EPOS WP 6 - Exploitation

Lead: Strane Innovation

EPOS Tool Market Study

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Strane Innovation (STRANE)

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Summary

This document summarises the main findings from Deliverable D6.1 on the EPOS Market study led by Strane Innovation. This 240-page, confidential report results from a collaborative effort involving 8 authors from Strane, Ineos, Veolia, EPFL and Omya.

The report studied in depth the potential for industrial symbiosis in Europe. More than 1,000 ideas of synergies were generated from interviews with field actors in industrial facilities carried out by Strane and Veolia, a collaborative brainstorming session involving all partners of the EPOS project and a technical assessment carried out by Strane based on the BREF reference documents.

A detailed categorisation framework was developed to classify these ideas depending on their nature (physical resources, equipment, organisations & human resources, immaterial & services) and their type (valorisation and mutualisation). Industrial symbiosis appears to be an incredibly, rich field of initiatives for industries. The valorisation of physical resources is the main potential for industrial symbiosis, followed by the mutualisation of equipment, organisational and service synergies. All EPOS sectors have a potential for industrial symbiosis, especially the steel, cement and petrochemical sectors.

All European industrial sites in the EPOS Sectors of cement, steel, refining and chemicals were mapped by Strane to systematically assess the geographic dimension of industrial symbiosis. Five hotspots were identified in Europe. The largest one covers Northern France, Belgium, the Netherlands, Luxembourg and Western Germany and gathers 20% of the European sites and 40% of the potential couples of sites below 200km. Northern Italy emerged also as an hotspot, especially due to the presence of electric arc furnaces and cement plants. Other medium hotspots were identified around Krakow, Bilbao and the UK Midlands. In between, the density of industrial sites is lower and more stretched.

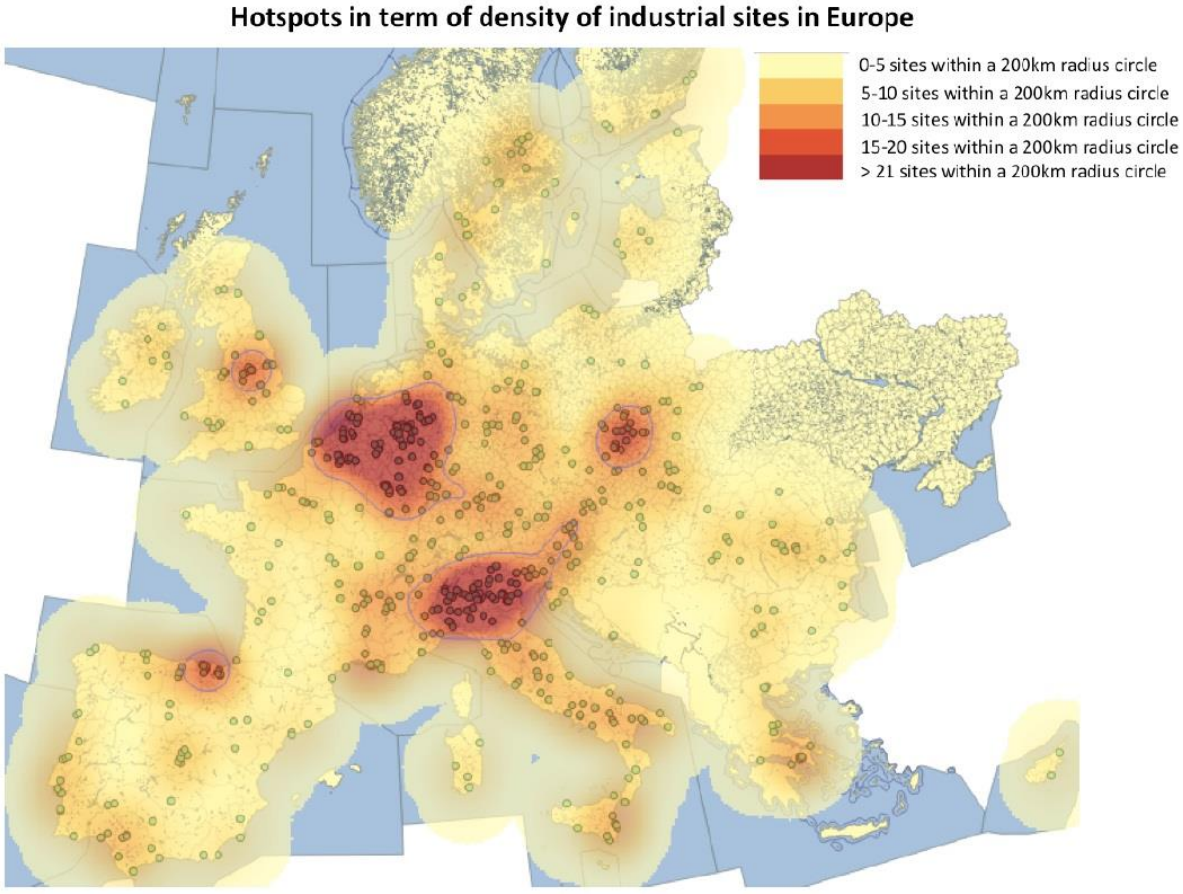

Figure 1: Hotspots in term of density of industrial sites in Europe (Source: STRANE)

An in-depth techno-economic assessment was carried out by Strane on a selection of technically credible set of 12 resources for 28 potential synergies. Only a minor share of the synergy ideas was found to be economically credible. The profile of resources with higher potential for IS appear to be solid or liquid resources, with a high intrinsic value and produced in sufficiently large amounts both on each site and at EU level.

The valorisation of a resource for an energy application was found more difficult than a valorisation of the same resource as a feedstock due to the price competitiveness of traditional fossil fuels.

The example synergies that were found economically credible represent a truly sizeable impact. For instance, the valorisation of tar sludge from steel to cement represents 19 TWh/year, i.e. 1% of the European annual solid fuel consumption or 24% of the annual energy consumption of the cement sector in Europe. Another example, the mutualised treatment of dusts from all EPOS sectors would recover precious metals and critical raw materials representing around 1% of the world production, therefore bringing a major contribution to the resource independency of Europe.

District heating appears as a particularly promising potential for the EPOS sectors. The EPOS sectors may produce 317 TWh/year of waste heat to be used for district heating, to be compared with the current consumption of district heating of 225 TWh/year. 52 million inhabitants live at less than 8km from a site in the EPOS Sector, representing a theoretical heat demand of 346 TWh/year. The first action is however not to use this waste heat but to optimise the energy consumption on site and reduce its overall energy consumption (and thus its production of waste heat), which is the purpose of the EPOS Tool to be developed in the EPOS project. In any case, developing district heating could in theory replace the consumption of fossil fuels, representing 200 MtCO2 savings per year (4% of EU emissions). It must be noted that this is a theoretical potential. Developing a district-heating network requires many conditions to be viable (e.g. long winter seasons, population density and acceptability, a favourable topology).

The market study also assessed the value chain of setting up an industrial synergy, to recommend measures to optimise the solutions to be proposed in the EPOS Toolbox and to identify the most promising exploitation schemes.

This market study represents a strong basis for the rest of the work to be carried out in EPOS, both to develop a generic business case for industrial symbiosis and to develop optimal exploitation schemes and maximise the project impact.