



A framework for Member States to support business in improving its resource efficiency

An Analysis of support measures applied in the EU-28
Measure synthesis

Support for industrial symbiosis

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its resource efficiency

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Support for industrial symbiosis

Measures that support industrial symbiosis aim to enable the sharing among industries of services, utility and by-products/resources (including reuse of waste from one industry by another industry) in order to add value, reduce costs and make environmental improvements. This may include financial support for technology parks/clusters, and/or virtual support for networking and skills.

State support for industrial symbiosis is widely used in two Member States (7%; Finland and Portugal) and used a little in the majority of Member States (20 MS, 71%) (see Figure 1). In six Member States (22%) there is no national policy in place.

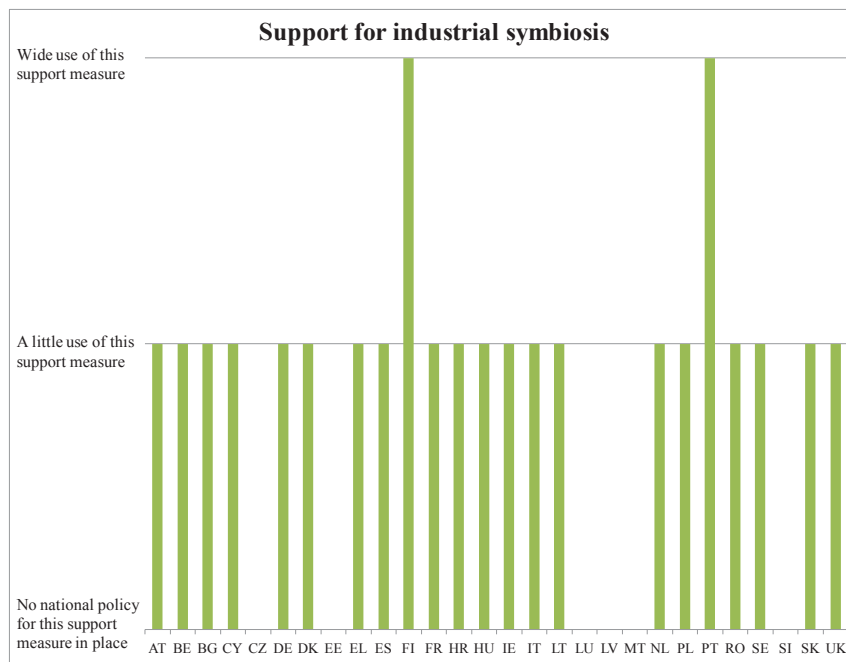


Figure 1: Scope of application of support measure 1 across the EU-28

Good practice examples

In the following section, we provide selected good practice examples for this support measure from five different Member States (see Figure 2; the full list can be found in the separate Annex document): Finland and Portugal (with wide use of this measure); Austria, Ireland and the UK (with a little use).

Support for industrial symbiosis

Scope of application of support measure 1 across the EU-28 & Best practice cases

5 UK's National Industrial Symbiosis Programme (NISP) – launched in 2005

NISP is aiming to help businesses improve profitability, commercial competitiveness and environmental performance. Operating regional services in the UK (in addition to national scope), and globally supporting regional and national programmes in over 20 countries.

More than 15,000 companies have been members of NISP; Impact of 8 years' investment (£36.8M) for the time period 2005–2013 covers 47 million tonnes of material recovered and reused, 60 million tonnes virgin material savings, £1.1 billion cost savings and £1.0 billion additional sales

4 Irish "SMILE Resource Exchange" – launched in 2011

SMILE is a free service for companies offered in the form of regional networking events and an online exchange tool, aiming to encourage the exchanging of resources between companies in order to save them money, reduce waste going to landfill and to develop new business opportunities.

As of the second quarter of 2015, SMILE Resource Exchange has 1,232 members; a total of 60 successful synergies were recorded in 2014, equating to 357 tonnes of material actually diverted from landfill with an estimated value of EUR 398,000

2 Portuguese on-line waste trading platform Mercado Organizado de Resíduos (MOR) – launched in 2010

A voluntary instrument to facilitate and promote waste trading between waste producers and operators through electronic negotiation platforms that support non-hazardous waste trading, promoting the interaction between supply and demand of waste

Financial and administrative support provided by Portuguese Environment Agency (APA) to potential management entities and to the producers themselves/holders of waste and waste recovery entities, e.g. for the launch of trading platforms.

1 Finnish Industrial Symbiosis System (FISS) – launched in 2014

An operations model which provides a systematic way to help companies and other organisations in order to (i) Save costs for participating companies; (ii) Create new business and new jobs; (iii) Encourage new investments; (iv) Increase the use of recycled and reused materials; (v) Save virgin materials and water; (vi) Reduce hazardous waste, GHG emissions and landfilling

350 companies and 2,042 waste/raw material flows involved, 3,300 website readers and 200 newsletter readers overall since its launch.

3 Recycling Network in Styria, Austria – launched in the late 1990ies

Online market place for waste exchange (Online "Abfallbörse") to investigate the material and energy flows of companies in Upper Styria and to identify possibilities for further intercompany use of these flows, aiming to (i) Reduce wastes and establish a circular economy; (ii) Provide incentives to companies for a better waste management; (iii) Increase cooperation between regional companies for finding new recycling solutions

Online platform open for all regions and backed by 7 regions and 2 ministries; more than 150 companies have participated in this network by now.

■ Wide use of the support measure

■ A little use of the support measure

■ No national policy in place for the support measure

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Figure 2: Good practice examples and scope of application for support measure 1 across EU-28

Finland's government undertook a pilot project in 2013-2014 to test how the British National Industrial Symbiosis Programme (NISP) model could be applied to Finland. Based on the experiences collected in the pilot project, the Finnish Industrial Symbiosis System (FISS) was developed and put into practice in October 2014. FISS is an operations model that provides a systematic way to help companies and other organisations create partnerships and new business opportunities through more efficient use of raw materials, technology, services and energy. FISS' objectives are: (i) Cost savings for participating companies; (ii) Creating new business and new jobs; (iii) Encouraging new investments; (iv) Increasing the use of recycled and reused materials; (v) Saving virgin materials and water; and (vi) Reducing hazardous waste, GHG emissions and landfilling. In mid 2015, 350 companies and 2,042 waste/raw material flows were involved and FISS had 3,300 website readers as well as 200 newsletter readers overall since its launch.¹

The state-owned company Motiva Oy is responsible for the coordination and development of FISS. The Ministry of Employment and Economy, the Ministry of the Environment and SITRA commonly funded both the pilot stage and FISS implementation. The European Regional Development Fund funds regional projects implementing individual symbiosis.

In **Portugal**, there is wide use of support for industrial symbiosis in the form of an on-line waste trading platform enabling the participation of interested parties nationwide with a specific focus on industrial waste and waste that can be utilised as a resource. The Mercado Organizado de Resíduos (MOR - Organised Waste Market) was implemented in 2010 and all companies willing to buy or sell waste can participate (except for hazardous waste). MOR is a voluntary instrument that aims to facilitate and promote waste trading as well as enable its recovery and reintroduction in the economic circle, decreasing the demand for primary raw materials and promoting industrial symbiosis. It operates on electronic negotiation platforms that support non-hazardous waste trading, promoting the interaction between supply and demand of waste. Waste producers and operators have access to these platforms in order to initiate orders to buy or sell waste. Managed by private entities, the platforms ensure transparency, provide universal and equal access to all potential users, ensure the timeliness and accuracy of the information circulating within the system, and are subject to confidentiality regarding transactions. (AEP 2011, APA 2013, Mota Mafalda 2010)

The Portuguese Environment Agency (APA) is entitled to provide a set of financial and administrative incentives both to potential management entities (of the waste market) and to the producers themselves/holders of waste and waste recovery entities. Specifically, APA can provide support to the launch of trading platforms (funding from the revenues of the Waste Management Fee - TGR), registration fee reductions in SIRAPA (the Portuguese Environment Agency's Integrated Registration System) up to 50%, and potential exemption from licensing of recovery of non-hazardous waste operations, in order to stimulate the creation of trading platforms and foster adherence to these.²

In **Austria**, the regional government of Styria established a Recycling Network in the late 1990s in order to investigate the material and energy flows of 31 companies in Upper Styria and identify possibilities for further intercompany use of these flows. To support intercompany cooperation, an online market place for waste exchange (Online "Abfallbörse") was established. The programme, which is still running, has the following objectives: (i) Reduce wastes and establish a circular economy; (ii) Provide incentives to companies for better waste management; and (iii) Increase cooperation between regional companies and find new recycling solutions. The platform is open to all regions and backed by 7 regions and 2 ministries. More than 150 companies have participated in this network to date.

¹ See also FISS – Finish Industrial Symbiosis System (n.d.). Creating Growth via Industrial Symbiosis. URL: www.industrialsymbiosis.fi, accessed 14 August, 2015

² APA – Portuguese Environment Agency, Organised Waste Market. URL: <http://www.apambiente.pt/index.php?ref=16&subref=84&sub2ref=670>, accessed 21 September, 2015

The **Irish** government provides support for Industrial Symbiosis through the “SMILE Resource Exchange.”³ This support measure was launched locally in 2011 and nationally in 2014, and aims to encourage the exchange of resources between its members in order to save them money, reduce waste going to landfill and to develop new business opportunities. SMILE is a free service for companies. Potential exchanges are identified through regional networking events and an online exchange tool. SMILE is now available nationwide and operates more strongly in some regions of Ireland: Cork, Dublin, Clare, Limerick and Kerry. As of the second quarter of 2015, SMILE Resource Exchange has 1,232 members. In 2014, through SMILE 60 successful synergies were concluded, altogether helping to divert 357 tonnes of material from landfill with an estimated value of 398,000 EUR (EPA 2015).

In 2005, the **UK** government set up the National Industrial Symbiosis Programme (NISP), aiming to help businesses improve profitability, commercial competitiveness and environmental performance. The NISP now also operates regional services in the UK (in addition to national scope), and globally supports regional and national programmes in over 20 countries. More than 15,000 companies have been members of NISP in the UK. The Impact of 8 years’ investment (36.8 million £) for the time period 2005-2013 (state funding for NISP was terminated in 2013) covers (Manchester Economics and Scott Wilson Business Consultancy 2009):

- Material recovered and reused: 47 million tonnes
- CO₂ savings: 42 million tonnes
- Virgin materials savings: 60 million tonnes
- Hazardous waste savings: 2.1 million tonnes
- Cost savings: 1.1 billion £
- Additional sales: 1.0 billion £
- Jobs created: 10,007

Lessons learnt from the application of the support measure

From the application of this support measure in the above five Member States, the following lessons learnt could be derived.

For the **Finish** FISS, a web portal (www.industrialsymbiosis.fi) enables companies to get information and contact other participating companies through **regional facilitators**. The regional facilitators use a **common national database**, SYNERGie, which enables the identification of new symbiosis opportunities also between regions. The database also enables reporting of impacts and achievements on a regional or national level. Furthermore, an industrial symbiosis map on the web portal shows a wide range of existing symbiosis in Finland, their locations and the **benefits of each symbiosis**. This can be used to get ideas for symbiosis and also to find potential partners, while at the same time it serves as an incentive for participation. The development of new symbiosis requires co-development and expert co-operation. To find the right expertise an “**expert pool**” has been formed, from which companies can find the right expertise needed. The TUORE Expert Network can also be utilised in building new industrial symbiosis.

In relation to the **Portuguese** MOR, at the time of its introduction in 2010, there were still quite underdeveloped waste management structures and not very sophisticated flows in the waste market, so the development of the **organised waste market** (MOR) contributed to a paradigm shift of the concept of waste into secondary material. The MOR played a fundamental role in **facilitating waste recycling and recovery operators to directly access** industrial waste (secondary raw materials), bypassing the licenced waste management entities and thus closing the loop of industrial symbiosis systems. It also increased the value of industrial waste by creating opportunities of resource circulation between seller/buyer. MOR increased **competitiveness on the demand side** of waste and forced the conventional waste management entities to optimise their operation and use of industrial waste.

³ Smile Resource Exchange (n.d.). What is Smile? URL: <http://www.smileexchange.ie/about-us>, accessed 12 August, 2015

Among the success factors identified in the case of the Recycling Network in Styria (**Austria**) are an **initial analysis of residues** of individual companies that allow for **improved match-making** between supply and demand of waste as (secondary) input material. The establishment of an **online waste exchange** (“Abfallbörse”) was seen as a crucial factor for this success. The online marketplace split up different waste streams: glass, rubber and plastics, and construction waste. The construction waste platform is the most successful and is financed by 7 regions and 2 ministries, as well as the chamber of commerce.

For the **Irish** SMILE programme, the following success factors have been identified: (i) A **team is provided free of charge** to assist in facilitating exchanges; (ii) **Regional events** are held which bring together interested regional companies, where many potential exchanges are identified at these events; (iii) A **mentoring system** is being developed which should see the environmental good practice from within a multinational company in Cork being shared with groups of SMEs – SMEs are thus engaged through **interaction with a multinational company**; and (iv) In 2014, a **team of technical consultants** was engaged by SMILE Resource Exchange to enhance the identification of potential resources and to support the exchanges. This approach has proved worthwhile to date and has been successful in other countries.

As regards the **UK’s** NISP, specific factors for the success of this support measure encompass (i) a **facilitated process with practitioners experienced** in (and credible among) industry (actors); (ii) provision of **quality data managed by practitioners**; (iii) a **model for cross-sector engagement** of all sectors and all company sizes; and (iv) a **holistic approach to resources**, i.e. including materials, energy, water, staff expertise and capacity, etc.

In addition, further lessons learnt emerged from the information obtained for the other Member States where this support measure is being applied:

In **Cyprus**, a scheme to encourage clusters and business partnerships in green and advanced technology investments was launched in 2015, targeting largely SMEs from industry and business in order to promote technology and processes that will enhance resource efficiency, reduce pollution and waste, and contribute to appropriate waste management and recycling. The **provision of appropriate information** to industry and business **on opportunities** for creating partnerships and clusters and **on the benefits of advanced technology** was identified as one relevant success factor, helping targeted companies to overcome the current economic climate.

Financed by the **German** Federal Environmental Foundation (Deutsche Bundesstiftung Umwelt), the development of an Intercompany Network for Recycling Materials in the Heidelberg-Pfaffengrund Industrial Region was supported financially in the period 1996 to 1999 with approximately 97,000 EUR (195,000 DM)⁴ (DBU 1997). This regional project was set up to support SMEs in the search for solutions in the area of waste management, to increase intercompany cooperation in order to support a circular economy, and to increase transparency as regards the potential of intercompany flows of residues. This project proved successful through achieving cost reductions of up to 50% within 2 years, establishing a common interim storage facility for waste paper and pooling of wastes that require monitoring. Consequently, the Pfaffengrund network could be expanded to the neighbouring Rhine-Neckar region. Relevant success factors encompassed (i) **data collection** of waste flows and optimisation processes within the individual companies as a first step; (ii) investigating intercompany solutions and encouraging **communication and cooperation** between companies; (iii) **concluding a confidentiality clause** between the participating companies and the institute undertaking the waste flow analyses (Institut für Umweltwirtschaftsanalysen, IUWA) to establish trust and security in the network; and (iv) establishing the “Working group Pfaffengrund,” which functioned as **contact point** for the participating companies and facilitated communication.

⁴ Based on the exchange rate of 1 EUR = 1.95583 DM fixed by the German Federal Ministry for Finances; see http://www.bundesfinanzministerium.de/Content/DE/Downloads/Europa/uebersicht-euro-umrechnung.pdf?__blob=publicationFile&v=3.

In order to promote the use of organic urban waste for biogas production in **Croatia**, a concept for the creation of an Industrial Symbiosis for the waste streams in Zagreb was established. An agreement was concluded between a biomethane production company, the waste management company ZCH Čistoća, the City Gasworks Company as well as the Urban Public Transport Company for the City of Zagreb. Launched in 2011, the Industrial Symbiosis concept aimed to (i) establish a joint waste management and renewable energy production (heat and biofuels) based on the least cost principle for public money; (ii) decrease production costs; (iii) reduce landfilling and greenhouse gas emissions; and (iv) raise the likelihood and increase possibilities of benefiting from EU funds. The roughly 1.2 million EUR UrbanBiogas project officially ended in April 2014 and aroused investor interest (two have signed letters of interest). A key success factor identified was the **initiation and financial support** through the “Intelligent Energy for Europe” **programme of the European Commission**. Furthermore, **commitment from relevant local actors** (local biomethane production company, the waste management company ZCH Čistoća, the City Gasworks of Zagreb and the City Office for Energy, Environmental Protection and Sustainable Development) helped secure investor interest and use of compressed biomethane in the City’s busses.

The ECOREG project “Application of the principles of industrial ecosystems in regional development” was launched by the Ministry of Environment and Forests as a pilot project to test the applicability of industrial symbiosis in **Romania**. The initiative is part of LIFE+ **EU Programme**, which **supports it financially** and thus enabled its implementation. The idea behind the project is to help operators identify innovative methods to reuse waste resulting from other industries, aiming to reduce the consumption of natural resources by 2 to 5% for all involved partners; to reduce the waste production by 5 to 20% for each partner and increase recycling. The pilot project was implemented between 2009 and 2011 in Suceava County with an overall budget of 880,000 EUR. 200 companies were involved, resulting in 114 synergies including 13 categories of waste, recycling more than 550,000 tonnes of waste, saving more than 130,000 tonnes of CO₂, following the replacement of virgin materials with alternative resources.⁵ Furthermore, case studies are available online (http://www.nisp-ecoreg.ro/studii_de_caz.aspx) hence enabling interested companies to turn to these cases for supporting own symbiosis activities.

The **Swedish** state supports the Industrial Symbiosis network in Norrköping (Norrköping/Handelö region) in order to reduce waste landfilling, greenhouse gas emissions and fossil-resource dependence, as well as to reduce costs for businesses. Participating companies include E.ON, Agroetanol, Svensk Biogas, Econova (a company specialised in producing usable products from industrial and domestic waste streams), Colmec (tire industry), Holmen Paper and others. Among the success factors identified were: (i) **strong support** of the environmentally motivated **municipality**; (ii) the business development department of the municipality promotes the development of synergies around steam, e.g. by giving priority to new industries that have a demand for steam; and (iii) **innovative capabilities and entrepreneurial mindsets of local enterprises**.

⁵ ECOREG (n.d.). Pilot project on Industrial Symbiosis – studii de caz (case studies). URL: http://www.nisp-ecoreg.ro/studii_de_caz.aspx, accessed 08 October, 2015

Across the examples obtained from literature review and Member State responses, the following aspects could be identified as key success factors for supporting industrial symbiosis among businesses in the EU:

- ★ Supporting data analysis to identify the potential for synergies and improve match-making between supply and demand.
- ★ Concluding, where necessary, confidentiality clauses between the participating companies and those providing support for or undertaking data analysis.
- ★ Providing information that is relevant to companies, for instance in the form of (free) on-site visits, accessible (online) high quality databases and online information offers – and in so doing respecting confidentiality clauses and concerns of companies involved. In order to ensure relevance of the information, experienced and credible practitioners (e.g. expert pools, teams of technical consultants) should provide or add to the information and advice.
- ★ Promoting the economic benefits achieved by industrial symbiosis settings through distributing information on relevant case examples.
- ★ Offering online and offline match-making opportunities (e.g. web platforms, regional facilitator events) to encourage and foster direct exchange between companies, both in terms of a) improving access to waste/material flows for creating synergies, and b) making use of potential mentoring options between SMEs and larger companies to make use of and replicate best practices.
- ★ Developing commitment among relevant local and regional actors (municipalities, utilities, key industry partners, networks) to support intercompany networks or public-private partnerships (PPPs) for industrial symbiosis.
- ★ Establishing local/regional contact points for supporting management and communication within intercompany networks.
- ★ Financial and administrative support through EU funding programs (e.g. LIFE+).

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