

# The Future For Industrial Chemical Parks

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#### **NEPIC - The North East of England Process Industry Cluster**

Set up by industry to develop the long term future and improve competitiveness of the process sectors in North East England.

NEPIC is a 'cluster' organisation that represents 720 participants drawn from across the process sector and includes representation from Pharmaceutical, Petrochemical, Fine & Speciality Chemicals, Bioresources/Biotechnology, Polymer & Rubber, Commodity Chemical and Supply Chain companies based in North East England.

> Over 35,000 people employed

> A further 200,000 are indirectly employed

- Generates over £26 billion (over 30%) of the regions GDP
- It is the regions largest industrial sector





NEPIC's strategic programmes involve senior personnel from industry and the research base, focusing on several strategic themes of crucial importance to the process sector.



## **NEPIC Cluster Strategy**

Vision - a world class, high value process industry cluster based on innovative, sustainable high tech manufacturing.

Strategic Themes:

- □ Collaboration, growth and investment.
- □ Improve connectivity in the supply chain
- □ Increase international awareness/promotion of the cluster and process industry.
- Develop and support innovative projects low carbon.
- Develop and grow business opportunities for SMEs.
- □ Support and develop NSAPI activities (grow apprenticeships).
- Grow cluster membership.
- □ Continue to provide a Voice for the Process Industry.









#### **Tees Valley Integrated Complex**

#### **Tees**ValleyUnlimited



# LOCIMAP

# Low CArbon Industrial MAnufacturing Parks

#### European energy intensive manufacture

- Rising energy costs
- Carbon taxation
- Competition for investment
- Parks effective for chemical sector
  - Energy integration
  - Recycle and reuse
- How might parks be expanded
  - Wider industry base
  - Renewable feedstocks and products
  - Additional integration
- Promote the benefits of expanding parks
  - Support members growth objectives
  - Secure further support







## **The Ambition**

The goal was to explore the potential for a step change in performance in Europe

What we need to underpin the future of manufacturing in Europe is a new industrial revolution

...explore a range of parameters that could make such a change has examined not only technical but also economic and business (and even political) factors

Europe alone, of all the major continents has a relatively stable population and therefore if we can indeed close the material loops then we may consider that we have at least our inventory residing within the existing techno-sphere.

Coupled with the high-value innovative and entrepreneurial landscape that we need to make this happen do we indeed have the format for this new industrial revolution



## **Project Objectives**

- Develop a future model for Industrial Parks,
- Understand opportunities parks offer to improve resource efficiency
  - Across industry sectors,
  - Along industry supply chains
  - With energy suppliers
  - By integration with community
- Assess the benefits to industry and community
- Promote these benefits to industry and the community
- Identify opportunities for innovation
- Identify and promote new business models for parks



## **Project Participants**

NEPIC	UK	Process Cluster
Terreal	France	Clay Products
BFI	Germany	Steel
BASF	<mark>Spain</mark>	Processing Park
Link2Energy	UK	Industrial Symbiosis
ECSPP	Netherlands	Network Parks
Insead	France	Business School
Sembcorp	UK	Utility provider and WILTON UK Park Operator
KCL	Finland	Paper R&D
IVL Svenska	Sweden	Environemental & Paper R&D
Kokkola Industrial	<b>Finland</b>	Processing Park
Park		
Kallundborg Kommune	Denmark	Processing Park/Industrial Symbiosis
Conoco	UK	Oil Refining
Parsons Brinckerhoff	Poland	Engineering Consultant
Cemex	UK	Cement



### Wilton Background

- The Wilton International Site, located in the North East of England, in the Tees Valley is one part of a large industrial/process area with a long history of salt, steel and chemical production which date back hundreds of years.
- Sembcorp acquired Wilton utilities and services business in 2003 from its then owner Enron, however, Wilton was first developed by ICI chemicals in the mid 1940's to build upon post war demand for polymers and petrochemicals.
- The original concept for Wilton was one comprising a centralised utility and services facility providing power, heat, water plus
  other utilities to a fully integrated chemical complex under the single ownership of ICI. The first major development at Wilton
  was the centralised power plant (which remains to this day) and the process units followed shortly after.
- Wilton has seen dramatic changes over its 70 year life, one of the most significant being the divestment by ICI of its business which began in the 1990's and has led to Wilton today operating as a multi-customer site with global businesses.



## **Global Trends**



In the coming decades, megatrends – some known and anticipated such as population growth and ageing, whilst others such as urbanization, resource scarcity, shifting economic power and climate change will reshape global demand in virtually every sector.

The chemical process industry is already undergoing fundamental changes in response to these megatrends. For example, bio-based feedstocks have been introduced into the value chain enabling technologies and end markets to converge. Furthermore, we continue to see significant investment in new production capacity shifting to the Middle East and Asia, and a dramatic recent shift in investment in the USA. Europe/UK manufacturing industry needs to react and adjust to the reality to date and additionally, the emerging realities also.



## **The Challenges for EU Parks**

- Location v Growth Markets
  - Investments
  - New Parks
- Feedstock and Energy
  - Costs and Availability/Security
  - Environmental Targets
- Driving Innovation
- Attracting Investment



WORLD PRODUCTION OF CHEMICALS BY REGION





## **Future Parks Vision**

- Industrial Symbiosis in action
- Renewable raw materials and energy sources.
- CHP systems with higher efficiency across wider heat/power ranges
- Community energy integration
- Expanded use of ICT in energy and resource management and site optimisation
- New business paradigms with increased flexibility in manufacturing configurations
- Technical breakthroughs in process integration and carbon reduction
- Expanded elements of supply chains



#### **Messages for European Industry**

## **10 PRINCIPLES**

## FOR A LOW CARBON FUTURE



## **List Of Principles**

**1. Industrial Symbiosis is the cornerstone of a low carbon industrial manufacturing park.** 

2. Process Integration techniques that define minimum utility targets for individual processes may be applied to define targets for industrial parks.

3. Most of the individual technology roadmaps cite technology advances as part of the plan for 2020 and 2050 targets.

4.0 Waste(d)/residual heat presents a major opportunity for improving the CO<sub>2</sub> performance of our industrial parks.





**5.** In much the same way as for waste(d) heat it is will be as important to plan for  $CO_2$  capture, utilisation and storage (CCUS) at the heart of future industrial (LOCIMAP) parks..

6. The major themes within LOCIMAP, the optimisation of steam and power systems are not possible to realize within **Supply Chains** Integration unless the manufacturing units are co-located, or because of a desire to achieve optimisation they choose to co-locate.

**7.0** The **Waste Industry** will play an increasing role within the industrial landscape of LOCIMAP parks through the provision of feedstock and fuel.

**8.0 Green Chemistry** will play an increasing role within LOCIMAP Industrial Parks





**9.** Concerns by LOCIMAP partners regarding **Carbon Leakage**;

**10.**To realize the benefits identified in **LOCIMAP** it will be necessary to challenge approaches to business.



#### **Three Barriers**

**1. LOCIMAP** findings could have been/can be implemented now.

What is needed is a culture change to think and work cross-sectorally.

**2. Local government and planning.** 

A new investment is best served by optimum integration with existing facilities.

The answer to a low carbon economy is a thermodynamic one and planning needs to allow for this;

**3.** Some of the opportunities are not economic under the existing landscape.

What is the price of carbon?

How do we introduce measures that deliver the low carbon benefits **without** disadvantaging European manufacturing within a global playing field?



### **LOCIMAP Business Tool**

Demonstrate sustainability benefits of a park location

- Provide a benchmark for driving improvement in sustainability
  - The Locimap Index
- Encourage parks to go further to identify energy & resource efficiency gains.







#### An Integrated Low Carbon Industrial Manufacturing Park Classification Model

This software tool is aimed to assist current industrial parks target low carbon integration opportunities.

It includes a sustainability index concept which reflects not only the business issues but also the carbon reduction opportunities which exist through additional integration of energy intensive processes on the park.

The tool can be used in a number of ways by existing parks to improve their sustainability and address policy and investment issues.

The tool allows parks to assess their own operation in a variety of dimensions and undertake benchmark assessments.

Click to Enter

For further information visit www.locimap.eu





The work has been funded by the European Commission as part of the Framework 7 Programme.



This model is available as a download. For further information please contact either: Louise Staffas, IVL Swedish Environmental Research Institute, <u>louise.staffas@ivl.se</u>, +46 (8) 598 56 448 Malcolm Bailey, Link2Energy Ltd, <u>malcolm@link2energy.co.uk</u>, +44 (1652) 601751

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#### Park Utilities Usage Summary







#### Park Approach to Carbon Emissions & Resource Use



#### CARBON EMISSIONS & RESOURCE USE

Low Carbon Energy Policy Park Reputation – Low Carbon CO2 Utilisation CCSU (Carbon Capture) Renewable Energy Renewable Feedstocks Material Use/Substitution Resource Efficiency Industrial Symbiosis Environmental Policy Energy Policy Low Carbon Businesses Low Carbon Support Low Carbon Support part 2 Transport Emissions Park Low Carbon Profile Low Carbon Markets Low Carbon Downstream Chain Low Carbon Raw Materials

#### Demand Availability Sufficiency з з

6.26 6.95



Weighted average (Demand/Availability)

### **Low Carbon Action Plan**







#### Why we need Industrial CCS:

- Industry coming under pressure from customers and Government to reduce carbon – 80% reduction in CO2 by 2050.
- At its maximum output, regional yearly emissions as high as 13M tonnes CO2
- The only technology available to significantly reduce industrial carbon emissions
- Can't meet legally binding carbon targets without Industrial CCS
- Technologically proven at a commercial scale on industrial plants
- It's an industry 'game changer' and builds on 2 existing CCS competition projects.
- Need to protect and build the existing industry
- Opportunity to attract new investments







#### **The Industrial Partners**

- SSI Blast Furnace ca 3-4M tonnes/pa
- Lotte PET, ca 50K tonnes/pa
- Growhow Ammonia plant, ca 600K tonnes/pa
- BOC SMR, ca 250K tonnes/pa
- NEPIC (as PICCSI)
- National Grid

GrowHow

Co-ordinated by Tees Valley Unlimited as the local LEP





#### **Communications Strategy**





#### www.teessidecollective.co.uk



#### Teesside: A unique industrial cluster ...



of the UK's chemicals industry



Northeast England process industries contributes £26bn to the UK economy

It has Europe's 2nd largest blast furnace





#### ...with major potential to cut carbon





Teesside is home to 5 of the UK's top 25 CO<sub>2</sub> emitting plants

