Supplementary information for Boons et al., chapter 5 of Deutz et al. 'International Perspectives on Industrial Ecology'.

Appendix 5.1 :This table provides indicative rather than exhaustive list of industrial symbiosis projects identified in each of the nine case study countries.

	Name of project / Reference	**Short description**	Initiator(s)	**Status**
Belgium (BE)				
BE1.	Energy cluster Koekhoven (Verguts et al., forthcoming)	A farmers' partnership started a bio-gas cogeneration plant in 2006 using manure and bio-mass streams from farms. The heat is used to dry manure, which is transferred to greenhouses in the nearby greenhouse park. Linkages continue to evolve through joint ventures beyond agriculture. In the same area, other linkages are emerging.	Private actors	In progress
BE2.	Symbiose (Agentschap Ondernemen, 2013)	Inspired by NISP, Symbiose is a pilot project that started in 2012 with the aim to serve as a platform to match supply and demand of industrial waste products and by-products. The pilot project is mainly subsidized by the Flemish government.	Public and private actors	In progress
BE3.	Bio-economy in Flanders (Departement Leefmilieu, Natuur en Energie, 2013; VITO and Ugent, 2012)	Multi-agency government project to promote bio-materials based industries in Flanders. Designed as economic initiative as well as to reduce carbon emissions and as contribution to energy security, albeit that use of biomaterials for energy generation is the lowest priority (food as highest).	Public sector	
France (FR)				
FR1.	Ecopal project (Brullot et al., 2014)	Ecopal is an association created in 2000 to coordinate eco-industrial developments at two industrial parks, "Grande Synthe" and "Petite Synthe." Ecopal was member of the broader COMETHE project (research project funded by the national research agency 2008-2011).	Public and private actors	In progress
FR2.	Aube (Brullot et al., 2014)	The Industrial Ecology Club of Aube was an informal public-private network for industrial ecology created in 2004. It became	Public actors and	In progress

		an association in 2008 and was also member of Comethe project in which it covered pilot experiments at three industrial parks. The club aims to promote and facilitate industrial ecology implementation in the Aube department.	university	
FR3.	Chemical Valley (Harpet et al., 2013)	The Chemical Valley project was dedicated to the identification of potential synergies between 11 chemical companies near Lyon. The project ended when the linked research program ended.	University	Project finished
FR4.	Industrial Park of Carros Le Broc, Plaine du Var	The planning public establishment wants to improve economic competitiveness of the territory and reduce ecological impact of activities through industrial and territorial ecology. The project started in 2010 and takes part in a broader sustainable territorial project called "Eco-Vallée".	Public actors	In progress
FR5.	Estuaire de la Seine (Massard, et al., 2014)	This project takes place in a broader territory than an industrial area (2 French regions, including 2 seaports). An association (with public and private actors) in charge of the governance has been created in 2010 in order to increase the competitiveness and economic development of the territory thanks to industrial ecology. Three industrial areas have been identified to experiment identification and implementation of industrial ecology synergies.	Public actors	In progress
FR6.	Bretagne (PCOB)	One of the first projects in France that is not a research experimentation project. Potential synergies have been identified between mostly farmers and food industry companies.	Public actors	In progress
FR7.	Business park of JeanMermoz, Plaine Commune.	Started in 2011, this project aims to identify industrial ecology synergies (by-product exchanges, equipment and services sharing) between actors of the business area. The data collection is finished, potential synergies have been identified and the analysis of their implementation is in progress.	Public and private actors	In progress
Germany (DE) (Isenmann, 2014)				
DE1.	TechnologieRegion Karlsruhe (Hiessl, 1998; Schön et al. 2003)	Regional recycling network with about 40-50 entities exchanging organic and mineral by-products	Public and private	Project finished

			actors, and university	
DE2.	Verwertungssystem Ruhrgebiet (Schwarz, 1996)	Regional recycling network with steal plant, power station and building material industries exchanging by-products and sharing steam and energy.	Public and private actors, and university	In progress
DE3.	Bioenergie und Rohstoffzentrum Dormagen (Denaro, 1999; Veiga and Magrini, 2009)	Bio energy and resource center with by-product exchanges and energy cascades, based on extended collaboration between companies, university and public entities.	Public and private actors, and university	Project finished
DE4.	Gewerbegebiet Henstedt-Ulzburg (Großman et al., 1999; GTZ, 2000)	Eco-Industrial Park with public and private entities collaborating in inter-firm material exchanges, sharing energy and developing common water treatment approaches	Public and private actors	In progress
DE5.	Verwertungsnetz Oldenburger Münsterland (Hasler, 2004; Müller-Christ and Isenmann, 2009)	Regional recycling network exchanging by-products, with a recycling information system and a recycling agency	Public and private actors	In progress
DE6.	Industriegebiet Heidelberg-Pfaffengrund (Sterr and Ott, 2004)	Eco-Industrial Estate involving SMEs from the metal, chemical, electronic and paper industry to close material loops and develop a local material flow management	Public and private actors	In progress
DE7.	Industrie-Region Rhein-Neckar (Sterr and Ott, 2004)	Regional Eco-Industrial network focused on closing material loops, developing from a local level of the industrial estate Heidelberg-Pfaffengrund to the regional scale of an industrial ecosystem of the Rhine-Neckar region	Public and private actors	In progress
DE8.	Zero Emission Parks Bochum, Bremen, Eberswalde, Kaiserslautern (Müller-Christ and Isenmann, 2009, Hauff, 2013)	Research project focused on a process model and the provision of guidelines for developing towards a sustainable industrial park, illustrated by examples in four different industrial parks in Bremen, Bottrop, Eberswalde and Kaiserslautern	Public and private actors	Project finsihed
The Netherlands (NL)				
NL1.	INES	The INES case was one of the inspirations for a national	Private	Project

	(Baas, 1998; Baas & Boons, 2004; Boons & Janssen, 2004; Heeres et al., 2004; Baas and Huisingh 2008 Baas 2011)	stimulation program for sustainable industrial parks in the Netherlands. INES was started by Deltalinqs, an industrial association, to develop potential industrial symbiosis projects.	actors	finished
NL2.	RiVu (Pellenbarg, 2002; Heeres et al. (2004)	The RiVu case was one of the inspirations for a national stimulation program for sustainable industrial parks in the Netherlands. Sustainable development initially revolved around the redevelopment of the connected industrial parks De Rietvelden, De Vutter & Veemarktkade in which efficient use of space, exchange of residual materials and utility sharing were included as integral components. These activities were first coordinated by a separate foundation, which was later integrated in the industrial park's business association.	Private actors	In progress
NL3.	Moerdijk (Pellenbarg, 2002; Heeres et al., 2004)	Several symbiotic exchanges are implemented at Moerdijk, including a pipeline infrastructure through which multiple companies exchange residual heat. Although recent large-scale initiatives are based on collaborations between public and private parties, these build on self-organized initiatives that have been implemented or in development since the nineties	Public and private actors	In progress
NL4.	EcoFactorij (Pellenbarg, 2002; Eilering and Vermeulen, 2004)	EcoFactorij is a new industrial park near Apeldoorn that was created for companies that comply with certain sustainability criteria that were originally set by the municipality of Apeldoorn. Companies that establish automatically become member of a cooperative park management system that aims to stimulate sustainability innovations. The park is still under development.	Public actors	In progress
NL5.	Agro Industrial Complex / Nieuw Prinsenland (Eilering and Vermeulen, 2004)	The Agro Industrial Complex is a site owned by the company Suiker Unie, whom has been trying to attract potential synergetic partners to its site. Currently, the project is known as Nieuw Prinsenland, in which Suiker Unie teams up with a greenhouses association (TOM) and other actors to develop a new industrial	Private actors	In progress

		park and greenhouse area next to the existing complex of the Suiker Unie.		
NL6.	Biopark Terneuzen (Spekkink, 2013).	Biopark Terneuzen is a cooperation that builds on several synergies in the Canal Zone of Zeeland, including the supply of residual heat and CO_2 by a fertilizer factory to greenhouses. Biopark Terneuzen has become part of a broader initiative to develop a Biobased Economy in cooperation with neighboring regions.	Public and private actors	In progress
NL7.	Cases identified in TU Delft – Bilfinger Tebodin project (Davis, 2012)	As partners of EIT's KIC Climate, Delft University of Technology and Bilfinger-Tebodin, The Hague, have analyzed existing symbiotic linkages in the Netherlands and their potential to bring forth solutions for climate challenges. They identified symbiosis in two main categories, firstly in integrated industrial areas and secondly, linkages between stand-alone firms, such as food and waste recycling. In total 165 Dutch symbiotic linkages were found and categorized by a new classification system that was prepared specifically for this project.	Private actor and university	In progress
Portugal				
PT1.	Organized Waste Markets Ferràо et al. (2011)	At the national scale Portugal has online waste markets managed by waste management operators and EPR societies. The members of the markets make known their supply and demand on the market and the platforms act as brokers. There is very little information about the performance of these tools.	Private actors	In progress
PT2.	Chamusca – Eco Parque do Relvão (Costa, 2010; Costa and Ferrao 2010)	Chamusca was a very large project (Eco Park of Relvão) that raised a lot of attention due to harboring hazardous waste recovery facilities. The park was developed through the course of the interaction between a municipality, private actors and the Technical University of Lisbon. Industrial symbiosis activities take place with regard to waste management, energy and waste management services. The municipality intended to expand the	Public and private actors	In progress

		network by involving additional local businesses and industries (and supported a study on that context) but so far the main focus of investment has been in the field of waste management and resource recovery.		
PT3.	SGR	Inspired by the activities at Chamusca, some waste management companies started developing their own "resource recovery parks." One such project is that of the Industrial Ecology Parks, led by SGR.	Private actor	In progress
PT4.	Carmona	Inspired by the activities at Chamusca, some waste management companies started developing their own "resource recovery parks." One such project is an integrated waste management center that concentrates on resource recovery activities, led by Carmona.	Private actor	In progress
PT5.	Sines (Lopes, 2013)	Sines is the Portuguese proxy of Kalundborg. Located in the south of the country, it is an industrial park developed around a large petrochemical refinery and electric plant. A recent assessment uncovered several exchanges involving water reuse, cascading energy reuse and also by-product exchanges. Most of the exchanges are seen as "business as usual" and although the term "industrial symbiosis" is known, there hasn't be any concise initiatives from the park's managers to further explore the potential provided by the park and the surrounding region.	Private actors	In progress
Spain				
ES1.	Industrial By-products Stock (*Bolsa de Subproductos Industriales*) (High Council of Chambers of Spain, 2014)	National initiative that facilitates the exchange of by-products among companies. There are ten regional by-product stocks in Spain. The first one was launched in 1991 in Catalunya, which is currently the more active one. The regional *Industrial By-products Stock* facilitates the development of exchanges.	Public actor	In progress
ES2.	Ecologic industrial Park Els Pedregals *(Valld'Uixo, Valencia)* (Cruzado et al., 2002)	The project of industrial ecologic park Els Pedregals started in 2001. The base of the project is the development of a sustainable industrial area supported on the reduction of resource	Private actor	In progress

		consumption, efficient use of energy, as well as, companies' cooperation in environmental issues and exchange of by-products.		
ES3.	22@Barcelona Network DHC *(Barcelona, Catalunya)* (Districlima, 2014)	The project of 22@Barcelona started in 2003. It consists of the development of a District Heating and Cooling network in the area 22@Barcelona, using the residual energy of an incinerating plant of wastes. Around 60 customers were added to the project from 2004 to 2010, and therefore the equipment of the plant has been increased.	Public and private actors	In progress
ES4.	Alfacar industrial park *(Granada)* (Ecomark Project, 2014)	Alfacar industrial park is a pilot industrial area of ECOLAND project (2003-2006) geared to promote innovative industrial areas, and also of ECOMARK project (2010-2012) that is focused on the promotion of sustainability principles among SMEs. Future plans of the industrial area involve the creation of a selective waste collection system or the recovery of organic waste to produce fertilizers.	Public actors	In progress
ES5.	CICLE Project *(Catalunya)* (Puig et al., 2008a; Puig et al. 2008b)	The CICLE Project has been used as a study for the diagnosis for leather and paper sectors in the Region of Anoia, and thus, for the design of several proposals for sectors' improvement based on the application of Industrial Ecology's principles. The project was developed among 2004-2006 and achieved the diagnosis state.	Public actors	Project finished
ES6.	Eco-industrial Park of Lorcha (Lorcha, Alicante) (Innovasem, 2014)	The project of eco-industrial area of Lorcha started in 2006, when the guidelines of the development of a park model as a sustainable industrial ecosystem were established. The origin of the project was the regeneration of a degraded industrial area supported on the principles of Industrial Ecology and Industrial Symbiosis.	Public and private actors	In progress
ES7.	SIT Project *(Torrelavega, Cantabria)* (INGEPRO, 2012,Ruiz Puente et	SIT (Industrial Symbiosis in Torrelavega) Project was developed among 2010-2012. The industrial system is formed by four large companies, which are intensive in resources consumption and wastes generation, and 104 SMEs from different industrial	Public and private actors	Project finished

	al., 2015)	activities.		
ES8.	GEOLIT *(Mengíbar, Jaén)* (EtaBeta Project, 2014; Geolit, 2014)	The scientific and technological park of Geolit developed a biomass plant that processes wastes of the regional olive industry, and offers heating and cooling services for companies located in the park. The park is currently a participant of the European Project EtaBeta, which aims to promote the development of Eco-managed Industrial and Business Estates.	Public actors	In progress
Sweden				
SE1.	Forest industry (Wolf and Petersson, 2007)	The forest industry forms strong clusters of different companies that fit each other. An inventory found 15 BPX networks; none of them were deliberately planned or labelled as Industrial Symbiosis. Integration of pulp and paper production is more energy efficient and a common practice. The forest industry is involved in bio-fuel and electricity production (by-production).	Private actors	In progress
SE2.	Mönsterås (Wolf, 2007)	One example of a forest industry system is to be found in Mönsterås, which involves several by-product and utility synergies between a pulp mill, a pellet production plant, and a saw mill. The pulp mill also supplies waste heat to the local district heating system.	Private actors	In progress
SE3.	Regional example Renewable energy production (Cleantech Magazine, 2009; Baas 2011; Tekniska Verkens annual report 2012)	Östergötland's district heating systems that have been developed since the 1950s and increased bio-fuel applications in the early 21th century are basic elements in current IS development. Moreover, later policies on landfill tax and landfill bans have strengthened the waste incineration system's transformation in adopting a "Waste to Energy" philosophy. A specific illustration is the biogas production in Linköping.	Public and private actors	In progress
SE4.	Landskrona IS project (Mirata & Emtairah, 2005)	Landskrona has a history in being the first European city where cleaner production demonstration projects were performed 1987-1989. The Landskrona IS project represents a creation approach	University	Project finished

		for networks as a collection of long-term, symbiotic relationships between and among regional activities between 21 companies and the Landskrona community.		
SE5.	Händelö Industry area (Martin, 2010; Nicklasson, 2007; Martin and Eklund 2011)	The Handelö industry area in the Norrköping municipality combines an IS renewable energy cluster, a logistical centre and Natura 2000 conservation areas (Nicklasson, 2007). Currently, the IS renewable energy cluster links the E.ON combined heat and power (CHP) plant with a biogas plant and an ethanol plant.	Public and private actors	In progress
SE6.	Helsingborg, Industry Park of Sweden (Industrial Symbiosis in Sweden, 2014)	Co-siting Industry plant in Helsingborg with Kemira Kemi AB as central organization. 7 Other industries are co-located, sharing steam of different pressure electricity, natural gas, hot water, cooling of various types, and process water of various grades.	Private actors	In progress
SE7.	Linköping bio-refinery network (Industrial Symbiosis in Sweden, 2014)	Industrial symbiosis for regional development by a combined heat and power (CHP) plant primarily fuelled by wastes and by-products sourced from Lidköping. The CHP plant mainly produces district heating for the city of Lidköping and its surroundings and electricity. In addition, the plant produces steam for Lantmännen Reppe. Lantmännen Reppe can be classified as a bio-refinery, the main outputs are wet and dry animal feed, glucose syrup, gluten, ethanol and raw material for production of biogas.	Private and public actors	In progress
SE8.	Stenungsund (Hackll et al., 2011; Røyne et al., 2013)	One of several research projects that take place in Stenungsund concerns industrial symbiosis and life cycle perspectives. The most recent Stenungsund industrial symbiosis project is a result of the petro-chemical industry joining up with the forestry industry.	Private actors	In progress
SE9.	Göteborg (Holmgren, 2006)	In Göteborg is one example where excess refinery heat and remaining heat in sewage water are turned into district heating and electricity. These, in turn, are sold as 'green' energy and new office buildings. Also, sewage sludge and waste from forestry industry are being turned into biogas which is in turn used to drive public	Public actor (City of Göteborg)	In progress

		transportation buses, etc. The symbiosis has been turned into a tourist attraction.		
Switzerland				
CH1.	Geneva Symbiosis project (Massard and Erkman, 2007)	The Geneva industrial symbiosis project was launched in 2004 to provide efficient solutions to companies to reduce resources consumption while increasing competitiveness. While the project initially focused on manufacturing actors, other economic actors were added to investigate the potential for IS among manufacturing, housing, and proximity agriculture throughout the state. As of 2014, industrial ecology (and industrial symbiosis) has been introduced in the state constitution and is mention as one of the 6 main concepts in the state masterplan 2030 and the state industrial park management structure launch a new ecoParc concept to accelerate densification and IS development.	Public actors	In progress
CH2.	Friburg	Switzerland implemented "the new regional policy" to support the economic development of 'peripheral' regions, in which the regions can choose their own focus. Friburg chose to focus on industrial ecology and industrial symbiosis projects (among other things).	Public actors	In progress
CH3.	Monthey chemical park (Massard, et al., 2014)	The canton Valais is hosting one the chemical cluster of Switzerland by grouping together 3 chemical producers and a petrol refinery. Shared services and infrastructures are developed since 30 years as a business approach by CIMO, the chemical park utility provider.	Private	In progress
United Kingdom updated and additional references supplied.				
GB1.	NISP network (Laybourn and Morrissey, 2009; (Jensen et al., 2011; Paquin and Howard-Grenville, 2012; Wang et al., 2015; NISP, 2015)	Currently, the UK's main activities to develop IS are organised at the national scale led by the National Industrial Symbiosis Programme (NISP). NISP was the first non-profit coordinating body for by-product reuse on a national scale. Though the service is no longer free to users, NISP's main approaches to IS	Public actors	In progress

		facilitation are via building a data collection or un/wanted materials from which to identify potential symbiosis partners, technical assistance as required.		
GB2.	London Sustainable Industries Park (Formerly Dagenham Sustainable Industries Park: Gibbs and Deutz 2007; London Sustainable Industries Park, 2015)	The London SIP vision is for a closed loop system, with occupiers sharing resources and exchanging waste or by-products to achieve working efficiencies. The Park aims to develop symbiotic relationships between occupants, which are promoted as delivering cost savings and competitive advantages, whilst also reducing waste and environmental impact.	Public actors	In progress
GB3.	Adnams Brewery in Suffolk	The brewery currently has an anaerobic digestion (AD) plant producing biomethane. A 0.5MW solar array is planned to provide all the electricity required to run the brewery's data centre and the AD plant. Adnams also plans to provide the 40 farms that supply it with barley for malting with fertiliser produced from the AD's two by-products - leachate and digestate.	Private actor	In progress
GB4.	Humberside port and hinterland complex (Penn et al., 2014; Schiller et al., 2014) Lenzing Fibres, Grimsby (Lenzing, 2015)	Multi-sectoral links, largely evolved, between companies located around the Humber Estuary. Petro-chemicals, pharmaceutical, energy and bio-based industries are involved. Company highlighted below is part of this network. Level of self-awareness is variable; companies send representatives to an Environmental Managers forum (partially industry funded),. Humberside NISP (as was) played a role in some links. The Penn et al project has increased awareness of the extent of the network. This Austrian-owned company manufactures fibres from paper. Their product is used in a range of goods, including textiles and non-woven fibre products. Amongst their achievements, and most relevant to IS, is a dramatic reduction in the amount of waste sent to landfill.	Private actor	In progress
GB5.	Biowaste Industrial Symbiois	The University of York has established a Biowaste Industrial	Knowledge	In progress

	Network (Biowaste Industrial Symbiois Network, 2015)	Symbiosis Network. Although led by the University of York, the project involves 22 academic and industrial partners from across the EU. The objective of the Network to develop the valorisation of food supply chain waste as an alternative carbon source for bio-chemicals, bio-materials and bio-fuels.	institute	
GB6.	Resource Recovery and Remediation of Alkaline Waste Alkaline Remediation (2015)	The Universities of Hull and Leeds with partners are undertaking research funded by the UK government's Natural Environment and Economic & Social Research Councils, along with DEFRA to look at new ways of recovering potentially valuable metals alkaline wastes during a process of remediation.	Knowledge institute	In progress

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