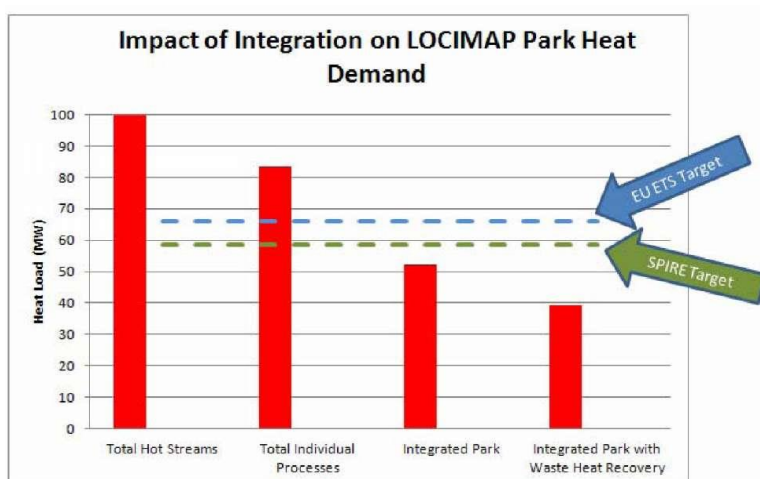


Figure 5. Impact on industrial park heat demand after applying LOCIMAP principles.

At the same time, the environmental benefits are significant. The analysis done in the LOCIMAP project shows that integrated industrial parks designed appropriately for process integration with optimised heat recovery have the potential to exceed the EU ETS 2020 and SPIRE 2030 targets (Fig. 5).

Examples from LOCIMAP partners prove too that the socio-economic benefits of a park's integration with the nearby community are considerable.

The existing resource and energy intensive industry in Europe is, as has become clear from the work of the partners in LOCIMAP, traditionally been sector focused, and this provides

opportunities for things to be done very differently. Industrial Symbiosis seems to be the answer, but cannot be considered as a panacea. There are obvious questions as to how IS can be applied to existing industrial parks, what key technologies need to be developed and deployed, and what business models can support this change.

LOCIMAP partners will propose answers to these questions in future papers which will address:

- Industrial Symbiosis
- The Smart Future Park
- New Operational & Organisational Structures

³ <http://www.spire2030.eu/about-a-spire>