Economic benefits drive industrial ecology

New research suggests that the main driver for industrial ecology initiatives is financial gain, whilst regulation plays a smaller role. Policy does influence their development but this tends to be indirectly through initiatives such as pollution control and waste reduction targets, rather than through direct regulation to enforce or encourage industrial ecology.

There has been a worldwide call to develop initiatives that reduce the environmental impact of our consumption and production. Industrial ecology (IE) seeks to reduce virgin materials and energy used in industry by re-using waste products, by-products and by producing energy from waste, actions which also reduce waste generation and emissions. Two key IE concepts are ‘industrial symbiosis’, whereby organisations share services and resources, and eco-industrial parks, which bring together a group of local companies and communities to exchange energy, water, by-products and waste.

By reviewing previous studies into IE, the researchers conclude that sustainable consumption and production (SCP) policies and IE instruments have developed simultaneously, but that the principles and the two key concepts of IE are not explicitly included in SCP action plans.

Both industrial symbiosis and eco-industrial parks are driven by economic motivations and not by policy. In general, it appears that the main driver for industrial symbiosis is financial gain: companies reduce costs by using the by-products of other companies, avoiding transport costs and buying resources below market prices. Eco-industrial parks tend to be promoted by the state.

At the global level, the United Nations Environment Programme has promoted both industrial symbiosis and eco-industrial parks as instruments to encourage sustainable production systems. EU policy documents do not explicitly identify industrial ecology as a way to promote SCP and rather focus on actions at the product-level. Nevertheless, some Member States, such as the UK and the Netherlands, have launched national industrial symbiosis programmes or planning guidelines for eco-industrial parks. Interestingly, the focus on industrial ecology is much stronger in the Far East, notably in China.

To provide more detail on the development of IE, the researchers focused on a Finnish pulp and paper mill case study. Industrial symbiosis developed over several years when the mill wanted to expand production, and forming an industrial symbiosis was the best financially feasible solution. There were no policy instruments that directly promoted its development or its environmental performance, although several instruments had an indirect effect, such as the introduction of limits on phosphorus and nitrogen load and permits on use, air pollution control and waste reduction targets. It appears taxation on energy and fuel had a limited effect. This is because energy intensive industries in Finland have lower energy tax rates than other energy users due to exemptions and paybacks for large scale energy users.

The study suggests that there is potential for other policy initiatives to encourage IE development, such as rewarding wastewater use or the additional use of waste heat. Another possibility is for local authorities to encourage companies to locate close to each other, helping the creation of eco-industrial parks, perhaps through town planning and land-use regulation. Local authorities could also act as ‘knowledge banks’ or brokers in building and promoting eco-industrial relationships.

The researchers suggest that IE initiatives should be analysed and developed on a life cycle basis, with real benefits identified and documented. This could further encourage eco-competitiveness that can develop synergies with or feed into the existing SCP policy tools, such as environmental permits, ecolabels and future product regulation based on the Ecodesign Directive¹ in Europe.


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