Cultivating Industrial Symbiosis between Process Industries

Amal Samie Maqbool, Giustino Emilio Piccolo, Brecht Zwaenepoel and Greet Van Eetvelde
Ghent University, EELAB ECM – Energy & Cluster Management, Ghent, Belgium - ecm@ugent.be

Challenge

Setting the frame for industrial symbiosis between different process industries within the EPOS project

Methodology

On the industry clusters, a case study approach is adopted as to cope with the complexity of the system and its actors.

Scope – to gain understanding of the activities with IS potential on an industrial site.

Boundary – EPOS industrial clusters.

A system’s perspective is applied for
• initiating industrial symbiosis
• cultivating cross-sector clustering by using the LESTS framework

Reference

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Explorative LESTS pentagons for EPOS clusters

District clusters
- Existing since 1080s
- Matured collaboration
- Dunkirk cluster
- Visp cluster

Industrial clusters
- New collaborations
- Exploitable IS potential
- Lavera cluster
- Rudnikl cluster
- Hull cluster

Results

Identified IS opportunities in Hull (UK)

Non-technical

Understanding system settings
Identifying wishes, needs, duties engaging change makers

Interpreting system trends
Defining LESTS cluster pentagons & companies SWOT analyses

Steering towards sustainability
Facilitating industrial symbiosis (IS) expanding IS boundaries

Technical

Mapping energy & resource utilisation identifying IS opportunities

Assessing economic & environmental value of substituting energy & resource streams

Proposing circular business models

EPOS

• 5 cross-sectoral clusters
• 3 industrial and 2 district clusters
• 5 key relevant process sectors:

Industrial symbiosis (IS) is a means to achieve resource efficiency via
(1) mutualisation of resources and
(2) substitution of raw materials with wastes or by-products from other sources, thus reducing CO₂ emissions to the environment.

Why process industries?

• 20% of European manufacturing industry (employment and turnover)
• EPOS industries represent
  > 400 manufacturing sites
  > 160 billion euros in sales
  > 500,000 employees
  > 250 million (metric) tonnes of steel, cement, minerals, refining, petro-, bulk & fine chemicals, bio-based products, etc.

The full LESTS survey covers three levels:

1. regional
   » weigh contextual elements
2. cluster
   » engage with IS facilitation platforms
3. company/plant
   » sound IS bottom-up appreciation

ECONOMIC

LEGAL

SPATIAL

TECHNICAL

SOCIAL

TOP-DOWN

FRAME

EPOS industrial clusters.

Chinese state-owned enterprises

Space

• 100% of cement kiln dust

• 100% of CaCO₃ rich reject stream

• 30% of high calorific by-product

• 20% of waste management

High quality residue derived fuel

Cement kiln dust

Landfill

Impacted existing flows
flows/services offset by IS proposed IS flows

Identified IS opportunities in Hull (UK)