

A3.1 Interregional workshop on how to plan and unlock public and private investments



**MUNICIPALITY OF
KOZANI**

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1 Introduction

This current document provides background information in support of an interregional workshop on industrial symbiosis and public-private investments, to be organised in accordance with the project work plan.

Public private partnerships are defined as cooperative arrangements between at least a public-sector authority and a private party, typically having a long-term duration. Their purpose is to benefit both the private and the public sector; to this end, their development and success depends upon a number of factors related to their design and realisation. The workshop organized by the Municipality of Kozani (Greece) aims to shed light on these factors, in order to draw policy conclusions on how to stimulate the emergence and secure the success of PPPs.

The two day workshop will include presentations by experts in economics, law and regulation, capacity building and management, as well as presentation of success stories from Greece and partners' countries. The workshop consists of three thematic axes: i) application of Public-Private Partnerships (PPP) in the context of industrial symbiosis, ii) business view and iii) public policy view.

2 About SYMBI

SYMBI - "Industrial Symbiosis for Regional Sustainable Growth and a Resource Efficient Circular Economy" is a project co-funded by the Interreg Europe programme through ERDF. The total budget of the project is approximately €1.6m and its duration spans from April 2016 to March 2021. During this timeframe, SYMBI brings together 9 partners from 7 European countries, to diffuse industrial symbiosis and align regional policies with the circular economy package of the European Commission. SYMBI aims to support the transition towards a resource efficient economy through establishment of territorial synergies to manage waste and exchange energy and by-products as secondary raw resources.

Industrial symbiosis follows a systems approach that looks at the interactions among the environment, the economy and the industry. It promotes the transformation of waste into production inputs, mimicking the processing performed by natural ecosystems aiming to minimise wastes. Industrial symbiosis can lead to: i) reducing cost of materials, resulting in higher competitiveness potential, ii) new business models that involve revenue streams from secondary raw resources and iii) mitigation of risk associated with the volatile global economy and proliferating signs of resource depletion.

Adopting the aforementioned approach, SYMBI supports the exchange of experiences and increases the capacities of partners and stakeholders involved, taking into consideration their profiles and regional interests. SYMBI prescribes policy learning activities on: a) waste management and transformation, b) public procurement, c) local taxation, and d) innovation programmes. Respectively, SYMBI aims to improve eight policy instruments concerning these four policy areas: Incentivise regional waste transformation systems and cross-sectoral synergies; promote the use of secondary raw materials; prioritise green procurement; unlock investment by regional and local financial actors; explore, assess, expand and enhance current practices in ecosystems of industrial innovation; and build consensus between regional stakeholders.

3 Rationale and aims of the workshop

For the purposes of the SYMBI project, the Municipality of Kozani, and more specifically the Development and Planning Bureau (project acronym: KOZANI), will organise and host a two-day workshop to investigate how regional authorities can develop public-private partnerships (PPP) to act as an enabler of industrial symbiosis. The workshop topics will focus on how to setup, finance, monitor and capitalise such partnerships, as well as barriers that may hinder these processes. During the workshop, successful case studies from Greece and other partner's countries will be presented, which will assist participants in identifying possible obstacles during all the phases and aspects of developing and implementing PPP initiatives and projects.

Besides the SYMBI partners, relevant stakeholders (e.g. private and public actors already participating in a PPP) and external experts (academics, policy makers, researchers and representatives from the case studies among others) will participate in the workshop to provide valuable input.

Overall, since existing evidence underlines the importance of PPPs as a tool for the reinforcement of industrial symbiosis networks, the workshop aims to identify the factors of successful PPPs that can foster the emergence of industrial symbiosis projects and secure their success. During the workshop, the views of different stakeholders will be presented in order to shed some light on the underlying costs and benefits of such endeavours. The following three thematic axes will be included in the workshop:

- **The application of Public-Private Partnerships in the context of industrial symbiosis (PPP-IS):** These sessions aim at explaining the PPPs schemes and link them with the industrial symbiosis framework.
- **Business view (BV):** *What is the importance of PPP in the context of industrial symbiosis?* Though industrial symbiosis can increase the resource efficiency and reinforce competitive advantages, businesses face many difficulties in the current market circumstances, which do not allow them to invest in industrial symbiosis project. PPPs can help the private sector achieve its objectives, while sharing the risk of investments required.
- **Public Policy view (PV):** *Industrial symbiosis PPPs as a response in achieving circular economy policy objectives.* The circumstances under which collaboration with the private sector on industrial symbiosis projects can result in innovation, economic development, national green growth, and resource efficiency targets.

4 Workshop Agenda

The workshop will take place on the 20th and 21st of June. During the two days of the workshop, three different thematic topics will be broken down in several sessions, each addressing a specific aspect of PPPs in the context of industrial symbiosis. More specifically, the agenda includes presentations on European policies and initiatives that concern PPPs, the application of PPPs within the industrial symbiosis paradigm, and barriers and challenges of PPPs. Apart from the presentations, time is allocated to interactive sessions between the participants of the workshops and discussions based on which policy conclusions will be drawn. To clarify the above, interactive sessions refer to group discussions among the participants. The group of participants is divided into two to three groups and each group discusses the topic that is presented. After the interactive discussion, each group reports on the key point of what has been discussed. Based on this and the presentation an open discussion takes place that is followed by the wrap up session.

More specifically, Day 1 will focus on the basics of PPPs (definition and overall description), regulatory and financial aspects of such partnerships, the incentives of the private and the public sector to form such partnerships, and how such partnerships can be used as a tool to achieve environmental targets.

Having established the context (regulatory, legal, financial) of PPPs, on Day 2 the workshop will revolve around the challenges and constraints that may affect or appear during the process of setting up PPPs. The presentation and discussions on the second day will cover issues related to relevant financial, contract and capacity barriers, and will propose ways to circumvent them.

Finally, the agenda also includes presentations of case studies from the Kozani region, Greece, the SYMBI partnership countries, and the EU. Examples of such cases are the district heating system that is run by the Public Power Corporation S.A. and the LIFE M3P project (Material Matchmaking Platform for promoting the use of industrial waste in local networks), in which the Management System of Western Macedonia S.A. participates. The case study will demonstrate how PPPs can be a tool to achieve private and public sector objectives.

SYMBI project
2nd policy workshop
20th – 22th June 2017
Kozani (Greece)

VENUE:
“Koventarios” Building,
Mouka 7, 50132
Municipality of Kozani

MEETING AGENDA

DAY 1: TUESDAY, 20th JUNE 2017

Time/ Duration	Description
09:30 – 10:00	<i>Arrivals and registration</i>
10:00 – 10:15	Opening speech Mayor of Kozani
10:15 – 10:30	Objectives of the workshop / Overview of the agenda
10:30 – 13:00	<p>Topic 1: EU policies and initiatives about Public-private Partnerships Key points to be included in the presentation: Definitions (different forms) Legal framework in Europe and legal issues Theoretical economical reasoning for the creation of PPP's National and European mechanisms to finance such partnerships Private and public sector incentives to participate in a PPP Greek examples</p>
	<p><i>Oral presentation of topic 1 (30 minutes)</i> <i>Questions of attendees on speaker's speech (10 minutes)</i> <i>Answering the attendees' questions (10 minutes)</i> <i>Interactive session (roundtable discussion or interactive exercises):</i> <i>Participants will be split into small groups to discuss specific topics or issues raised during the presentation (45 minutes)</i> <i>Wrap up: The main conclusions and findings for the interactive session will be presented (25 minutes)</i> <i>*short break after the oral presentation</i></p>
13:00 – 14:00	<i>Networking lunch</i>
14:00 – 16:00	<p>Topic 2: PPPs in the context of circular economy and sustainable use of resources Presentations to be delivered: PPPs in the context of environmental policy Implementing PPP' in the context of circular economy – Greek example 1 1. District Heating System of Kozani, Kypirtidis Eleftherios , Municipal Water Supply and Sewerage Company Implementing PPP' in the context of circular economy – Greek example 2 2. Kafasis Periklis, Waste Management of Western Macedonia S.A. Implementing PPP's in the context of circular economy- specific areas of interest (territorial development, new jobs creation, use of ash, biomass</p>

	<p>production) <u>Experts from partner’s countries are invited to deliver presentations</u></p> <p>Greek case a. “Energy and Technical Description of Biomass System at the District Heating Network of Amyntaio” by Antonis Dimitriou, Dipl.Ing.Mechanical Engineer.</p> <p>Slovenian cases b. “Transition of Urban Region into Circular Economy” by Mr. Igor Kos, Municipality of Maribor, Mayor`s cabinet and Procurator of Institute WCYCLE Maribor c. Case #2, by mayor of municipality of Šentrupert, Mr. Rupert Gole.</p>
	<p><i>Presentation of topics (20 minutes each)</i> <i>Questions of attendees on speaker’s speech (10 minutes after each presentation)</i> <i>Answering the attendees’ questions (10 minutes after each presentation)</i> <i>Wrap up: The main conclusions and findings for the interactive session will be presented (20 minutes)</i> <i>Timetable to be finalised after the finalisation of the presentations to be delivered</i></p>
15:30 – 16:00	<i>Coffee break</i>
16:00 – 17:30	Continue Topic 2 discussion Wrap-up / conclusions from Day 1

DAY 2: WEDNESDAY, 21st JUNE 2017

<u>Time/ Duration</u>	<u>Description</u>
09:00 – 11:00	<p>Topic 3: Barriers and challenges related to PPPs Key points to be discussed: Financial issues and how to overcome them Contract related constrains and how to overcome these Constrains related to capacity and how to overcome these</p>
	<p><i>Oral presentation of topic 3 (30 minutes)</i> <i>Questions of attendees on speaker’s speech (10 minutes)</i> <i>Answering the attendees’ questions (10 minutes)</i> <i>Interactive session (roundtable discussion or interactive exercises):</i> <i>Participants will be split into small groups to discuss specific topics or issues raised during the presentation (40 minutes)</i> <i>Wrap up: The main conclusions and findings for the interactive session will be presented (20 minutes)</i></p>
11:00 – 11:30	<i>Coffee Break</i>
11:30 – 12:00	Continue Topic 3 discussion Wrap-up / conclusions from Day 2
12:00 – 13:00	Final remarks from the workshop Evaluation
13:00 – 14:30	<i>Networking lunch</i>

5 Implementation of the Workshop

5.1 Planning, Preparation and Implementation

The proposed structure of the workshop foresees specific allocation of time to different sessions and procedures. More specifically, each presentation is followed by a Q&A (Questions and Answers) session, and interactive discussions among the participants.

Since many different types of sessions will take place, it is important to make participants aware of the scope and procedure of each session, to make it easier to follow and reinforce them to be more active.

Additionally, it is important not to deviate considerably from the timetable (i.e. avoid delays), as this increases the fatigue of the participants. A way of dealing with tiredness and reinforcing interest during a workshop is to use short activities after each session, such as providing participants 3' to think about an interesting argument presented during the last session, and asking them to write it on a board for everyone to see.

During each session, the moderator should keep track of the time; it is also suggested to give presenters 5', 3' and 1' warnings before the time is up. The same holds for the interactive sessions. In addition, the moderator and his/her team should keep track of what is being discussed by keeping notes. These notes will serve as the minutes of the workshop. The minutes should include the title of the session, the name of the presenter, and the topic of the presentation. The minutes should also include any key points that arise during the sessions.

5.2 Speakers and presentations

It is recommended that the invited speakers are experts from different fields, in order to provide multifaceted information on the establishment and successful development of PPPs. The profiles of selected speakers should include both theoretical and empirical knowledge on the topics discussed, since the workshop aims at drawing conclusions on how PPPs can be reinforced to create industrial symbiosis networks.

Given the structure of the agenda, the first day focuses on the definition and the framework of the PPPs, the regulatory system in which they operate, financial reasoning for the establishment of PPPs, their relevance to industrial symbiosis, as well as real life cases; the second day includes presentations that deal with the challenges and barriers of PPPs. Consequently, it is suggested that the invited speakers for the first topic have a background in legal and regulatory issues, preferably in the context of EU.

In addition to that, the first day of the workshop includes a thematic session PPPs on the context of circular economy and the sustainable use of resources, which includes presentations on policy aspects of PPP and circular economy and case studies from Greece, Partners' countries, and the EU. For the environmental policy segment, it would heavily benefit the workshop to invite speakers that have a background in policy making tools. The table below contains an indicative lists of speakers.

Regarding the case study segment, the speakers can be employees who were responsible for negotiating their companies' involvement in public-private partnerships. This would provide a concrete business view on the topic and would greatly benefit the discussion. Presentations by speakers from partners' countries (besides Greek speakers) would also add value to this segment.

As far as the speakers for the second day are concerned, it is recommended that they have experience on establishing and operating PPPs. The table below presents a list of speaker categories for each of the topics of the workshop.

Table 1 List of speakers for Topic.

Indicative list of speakers categories for Topic 1
Academics in EU contract law
Economists with a background in EU law
Consultants with experience in the design of PPPs in Europe
Legal advisors/economic from the Municipality of Kozani (or from another Municipality with experience in PPPs)
Legal and Economic advisors from industries participating in PPPs
Special Secretariat for PPPs
Other ministerial office
Indicative list of speakers categories for Topic 1
Academics in the field of environmental policy
Consultants in the field of environmental policy
National European Environment Agency focal points
Regional authorities in the field of environmental management
Special Secretariat for PPPs
Indicative list of speakers categories for Topic 3
Special Secretariat for PPPs
Regional authorities with experience in designing and establishing PPPs
Consultant groups
Companies that have acted as administrators of PPPs

6 Thematic focus and background research

Industrial symbiosis is a concept that find its roots in the disciple of industrial ecology and it is concerned with the optimisation of resources used by companies (Jacobsen, 2006). Industrial ecology can refer to one of the following three levels: *global, interfirm and individual facility* (Chertow, 2000). From an industrial symbiosis perspective, the operational and geographical setting of industries, follow the pattern of a natural ecosystem. Industries operating in similar or completely different fields develop organic relationships. These can take the form of exchange of material or waste streams between companies so that the non-usable by-products of company become raw materials for some other company. Key to that process is the development of collaboration between different industrial units and willingness to exploit synergistic opportunistic possibilities. The mode of the synergies can be mutualistic or commensal and is defined by the outputs of the synergy and the aims of the involved actors (Jensen et al., 2011). Essentially, this can be achieved by integrating industrial units in a network of services, by-products and energy flows that would make them dependent on each other.

By creating such a cyclic system there is no energy loss (Hawken et al., 2013). Additionally, though several reasons can drive the development of symbiotic relationships, such as economic (reduced of landfill disposal costs, reduce of energy costs, etc.) and competitiveness benefits, they can only be strongly affected by social and environmental factors as well as regulation (Chertow, 2007). For example, the concentration of industries in a confined location can alleviate the not-in-my-backyard (NIMBY) effect and reduce the net load of waste released in the nature. In addition to that, industrial symbiosis can result in reduction of harmful emissions to the environment, use of less energy in a more efficient way, preservation of natural resources and efficient use of land.

6.1 EU Policies and Initiatives

The above have been recognised by the European Commission, which relates industrial symbiosis with a broad spectrum of policies that includes innovation, green growth and economic development (Johnsen et al. 2015). More specifically, on 2 December 2015 the European Commission adopted a Circular Economy Package to help businesses and citizens to move towards a circular economy paradigm. The Package explicitly mentions that circular economy projects, require private and public sector investments to develop infrastructure, intensify the collaboration between different agents and scale up technologies and processes. One of the proposed ways of encouraging the above is through the Commission supporting private and public partnerships through funding and through stakeholder engagement.

Also, in 2012 industrial symbiosis was selected by the European Resource Efficiency Platform, as one of the most important priorities through which a transition to a resource-efficient can be achieved. In its document entitled “Manifesto for a Resource Efficient Europe”, the European Resource Efficiency Platform commonly with the European Commission, indicated that in order to ensure current and produce jobs in the future and increase competitiveness, circular economy models could be a potential pathway that should be supported through innovation and investment, regulation of harmful subsidies, development of business opportunities and clear targets (European Commission, 2012).

Additionally, the reuse of materials through industrial symbiosis is recognized by the Resource Efficient Europe flagship initiative of the Europe 2020 strategy as a way that could save €1.4 billion and generate €1.6 in sales. The Circular Economy Action Plan¹ of the EU underlines the promotion of innovative solutions, such as the industrial symbiosis. In its revised proposals on waste, the Commission aims at clarifying rules on by-products and engage the Member States to facilitate industrial symbiosis.

Besides that, in 2012 an initiative that aims at a European-wide PPPs was launched. It is entitled SPIRE that stands for Sustainable Process Industry through Resource and Energy Efficiency and it has the

¹ EC, closing the loop- An Action Plan for the Circular Economy, 2015. Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52015DC0614&from=EN>

form of an association with the objective of representing the private sector in making the process industry sustainable.

In the same context, in 2014 the Directorate General for Enterprise and Industry published a document titled: “Sustainable Industry: Going for Growth and Resource Efficiency” (EC, 2014) that advocates that Industrial Symbiosis has added value in generating local and regional growth and could act as a key opportunity for improvement of the European industry. Consequently, the spirit of this document praises industrial symbiosis as being a policy instrument for realizing the potential of sustainable European industries.

The abovementioned actions send an encouraging signal in terms of adopting industrial symbiosis practices across Europe. This is further supported by available funding for relevant actions. The Circular Economy Package includes funding that exceeds €655 euro under the EU framework Programme for Research and innovation, i.e. Horizon 2020 that funds large-scale innovation and structural funds combined, actions to reduce food waste, quality standards for secondary raw materials a strategy on plastics in the circular economy and actions on water reuse among others. In the period 2016 and 2017 the EC announced a new focus area, named “Cross-cutting activities” that could fund projects related to industrial symbiosis. Such funds will be proven important for the development of PPPs in the future. This is due to the fact that, the Commission has set out eight contractual PPPs, some of which are: Factories of the Future, Energy-efficient Buildings, European Green Vehicles Initiative and Sustainable Process Industry.

6.2 Public Private Partnerships

A PPP can be defined as a cooperative arrangement between at least a public-sector authority and a private party, typically having a long-term duration, for instance 25 years or more. In a PPP, the objectives of a government related to the delivery of a good or services are intended to be aligned with the profit maximisation objective of private companies.

The types of PPP vary according to the extent of involvement and the risk borne by the private party. According to the "PPP in Infrastructure Resource Centre of the World Bank"², there are four broad categories of such partnerships. These are contracts such as, management and operating agreements, leases/affermage, Concessions, Build-Operate-Transfer (BOT) and Design-Build-Operate (DBO), Joint Ventures and Partial Divestiture of Public Assets that both the public and the private sector(s) are highly involved. However, there is not a widely recognized definition of a PPP, therefore different countries adopt different definitions. Eurostat (2016), provides a list of features of what constitutes a public private partnership:

- The private partner must bear capital expenditures to create or renovate/refurbish fixed assets.
- The private partner must maintain the fixed assets for the duration of the contract.
- The private partner must receive payments by Government for the provision of goods or services.
- The fixed assets must have a life span, at least as long as the duration of the contract.
- The economic value of an asset that has been refurbished, must be at least twice the value before the refurbishment.

There are several advantages of such partnerships, since they are able to combine characteristics of both the private and the public sector. More specifically, the private sector has easier access to finance, is more informed about current technologies, manages resources and processes more efficiently and it is aware of the local conditions. On the other hand, the public sector is concerned about the social aspects of entrepreneurship, the environment and the generation of jobs.

² <https://ppp.worldbank.org/public-private-partnership/agreements>

Consequently, given mutually beneficial conditions, partnerships between private and public bodies can yield significant results (Ahmed & Ali, 2004).

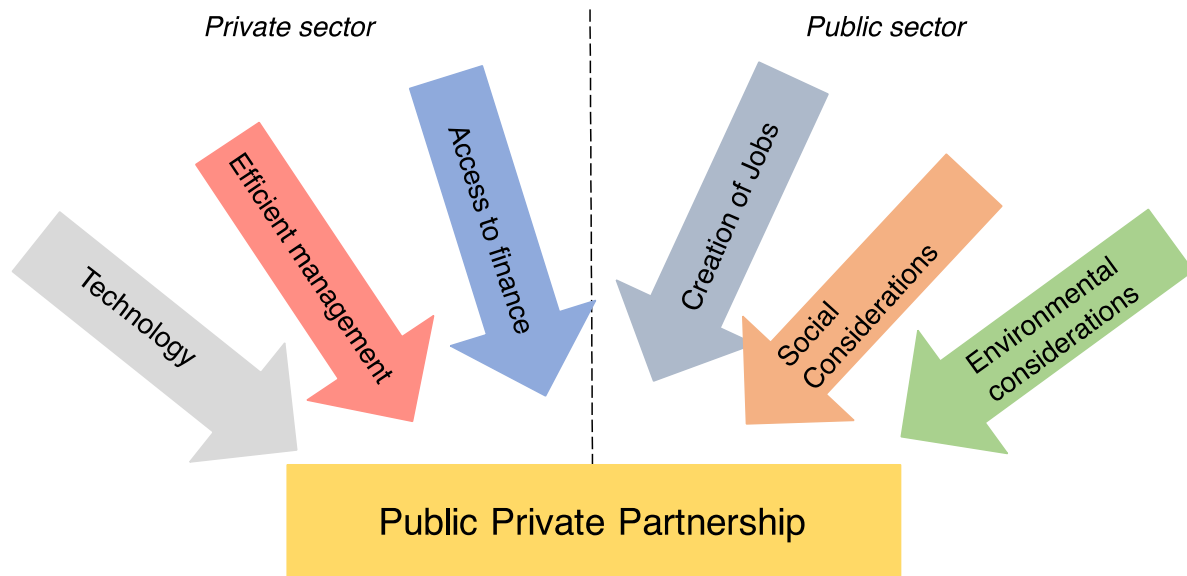


Figure 1 Private and Public sector contribution to a PPP.

However, barriers may exist that relate to lack of policies to reinforce incentives for stakeholders, inability to access required capital, immature level of technology, insufficient participation (Rehn, 2013). Recognizing such barriers, the World Bank has developed a methodology to assess the readiness of countries for PPPs³. The suggested process includes the assessment the status quo in terms of the legal and regulatory, institutional frameworks, access to finance, funding and managing risk, and its comparison with the best practices to determine the gap. The steps are the following:

1. Establishment of the status quo. This step concerns a basic overview of the country in terms of macroeconomic data, business climate, climate change, fragility and gender inclusion.
2. Assessment of the degree of prior experience of the country on PPPs.
3. Assessment of the extent to which a country supports PPPs.
4. Assessment of the legislative and regulatory framework. During this step, assessment of the general PPP and specific business legislation takes place, as well as the assessment of how well the law is being implemented.

³ The World Bank Group (2016). Country Readiness Diagnostic for Private-Public Partnerships. Available at: <http://pubdocs.worldbank.org/en/943711467733900102/Country-PPP-Readiness-Diagnostic-Tool.pdf>

5. Identification and assessment of the institutions and processes that are in place to support the preparation, procurement and implementation of PPPs.
6. Assessment of the ability of the government to provide funding and manage financial risk.
7. The assessment of accessing finance sources.
8. Assessment of the oversight, audit and disclosure procedures and the relevant institutions that are in place.
9. Gap assessment.

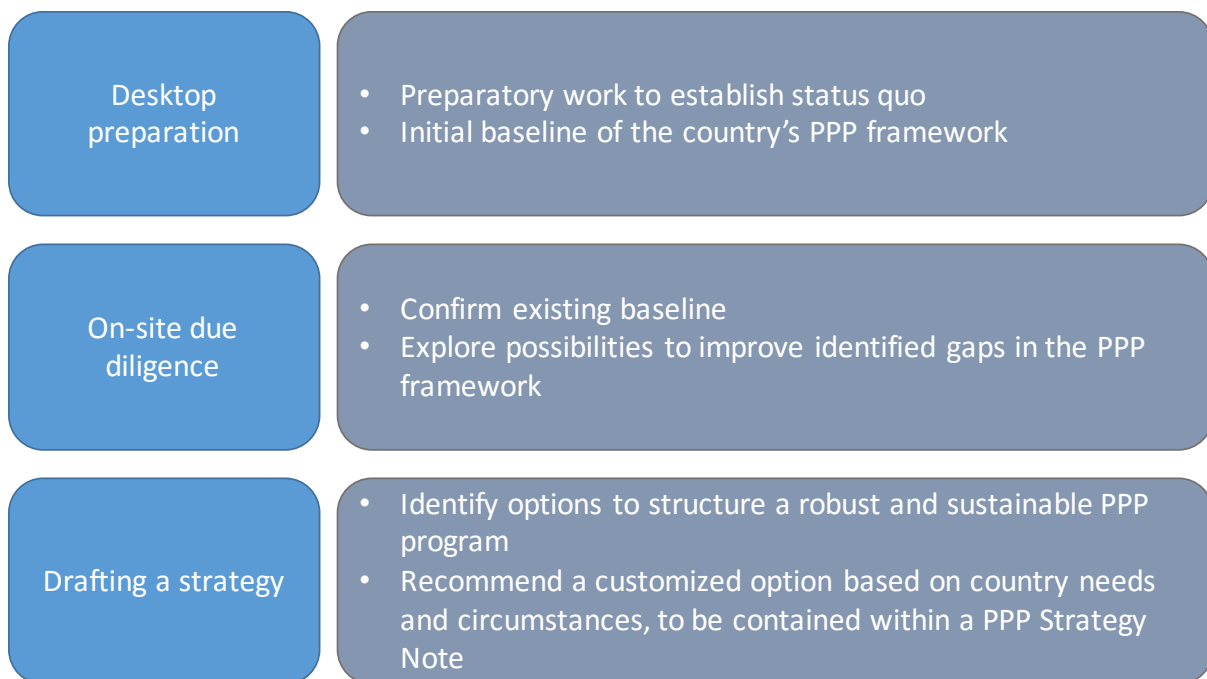


Figure 2 The approach developed by the World Bank. Adopted from The World Bank Group (2016)

6.3 Barriers and Challenges related to PPPs

Several prerequisites have been recognised for the successful implementation of PPPs (European Commission, 2003). Launching successful partnerships requires streamlined decision making, and this may require the establishment of special-purpose authorities. In addition to that, sound procedures of overseeing the development and operation of PPP projects should be in place to ensure smooth implementation of the projects. Furthermore, the initiation or success of PPPs might be difficult, if appropriate and commercial laws are not in force by the government. In an environment that facilitates collaboration and aims at socioeconomic development, the creation of synergies and PPPs can flourish. However, there are a number of constraints that can hamper PPP development. These include⁴:

- *Legal and regulatory issues.* Apart from laws and practices related directly to PPPs, the broader legislative and regulatory environment might affect the interest of the private sector to participate in such partnerships. More specifically, extensive regulation, the tax regime, labour laws and restrictions related to foreign investments and banking cumulatively, might not provide the right incentives for the private sector to enter such a contract. Therefore, the first step that should be taken before the initiation of a partnership would be to assess possible barriers imposed by the legislative and regulatory environment, or frame the partnership in such a way so that it accommodates the legislation or circumvents constraints.
- *Institutional constraints.* Barriers often arise from the internal organisation of the partners involved. Poor planning, unwillingness to share information, lack of leadership, exclusion of members of the partnership due to unequal involvement and lack of commitment are some issues that relate to how institutions are structured. Some ways to circumvent the above are strong leadership and processes that abet the partnership.
- *Finance.* Issues related to this are, i) private sector might be unable to compete with the public sector, due to the high costs of the project, ii) the project might not be financially sustainable, iii) Financial support in the form of co-financing, subsidies and supplies cannot be provided by

⁴ United Nations Development Programme: Public- Private Partnerships for the urban Environment. Available at: http://pppue.undp.2margraf.com/en/05_2.htm

the public sector. Careful planning, good communication among the partners and investigation of possible international sources of funding might be solutions to such issues.

- *Constraints related to contracts.* Barriers related to this category are: i) the project may not be competitive. This is especially relevant to countries with markets that tend to be monopolistic; ii) Lack of assessment of benefits and costs. As a tool cost-benefit analysis can be useful, not only because it is able to elicit costs and benefits that may be important for the implementation of the project, but also because it can be used in the negotiation between partners; iii) Size of contract. Bigger contracts allow for exploitation of economies of scale, whereas small contracts might not be as beneficial and iv) Transaction and bidding costs. High costs might be a factor to make a project less beneficial to the private sector and to the society.
- *Capacity.* Generally, the private and the public sectors may not have the same understanding about the importance of PPPs. Also, especially in cases where there are not many PPPs already formed difficulties might arise in terms of contract specifications and administration, tendering and contracting and financial analysis and planning.

To overcome the aforementioned constraints, the Organisation for Economic Co-operation and Development (OECD, 2012) provides the following recommendations for the public governance of PPPs:

1. Establishment of a legitimate framework that is supported by competent and capable public authorities.

2. The selection of PPPs should be based on a “value for money” assessment

3. The budgetary process should be transparent in order to reduce fiscal risks and not to harm the integrity of the procurement process.

6.4 Case Studies

Several cases of PPP in the context of industrial symbiosis, demonstrate that successful projects can be initiated either by the private or the public sector. Such cases are presented below.

6.4.1 Industrial Symbiosis networks initiated by the Public Sector

Händelö industrial symbiosis network-Sweden

The industrial area in Händelö is located on an island outside of the city of Norrköping. Before the establishment of the industries, the area was used mainly for agricultural purposes. Nowadays, industrial and natural systems coexist with some of the latter being considered Natura 2000 protected areas. Industrial activities in the area include processing, manufacturing and logistics.

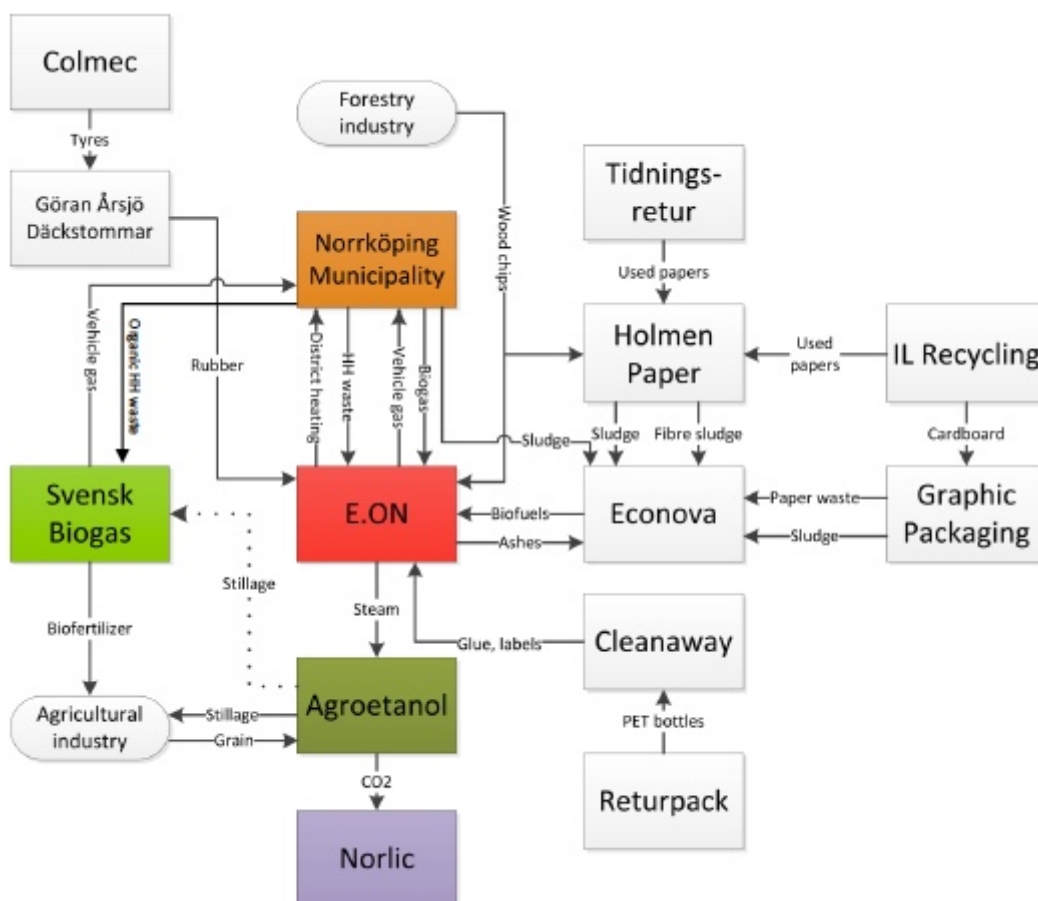


Figure 3 The industrial symbiosis network in Händelö. Adapted from: Nicklasson (2007).

For the development of the industrial ecosystem, public authorities and especially the municipality of Norrköping have played a crucial role. This is due to the fact that the municipality is responsible for managing waste. The organic waste that dwells mainly from households is diverted to the plant of Svensk Biogas, whereas the non-organic waste is used by E.ON power generator to produce electricity and heating. In addition to that, the municipality has invested in technology development and dissemination, and in creating trading routes. These were done with the establishment of a new campus of the Linköping University in 1996 and the development of the harbour that would promote the establishment of logistics companies. Another action that was taken by the municipality and helped the development of the network, was the facilitation of Lantmännen Agroetanol that was looking for a location to establish an ethanol plant. In addition to that, the municipality provides collected household waste to E.ON CHP power plant and in exchange it receives electricity and district heating. The organic material is given to Svensk-Biogas that treats it to produce gas. Gas is also produced by the municipal waste water treatment plant, which is then upgraded by E.ON and is finally used by the public transport fleet and the residents of the region.

The Envi Grow Park Project-Finland

The Forssa region in Finland is another example where the participation of public and private sectors in an industrial symbiosis network has led to significant economic and social results. The area is located 100km away from Helsinki, between three sub-regions of the Häme region in Finland. Forssa is home to food, construction, environmental technology, electronics, information and communication technology, metal and printing industries. In 1990, a new dump was established in the area along with Loimi-Hämeen Jätehuolto, a municipality-owned company. Apart from the local environment that consists of several public and private businesses and a university that offers programs in bioprocesses and environmental technology, the development of synergistic effects has been reinforced by the Finnish National Strategy on Bioeconomy. In addition to that, the local authorities have also been supportive through developing a strategic programme for the Häme region that included the initiative, such as the Envi Grow Park Project.

The success of this initiative was based in the close collaboration between the private and the public sectors that has a long standing tradition in the region. In relation to that, two entities should be mentioned that have assisted in shaping the industrial symbiosis network in the region. The first is the Forssa Envitech Club that operated between 2006 and 2010 and the second the Development Centre of the Forssa Region that took over after 2010 and was responsible for the collaboration between the

private and the public sector, and the implementation of development projects in the region. Essentially, a top-down approach was followed in Forssa, meaning that local authorities were the driving force behind the development of the project.

Envi Grow Park - eco industrial park

business from the bioeconomy innovations

Brightgreen
Forssa region

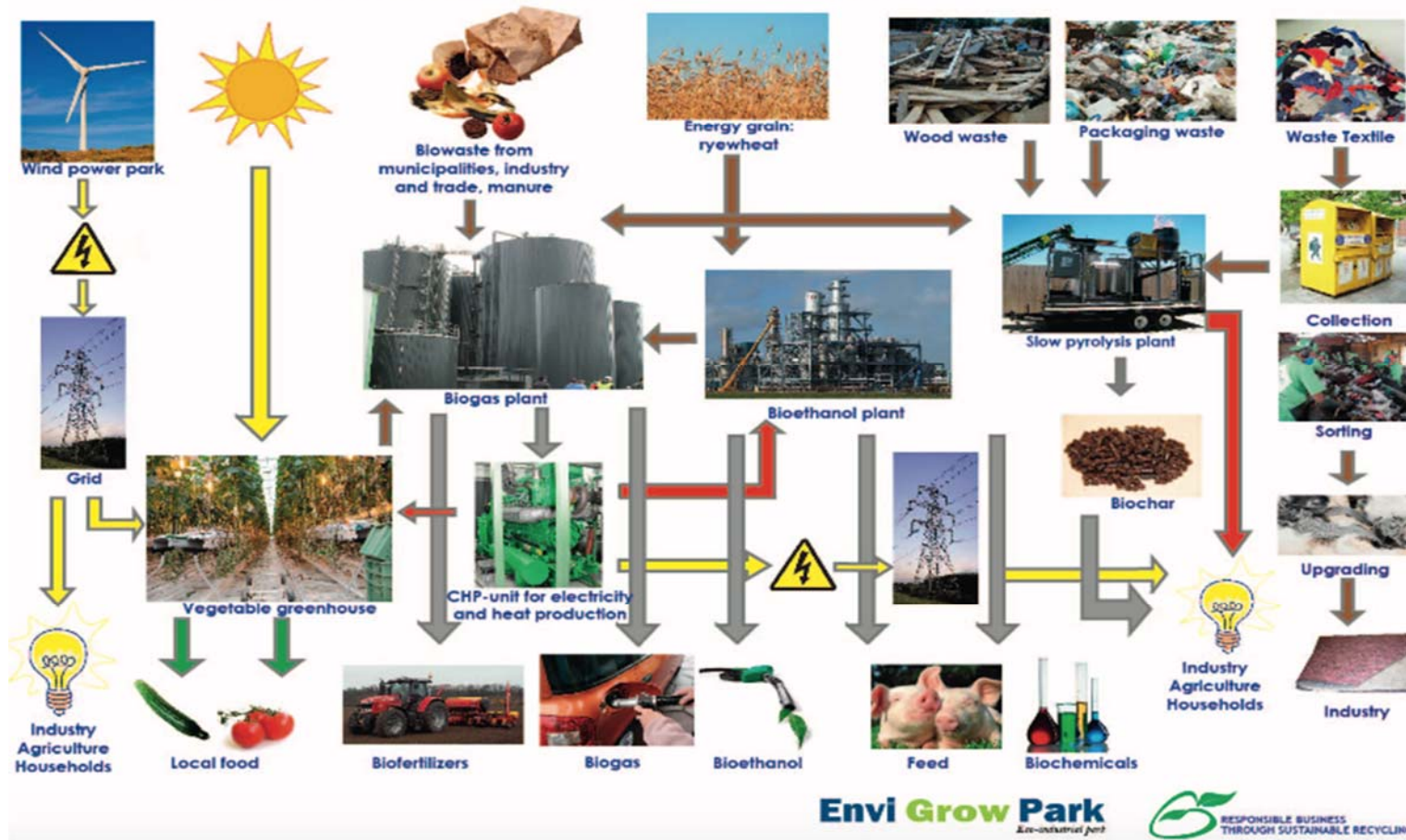


Figure 4 Depiction of the Envi Grow Park project. Source: Teräs et al. (2014)

Animal waste management network- Romania

A symbiosis network between different small-medium enterprises (SMEs) has been established in Romania in order to treat animal waste. The problem that these companies were facing was related to the production of animal waste (e.g. carcasses, expired animal or dairy products, waste generated by the slaughterhouse, etc.) that would constitute a source of public discomfort, such as smell and public health hazards for individuals living close to the industrial units. PRODINCOM, an SME that slaughters animals and processes their meat, had been in conflict with local authorities, due to its inability to treat its wastes. As a result, fines would be issued for poor waste management.

A solution that was suggested by the ECOREG project (LIFE07 ENV/RO/000690) that was co-funded by the LIFE+ programme, the Ministry of Environment, the Ministry of Finance and the partners of the consortium. The idea was to fund the installation of an organic incinerator at PRODINCOM. After the installation, other SMEs in the area within the same industry, started feeding the incinerator with waste. This process helps PRODINCOM and other SMEs to reduce expenses that would accrue from conveying to and processing by other incinerator facilities. In addition to that, through incinerating waste hot water is being produced and used in PRODINCOM's production processes.

Industrial Symbiosis Platform in Italy

In 2010, ENEA which is the Italian National Agency for New Technologies, Energy and Sustainable Economic Development started developing a platform to enable companies to share resources (e.g. energy, water, material) and offer operational tools to companies and relevant stakeholders. ENEA acts as the manager of the platform that combines Geographical Information Systems with databases. Through the platform, companies can search for possible collaborations in their region to create synergies in the context of industrial symbiosis.

The platform implemented a pilot project in Sicily that successfully gathered more than 80 small medium enterprises (Cutaia, 2015). In addition to that, the platform has supported technically and scientifically the "Green-Industrial Symbiosis" project that was developed in Emilia-Romagna region with the collaboration of 13 companies, 7 research institutes and 1 public authority (Cutaia, 2014). The project consists of two phases. During the first (2013-2014), 90 potential synergies were identified among 10 companies. The second phase (2014-2015) included finding ways to implement the identified synergies. Results are yet to be seen.

6.4.2 Industrial Symbiosis networks initiated by the Private Sector

Kalundborg industrial symbiosis network- Denmark

Kalundborg was the first ever case of an industrial symbiosis network to be realised. The park was given birth in 1959 when Asnæs Power Station was set up. Nowadays, Kalundborg Symbiosis includes eight public and private enterprises in the Kalundborg area and it is being expanding.

The first cooperation ever formed in relation to the network, was between Statoil and the municipality that concerned the supply of water. The city of Kalundborg was responsible for building the pipeline, while the company would finance it. However, the first symbiotic relationship was formed in 1972 and concerned the supply of gas through a pipe system. Later on, in 1981 the municipality of Kalundborg established a district heating system that made use of waste to generated energy. With the establishment of more industrial units in the area, symbiotic practices began to flourish, leading to more than 30 exchanges of water, energy and other by-products between symbiotic actors.

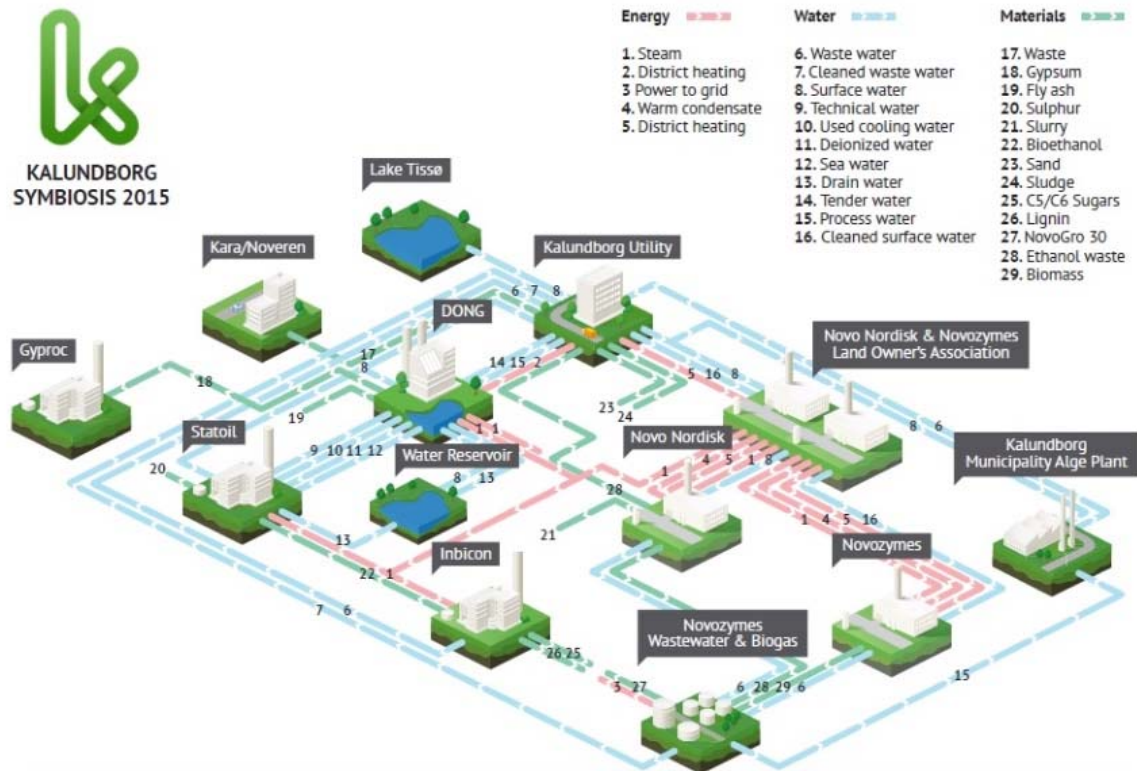


Figure 5 Simplified depiction of the Kalundborg industrial symbiosis network. Source: <http://www.symbiosis.dk/diagram>

Though initial investment is required, the companies obtain benefits in the form of sales of by-products and reduced cost of input. In addition to that, the payback time of investments is estimated to be approximately 5 years (Christensen, 1999), which further stresses the economic benefits for those involved.

A useful practice that increased the synergies between the different actors was the establishment of the Environmental club in 1988. The municipality, the Danish Society for Nature Conservation and companies were part of this club.

Eyde Cluster- Norway

The Eyde Cluster is situated in the Agder region in Southern Norway. The region is divided in 15 municipalities with total population of 113,747 (Reference). The environment is high on the priorities of the regional political agenda. The “Regional Development Plan Adger 2020” states that one of the key priorities is for the Adger region to become globally a leading region in climate-friendly production and distribution of energy by 2020. To succeed in this, as well as in development, job security and competitiveness, the local municipalities support clusters of businesses by providing funding through the Regional Development Funds and the Regional Research Funds Adger.

The Eyde cluster was established in 2007 by directors of companies in the processing industry. The companies that participate in the network produce products such as metals, materials and chemicals that they export to global markets. Though each company’s value chain varies significantly, they all have developed synergies with one another. The reason for the formulation of the network was the need to decrease costs to attract capital from international investors, and to follow environmental standards.

In 2010 the network received funding and technical support from the Innovation Norway’s Arena Program for its long-term development. In addition to that, the companies have been involved in several projects supported by the Eyde Environmental Program, such as the “Eyde 0 Waste”, which aims at dealing with the waste produced by the companies and investigating possible ways to reduce the use of landfill to zero. The project has received funding from the Norwegian Research Council, Innovation Norway, Regional Research Funds, Enova and the EU association SPIRE.

National Industrial Symbiosis Programme (NISP)- United Kingdom

The NISP project scaled up at a national level in the United Kingdom in 2005, after it had originated three pilot projects in Scotland, West Midlands and Yorkshire & Humberside in 2003. It was developed with the involvement of UK Business Council for Sustainable Development, which had previously been involved in regional projects, such as the Humber Industrial Symbiosis Program and other projects in the West Midlands and Mersey Estuary. NISP is open any type of businesses across the UK. NISP is a public-partnership that was proposed by International Synergies Ltd. and was funded by the UK Department for Environment, Food and Rural Affairs until 2014. It started as a private sector activity but the support of the Government assisted in the scaling-up of the project.

NISP essentially, assists industries in looking for business opportunities beyond their conventional markets, while having resource efficiency as one of their objectives. NISP successfully applied the concept of industrial symbiosis, achieving cost benefits that exceed £1.1 billion, generating more than 1.4 billion in sales revenues and assisted in the reuse of approximately 45 tonnes of material.

The economic and environmental benefits that have been generated by NISP has been recognized by numerous countries in Europe that also developed industrial symbiosis programs. More specifically, the NISP approach have be has been followed by Belgium, France (<http://pnsi.fr>) Hungary (http://nisp.hu/en/about_nisp) where it lasted for three years (2009-2012), Italy, Netherlands, Northern Ireland (<http://www.international-synergiesni.com>), Poland and Romania (<http://www.nisp-ecoreg.ro>) where it was implemented between 2009-2011, which have also developed national industrial symbiosis programs following the NISP approach. It has also been recognized by the European Commission as one of the best practices in the field of resource efficiency.

7 Indicative Topics to be discussed in the Workshop (main axes)

As indicated above, the workshop organised will be focus on the establishment of PPPs in the context of industrial symbiosis and will be based on three different axes: application of PPPs in the context of Industrial Symbiosis (PPP-IS), Business View (BV) and Policy View (PV) in the agenda.

Sessions related to the **application of PPPs on Industrial Symbiosis** (PPP-IS) aim at establishing a connection between what constitutes a PPP and how these can be utilised to create industrial networks in the context of industrial symbiosis. The topic *EU policies and initiatives about Public-private Partnerships* falls under this category. The relevant session could include the definition of the different forms of PPPs, discuss the legal aspects of PPPs in Partners' countries and other European countries, explain the economic incentives of public and private partners to enter such agreements, discuss national and European funding schemes for PPPs and if possible provide examples from Greece, Partners' countries and the rest of the EU .

Sessions that relate to the **business view** (BV), are focused on shedding light on the incentives of the private sector to be willing to participate in an industrial symbiosis network, issues that might create barriers for the private sector, benefits and costs related to the implementation of such partnerships. In terms of the workshop agenda, sessions that relate to this axe are: PPPs in the context of circular economy and sustainable use of resources, where it should be presented how the European Union and Member States have been promoting PPPs to achieve sustainability; Barriers and challenges related to PPPs; Implementing PPPs in the context of circular economy – Greek example 1, where Public Power Corporation S.A. will present its district heating system; and Implementing PPPs in the context of circular economy – Greek example 2, where Management System of Western Macedonia S.A will present a platform for the exchange of wastes that was developed by the LIFE+ M3P project. The partners could also present case studies from their countries on specific topics (territorial development, new jobs creation, use of ash, biomass production) that would be on common ground with the Greek cases.

Public Policy view (PV) sessions are similar to BV sessions in the sense that they aim at providing information on the incentives of the public sector, the social benefits and costs of PPPs related to industrial symbiosis, potential of achieving economic development and growth. These sessions fall under the topic: *Barriers and challenges related to PPPs*. The time slot dedicated to this topic should

include presentations and discussions on financial, contract and capacity constraints, as well as ways to overcome them.

The following graph depicts the three axes and the topics that will be discussed during the workshop. As it can be seen, some topics concern one axis, while most of them concern two or three. Since different actors try to satisfy different objectives (public sector versus private sector objectives), it is deemed important to investigate how different aspects of a potential PPP affect these actors, in order to identify the keys of a successful partnership that leads to Pareto efficiency (i.e. a status where each actor is better off without actors being worse off).

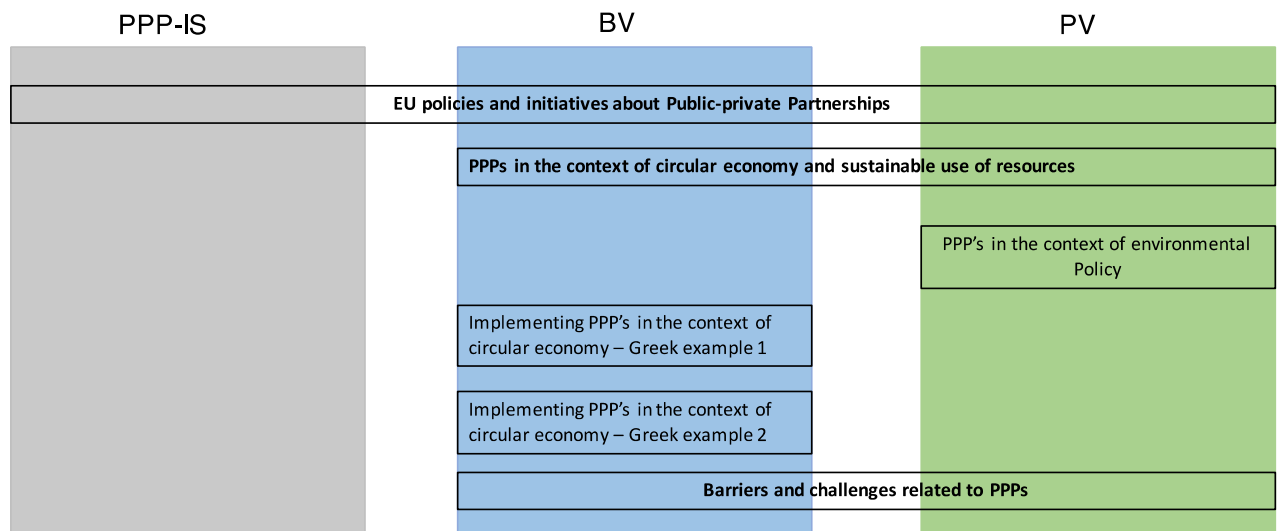


Figure 6 The topics of the workshop agenda and their relevance to the three thematic axes.

Overall, it would be advised that the presentations and discussions cover the whole spectrum of PPPs providing information that is valuable to both the private and the public sector attendees.

8 Guidelines for the Development of the Workshop Summary Report

At the end of the workshop a summary report will be drafted. The summary report should contain the following elements:

- Brief background information on the theme of the workshop
- List of attendees (name, affiliation, contact information)
- Agenda of the workshop
- List of speakers (session, name, affiliation, contact information)
- Main key points from the presentation of each session
- Main key points from the discussion that followed each presentation

The report should start with a brief description of the workshop, the venue, the theme and the objectives of the workshop and provide some background information about the theme. More specifically, this section should briefly explain what is a PPP and describe the different aspects that were analysed during the workshop.

Additionally, the report should contain the agenda of the workshop, the number of attendees and information about them, such as their name, field and affiliation (e.g. university, public authority, etc.), as well as information on the speakers of each session.

The summary report, should contain information about each session of the workshop, presenting the key issues that were discussed during each session and main conclusions from the discussion that was held after each presentation. For this purpose, a person should be assigned to keep minutes during each session. It would be of added value for the preparation of the report after the workshop, the person that takes notes to keep record of issues raised and perspectives provided by the participants in relation to the discussed topic. Also, in the minutes it is suggested that the organiser and his/her team note any aspects that will emerge during the discussion.

Finally, Annex 2 provides a short policy learning survey, which the organiser could distribute to participants to fill in. If the organising team feels that the notes they kept suffice for the development of the summary report, the survey could be neglected.

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10 Annex 1 List of Attendees Template

A3.1 Interregional workshop on how to plan and unlock public and private investments. Municipality of Kozani				
List of participants				
#	Full Name	Email address	Organisation/Affiliation	Country
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11 Annex 2 Policy learning Survey

At the end of the workshop, if deemed useful, the organiser can use the survey template below to obtain additional feedback and policy learning input from attendees.

Country of Origin:

Occupation:

Days of attendance (1st, 2nd, both):

1. Please rate the following phases related to the establishment of a PPP in terms of implementation difficulty (1-5 scale, with 1 being the easiest and 5 the most difficult)

Phase	Rating
Analysis of the current (economic, institutional, regulatory) status	
Identification of partners	
Design of the PPP	
Initiation of the PPP	
Operation	

2. Are there any other phases of a PPP project that you think are essential?

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3. In your opinion, which are the most important benefits of industrial symbiosis?

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4. To what extent do you believe that barriers against the establishment of PPPs are country specific? (Please circle one choice)

Strongly disagree

Disagree

Neutral

Agree

Strongly agree

5. Do you think that a PPP would better be initiated by the public sector, the private sector, or both? (Please circle one choice)

Public sector

Private sector

Both

6. Which of the following sentences matches your opinion regarding who is abler to manage a PPP?
(Please tick your selection)

The public sector is abler	<input type="checkbox"/>
The private sector is abler	<input type="checkbox"/>
It depends on the general environment of the country	<input type="checkbox"/>

7. Considering that barriers and constraints exist, how would you rate the severity of each in your country? (1-5 scale, with 1 being the most severe, and 5 not important at all).

Barrier/Constraint	Rating
Legal, regulatory	<input type="text"/>
Economic	<input type="text"/>
Institutional	<input type="text"/>
Capacity (of the economy)	<input type="text"/>

8. Do you think that governments have been reinforcing the stimulation of PPPs during the last decade? (Please tick your selection)

Yes	<input type="checkbox"/>
No	<input type="checkbox"/>
Not sure	<input type="checkbox"/>

9. Do you think that PPPs will be a tool that will attract the interest of the private and the public sector in the future? Please justify your answer.

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