FISSAC

FOSTERING INDUSTRIAL SYMBIOSIS FOR A SUSTAINABLE RESOURCE INTENSIVE INDUSTRY ACROSS THE EXTENDED CONSTRUCTION VALUE CHAIN

Social strategies for FISSAC: Definition of target social groups

February 2016

D1.4: Social strategies for FISSAC: Definition of target social groups
WP 1, T 1.5

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[1] PU = Public
PP = Restricted to other programme participants (including the Commission Services)
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0. Summary

Industrial Symbiosis is an emerging concept with multitude benefits for companies, communities and the local environment. It can be a very powerful and important strategic approach to promote sustainability in the European Union. For this reason, FISSAC project is highly relevant, bringing together a wide range of partners and countries.

Industrial Symbiosis can be initiated by a public authority or a private firm or association and, as it is meant to be business driven, it is not directly affecting the social milieu. Research to date shows there is limited knowledge about non-technical aspects (including social aspects) and associated networks pertaining to IS developments.

It is the aim of this report to highlight the importance of non-technical and social aspects as a key for achieving successful Industrial Symbiosis projects. In line with FISSAC D1.1 'Stakeholders network set up' and D9.1 'Dissemination plan', this report will define target social groups as beneficiaries and influencers of the FISSAC model. Lessons learnt from previous analysis of best practices in Industrial Symbiosis (D1.2) underline why social aspects have to be equally considered in the project implementation and operation phase.

The diversity of the project and the wide range of countries and partners also underline the need to make priorities, which need to be aligned with the project objectives in the long run.

This task outlines the strategies and upcoming activities for social engagement and acceptance to be reported in month 18 (February 2017). By making research more responsive to social needs, it is the aim of FISSAC project to evaluate the new changes, engage with and raise awareness amongst all stakeholders and drive the successful development of IS projects. Social engagement and acceptance will be discussed and evaluated during the overall project duration considering inputs from the Social Advisory Board.

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Table of content

Project funded by the European Union's Horizon 2020 research and innovation programme under grant agreement Nº 642154.

List of Tables

List of Figures

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1. Introduction to FISSAC

1.1 Objective

The FISSAC project involves stakeholders at all levels of the construction and demolition value chain to develop a methodology, and software platform to facilitate information exchange that can support Industrial Symbiosis networks and replicate pilot schemes at local and regional levels.

The model will be based on three sustainability pillars:

- environmental (with a lifecycle approach);
- economic;
- social (taking into consideration stakeholders engagement and impact on society).

Our ambition is that the model we create can be replicated in other regions and other value chain scenarios.

The project runs from September 2015 until February 2020.

1.2 Expected outcomes

FISSAC aims to demonstrate the effectiveness of the processes, services and products at different levels.

- **Manufacturing processes**
  - Demonstration of closed loop recycling processes to transform waste into valuable acceptable secondary raw materials;
  - Demonstration of the manufacturing processes of the novel products at industrial scale.
- **Product validation**
  - Demonstration of the eco-design of eco-innovative construction products (new eco-element and green concrete, innovative ceramic tiles and rubber-wood plastic composites) in pre-industrial processes, under a life cycle approach;
  - Real scale demonstration of the application and technical performance of eco-innovative construction products in a variety of case studies.
- **Industrial Symbiosis model**
  - Demonstration of the software platform;
  - Replicability assessment of the model through living lab concept (as a user-centered, open-innovation ecosystem, often operating in a territorial context).

1.3 Partners

The FISSAC project is coordinated by Acciona Infrastructures (Spain). The consortium is composed of 26 partners from nine countries (8 EU Member States and Turkey) and includes:

- general contractor and engineering/construction companies;
- non- profit research organisations;
- SMEs in different sustainable business fields;
- public authorities;
- manufacturing and energy intensive industry organisations;
- standardisation and certification bodies;
- local and regional recycling / sustainable resource management organisations.

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1.4 Aim of the Task

This report will introduce the social aspects pertaining to the development of Industrial Symbiosis projects and highlight their importance for achieving successful results.

Throughout the project duration, target groups as beneficiaries and influencers of the FISSAC model will be defined in the short- and long-term.

A series of activities and methods of engagement and social acceptance strategies will be discussed and reported at month 18. For this purpose, three candidate projects have been selected from previous analysis (D1.2), which will serve as testing and validation cases. These projects are considered as good practices in social engagement.

FISSAC project, apart from its relevance and interest in technological innovation, implies a transformation of a well-established global production and operational model and brings multiple changes, which will affect the organisational culture, habits, labour and skills market etc.

Apart from considering the three key dimensions of sustainability, we believe that all three aspects should be equally balanced. Therefore, the project will need to propose some concrete actions in order to keep the social interest and minimise any risks and threats that FISSAC might create in the social milieu. The following aspects need to addressed:

- Economic and business aspects (corporate culture, CSR and human resources policies, innovation, strategic management, organisation, management model, consolidation etc);
- Entrepreneurship (new companies etc);
- Social aspects (consumers perceptions about new models affecting their purchases, present and future consumer habits, social welfare etc);
- Employability (job creation, new jobs, new skills required, training needs etc)

The aim of the Task on social strategies and engagement is two-fold:

- To highlight and communicate the specific benefits of Industrial Symbiosis, namely the social aspects to all relevant stakeholder groups;
- To define strategies for more effective social engagement, cooperation and networking opportunities.

1.5 Social Advisory Board

The FISSAC project does not include a specific work plan to assess the social impact of the project, at least not explicitly. Therefore, the project will count on the insight and advice from experts on social issues, namely the Social Advisory Board. These experts are not members of the Consortium but they will be regularly involved in the project, specifically about the progress on social aspects work.

ACR+ and Acciona have organised several conference calls (October 2015, January 2016, February 2016) with members of the Advisory Board in order to discuss the outline of the present paper as well as questions about Industrial Symbiosis and previous experiences and lessons learnt.

The Social Advisory Board will be invited to join project meetings and FISSAC workshops, depending on the topic. Acciona and ACR+ will be the point of contact to communicate the progress and any relevant project activities.

The members of the Social Advisory Board who confirmed their participation so far:

- Mr Fredrik Bjork (Malmo University, Sweden)

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- Ms Teresa Domenech (UCL, United Kingdom)
- Ms Elisabeth Ekener Petersen (KTH University, Sweden)
- Ms Marta Zaragoza Domingo (Cresalida, Spain)

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2. Social aspects

2.1 State of the art

Limited scientific and peer-reviewed literature to date is discussing the evaluation, analysis, and understanding of social and organisational aspects pertaining to Industrial Symbiosis projects. Current IS developments have been established for Business to Business (B2B) transactions therefore primarily focusing on the technical and engineering solutions to optimise the connection of different processes and facilitate the exchange of by-products, waste and energy.

Despite the progress and the challenges that the industry has to overcome to set up IS networks (see D1.2 ''Identification of best practices and lessons learnt in Industrial Symbiosis''), social aspects have not been so far equally considered. However, they can play an important role in the project development as they can result in:

- delaying or even halting a project development;
- forming different kinds of business networks ;
- fostering culture of cooperation and sense of community;
- understanding the dynamics of collaboration and leadership by the different key actors.

Literature suggests that trust is essential for the setting up and functioning of industrial ecosystems. However, to ensure the uptake of Industrial Symbiosis, experts underline it is not technical knowledge or inter-industry relationships that only matter but also the ability to mobilise actors, empower and make them aware of possible synergistic opportunities (Schiller et al, 2014).

The objective of this task will be first to evaluate the social impact of the project, raise awareness and highlight the importance of social aspects in order to achieve successful IS projects.

2.2 Definition of Industrial Symbiosis

[Industrial Symbiosis] engages diverse organisations in a network to foster eco-innovation and long-term culture change. Creating and sharing knowledge through the network yields mutually profitable transactions for novel sourcing of required inputs, value-added destinations for non-product outputs and improved business and technical processes. (Lombardi and Laybourn, 2012)

The FISSAC project will be working with various stakeholders across the extended construction value chain to understand these aspects and build a model and supporting systems that will endeavour to overcome the challenges associated with Industrial Symbiosis.

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Figure 1 – Circular economy in the construction value chain

Industrial Symbiosis as a transition of a well-established global production and operational model to a new innovative concept can deliver a multitude of benefits to companies, communities living in the vicinity and the local environment. Based on publications (Stehlik et al., 2006), (Energy Delta Institute, 2012) and the FISSAC analysis in D1.2, a number of benefits and savings have been identified:

Table 1 – Potential benefits of Industrial Symbiosis projects

Potential benefits of Industrial Symbiosis projects		
For communities and local authorities	**For the environment**	**For business**
Boost local economy and growth	Improved air quality and reduced pollution	Cost savings
Local business opportunities	Ecosystems protection	Increased energy efficiency
Improved health for citizens and workers	Avoided water use	New partnerships
Knowledge transfer and new skills	More efficient use of resources	Speed up innovations and invest in R&D
Enhanced quality of life	Waste reduction	New patents
Improved aesthetics	Reduced carbon emissions and climate change mitigation	Additional sales and increased turnover
Improved local environment	Raw material availability	Reduction of operation costs
Reduced cost for waste disposal		Green profile, better public image
'Sense of community'		Decrease carbon footprint
		Income from sale of by-products
		New business models
		Reduced business risk
		Infrastructure sharing

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2.3 Lessons learnt from analysis

FISSAC project partners compiled over sixty cases from across Europe and the world as part of Task 1.1 'From current models of Industrial Symbiosis to a new model'. Based on the information collected, we identified four types of projects:

- Symbiosis based on heat and power;
- Industrial Symbiosis;
- Symbiosis based on (de)construction materials;
- Regulations, plans and R&D programmes.

Following the analysis of the collected cases about the opportunities and benefits created by IS projects, we can withdraw some conclusions:

- Promoting culture of cooperation, building transparency and open communication and trust is critical for synergistic projects. On the other hand, having companies engaged in Industrial Symbiosis projects is a way of starting building trust.
- Non-secretive leadership style and management profile of high-level executives in a company has proven to be inspirational for employees. In some cases, a passionate and committed CEO has initiated and driven such projects by solving a number of problems.
- The team can be motivated from the transformation of business, new source of inspiration.
- Having different firms collaborating at the very first stages of the project (idea, partnership, concept) is important.
- Investing in Industrial Symbiosis can often be associated with the 'green' and sustainable profile that a company wants to promote.
- Stability and long-term vision provided by local and regional policy makers will provide a favourable environment for investing in Industrial Symbiosis.
- Developing a sense of community between the companies within a network will make them realise a multitude of resources to be shared (e.g. waste streams, water, energy, by-products, ideas, people) and gradually develop their willingness to collaborate.

2.4 Why social aspects are important

The social aspects of Industrial Symbiosis projects should be considered in the internal social dimension of the companies. For FISSAC project in particular, the organisation dimension will be a key factor of the success or failure of the methodology and the model. This dimension will have some relevance and implications in both the construction phase of the project and the exploitation and replication by other stakeholders from outside the Consortium. The dimension requires working with the organisational culture as a key element for the success of the proposed change. The organisational culture will affect the kind of strategic management, the staff management model and the organisational structure. In this regards, it is important to consider the new organisational forms, new models of leadership and staff management that put the hub of activity in people (develop knowledge, new skills, aptitudes and attitudes). Organisational strategy and performance-related goals should also motivate managers to evolve and have an open, flexible mindset.

These models aim to strengthen key competences and new business models, such as creativity and innovation, teamwork, adaptability, communication, interpersonal relations etc. Besides, they foster social-oriented values in the organisation, internal and external to the company, such as cooperation, transparency, innovation and equal opportunities.

These values imply corporate competences that benefit from the fulfilment of duties and responsibilities of the team; also by promoting greater motivation and staff involvement.

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That is a key factor i.e. to keep on learning and improving new competences (corporate and specific) required for new business models and methodologies as in the case of Industrial Symbiosis models suggested in FISSAC (Zaragoza Domingo et al, 2015).

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3. Setting the boundaries

3.1 Mapping of social actors

A first network of stakeholders relevant to FISSAC project was identified and set up in Task 1.1. A total of one thousand and five hundred direct contacts and more than nine hundred actors were identified, either as 'warm contacts' or contacts of indirect interest in the FISSAC project. The majority of them comes from industry (materials producers, managers, federations, construction companies) followed by research and innovation organisations, public authorities and consultancies.

These stakeholders are expected to participate at different stages of the FISSAC project for instance:

- validate the FISSAC model;
- participate in Living Labs and webinars;
- provide insight in the Social strategies and engagement work;
- replicate the FISSAC model in new markets and regions.

In line with the Industrial Symbiosis boundaries, the FISSAC project will primarily focus on the interactions between social actors within the Industrial Symbiosis networks (internal relations).

More specifically, we will consider the following actors as directly involved in IS projects (i):

- research centres;
- local, regional and national policy makers;
- company CEOs an executive leaders;
- consultancies and facilitators;
- industry federations;
- workers.

All other target groups are identified as indirectly involved groups in the IS projects development. These are (ii):

- transportation and logistics companies;
- the media;
- local communities;
- agencies at European and international level;
- citizens' groups;
- consumers.

However, as the project aims at stakeholders' participation in the symbiosis projects, we will consider some target groups already defined as 'indirect' in the scope of the present analysis. These are (iii):

- local communities;
- citizens' groups;
- consumers.

If actors from (iii) are excluded from the scope of the study, there is a risk that the approach to social engagement tends to focus on ''overcoming barriers'' rather than ''project implementation''. Therefore, a wider group of stakeholders including social actors identified as (i) and (iii) will be considered in the scope of the present analysis.

In addition to this, we expect logistics and transportation companies to be affected by new business models and logistics models, and local communities and citizens' groups to be involved in project approval, as new

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projects will seek for permit in their vicinity. The multi-stakeholder approach will allow for better implementation of the project findings depending on the activity that partners may focus on.

For the purpose of the study, we will distinguish two levels of involvement:

- Phase 1 Construction of methodology and of the platform: Only direct beneficiaries (i.e. FISSAC Consortium) and other interested stakeholders (groups (i) and (iii))
- Phase 2 Exploitation and replication of the FISSAC model: Direct beneficiaries and all social actors groups (i), (ii)

3.2 Mapping of transactions

Based on the cases reviewed, we can identify the following transactions within an IS network:

Table 2- Transactions within an Industrial Symbiosis network

Flows	Actors	Interactions
Energy and materials	Supplier/ purchaser	Supplies/ purchases
Waste	Regulator	Legal contracts
Water	Facilitator	Moderation
Knowledge	Initiator	
Technology and innovation	Practitioner	
Payments	Managers/ employees (white collar)	
Non-financial exchanges	Workers	
Logistics		
Infrastructure sharing		
Space		

The transactions and key players within an IS network will be evaluated and closely monitored in this task. Their description will be integrated in the candidate IS projects (see 4.2), which will highlight the social dimension in practice.

3.3 Interaction with other Tasks and Work Packages

The Task on social aspects aims to highlight the importance and raise awareness about the social dimension as a key factor of Industrial Symbiosis model success.

This will be done without any concrete assessment methodology or quantification of the expected social benefits nor is it planned to measure the social impact of real cases (see Chapter 4). To this end, it would be advisable to integrate the social dimension in the work carried out through joint but concrete actions. For instance in the following tasks, social aspects will need to be considered:

- Task 1.4 Identification and development of ecoinnovation, waste and IS indicators: *In this task [..] indicators for quantifying the environmental, economic and social dimension of IS initiatives [..]*
- Task 2.4 Overcoming non-technological barriers: [..] *to identify and analyse the main non-technological barriers (economic, legislative/regulatory, organisational, social/cultural [..])*
- Task 6.4 Definition of the final version of FISSAC IS methodology: *In this task the final version of the methodology will be defined [..] it will guide how to overcome technical barriers [..] and non technical barriers (social/ cultural, legislative/ regulatory, economic [..])*

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- Task 6.5 Definition and validation of FISSAC model: *Environmental issues will be addressed by LCA studies while economic considerations will be addressed to LCC step [..] and last, social aspects will be studies through social network analysis [..]*
- In WP8 ''Exploitation and business models for industrial symbiosis'', there are many factors related to the social dimension (organisational, cultural, political, legal etc) that might act as non-technical barrier to exploitation and replication of the project.

Barriers to implementation

FISSAC findings will be tested and validated in countries with different PESTEL environments, so the identification of non-technical barriers in the implementation of the methodology and model are essential elements to consider, especially for future replication.

For instance, in the phase of construction and project validation, social aspects and organisational non-economic relations (Corporate Social Responsibility or Human Resources policies) are key factors for the viability of any technological innovation or production model.

Another non-technical barrier is the training of professionals for new jobs or roles associated with Industrial Symbiosis. To this end, it would be useful for companies to identify the required professional profiles, skills and competences that need to be attracted.

From an external point of view, internal relations between firms and organisations should be considered when it comes to promoting networking, cooperation and synergies, or understanding the differences between corporate cultures, territories and industries.

When we consider other barriers to the transition towards a circular economy, we need to think about implementing solutions that involve a change of values and behavioural change in companies from a horizontal point of view. It is necessary to work at macro-level considering the role of regional economic policies as a driver for business transformation in order to achieve greater impact on change.

In addition to this, policy instruments should be developed that take into consideration the educational system and future prospects to improve employability and attracting new skilled personnel.

It is also important to incorporate the social dimension in the new business models (WP8). For instance, these models need to consider aspects of entrepreneurial culture and promote economic models, which foster social aspects in the company mission, or promote certain types of work (Zaragoza Domingo et al, 2015).

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4. Next steps

4.1 Proposed strategy

Following the mapping of social actors, we consider for the development of social innovations, which is highlighted in several parts of the report, as necessary to open the process to a wider range of stakeholders. Most definitions of social innovation highlights the necessity of participation of civil society actors in order to enable social sustainability (Moulart et al 2005; Mulgan et al 2007) and also to enable a more integrated social-ecological approach (Olsson & Galaz 2011). Excluding civic perspectives in the early stages of the project may severely hamper the possibility for the project to facilitate, at a later stage, the development of innovations that are social in their character.

It is suggested to assess and analyse the social elements of Industrial Symbiosis by aligning the specific activities in on-going tasks where social aspects will be considered, if possible (see 3.3). The detailed work plan of upcoming activities is displayed below:

Table 3- Upcoming activities to assess social aspects

Focus on FISSAC candidate IS projects		When
	Literature review	Month 6-18
	Conduct interviews with project leaders	Month 6-18
	Organise site visits	Month 6-18
	Evaluate drivers and barriers (qualitative)	Month 6-18
	Assess business culture (organisation structure, leadership models)	Month 6-18
Organise joint activities with other Tasks and Work packages		
	Organise webinars and trainings with experts on social issues	Ongoing
	Circulate questionnaires to multiple stakeholders	Ongoing

During this work, it is important to know in advance how the information will be assessed in order to draw pertinent conclusions for the project. The proposed case studies will be evaluated according to their strengths and opportunities but also weaknesses and threats that may result from them (SWOT analysis). In this way, the analysis will elaborate not only on the benefits of the IS projects but also any potential drawbacks affecting the environment, people and the business. The opportunities for Industrial Symbiosis to contribute to social sustainability through social innovation as well as the possibilities to mitigate the potential impacts to social sustainability will be better captured considering the benefits and risks for all sorts of stakeholders.

The first set of activities will take place between months 6 and 18. The activities will be reported and evaluated in terms of effectiveness and qualitative impact (D1.5). As social multi-stakeholder engagement is an on-going process and one of the pillars of the project, the Final report of social engagement and acceptance (due by month 54) will document all aspects relevant to the social dimension (D10.5 Report of social engagement and acceptance).

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In addition to this, as a participation strategy for achieving greater commitment and engagement, we suggest to include some workshops where the community can participate. The concept will be based on the educational model of a Learning community. In this case, the *FISSAC Learning Community* would count on the participation, cooperation and collaboration of the direct beneficiaries including the indirect beneficiaries who are expected to be affected by the project development. This will ensure their contribution in the three sustainability pillars that FISSAC supports in the long run. Ideally, this tool will be integrated into the FISSAC platform, as the platform should address barrier identification and removal issues.

To make this possible, the community will actively participate in a ''virtual space'' and be able to feed their contributions during the project duration. Cresalida, one of the members of the Social Advisory Board, has some relevant experience managing and creating this tool so FISSAC can build directly on them. This tool will serve as a strategy for open innovation, knowledge management, participation and communication in projects. Finally, the idea can be jointly developed with the concept of Living Labs (see 4.3) in order to optimise outreach and engagement.

4.2 Candidate projects

Following the analysis of best practices and lessons learnt in Industrial Symbiosis (D1.2), we suggest three case studies as candidate projects to assess their social dimension, key actors, transactions and engagement strategies. These projects have been selected as candidate cases because of their strong social element: cultural, organisational or educational highlights, which have made the projects successful and ensured long-term operation.

The projects were carefully selected to be located in different countries, represent different symbiosis concepts and be at various stages of project maturity. The proposed projects to be evaluated are the following ones:

1. Flanders Materials Programme – OVAM (Belgium)
2. Iskenderun Bay – Ekodenge (Turkey)
3. Manresa – Simbiosy (Spain)

Platform for governance:

- **Case "Flanders' Materials Programme (VMP)" (Belgium**)- Regulations, plans and R&D programmes
- Long-term vision development, experimental pilot projects, policy-relevant research and concrete priority actions towards circular economy.
- It is a 'network of networks', comprising the frontrunners within government, industry, universities and research centres, and non-governmental organizations.
- Extensive experience in sustainable materials management, able to identify drivers and barriers to materials management, opportunities for circular economy via innovation, international logistics, new jobs and skills creation, the redesigning of economic policy instruments, consumer behaviour and circular public procurement;
- Educational and management tools to prevent value escaping the material flows http://www.vlaamsmaterialenprogramma.be/fmp

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Leadership:

- **Case "Iskenderun bay" (Turkey**) – Industrial Symbiosis with various materials.
- Collaborations between companies in Iskenderun Bay region with both economic and environmental returns.
- The aims of the project are to increase the competitiveness, to create new market opportunities and to reduce in naturally occurred raw material usage.
- A passionate, determined and competent person drove the process and managed to solve a number of problems.
- http://www.ttgv.org.tr/en/industrial-symbiosis-cooperation-networks-for-environmental-and-economic-benefits

Cooperation:

- **Case "Manresa'' (Spain**)- Industrial Symbiosis with various materials
- Municipalities seem to be good promoters of IS in the territory;
- Benefits for both, companies and Municipality, are high;
- Help companies to visualize how to maximize resource efficiency reducing costs;
- Promotion of the innovation and industrial competitiveness;
- Creation new companies and jobs;
- Social benefits;
- Promotion of circular economy and industrial symbiosis concepts;
- Strengthening Manresa's industrial network.
- http://www.simbiosy.com

ACR+ will organise a series of activities (preferably on site), assisted by the project partners who are in contact with the project representatives (OVAM for Belgium, Ekodenge for Turkey and Simbiosy for Spain). Depending on the activity and level of involvement, several project partners will be invited to join the discussions. These activities aim to provide a qualitative insight on the information collated in Task 1.1 and focus on the internal transactions and actors involved in the network.

4.3 Introduction to Living Labs

The FISSAC model will be demonstrated and validated in Spain, the UK and Turkey and will be replicated in all FISSAC countries through Living Labs (LL) (as a user-centred, open-innovation ecosystem, often operating in a territorial context). The results and knowledge gathered from other WPs will be used for the purposes of the LL. The LL concept will be set up in Task 7.1 and implemented between months 19 and 54.

LL concepts will gather various stakeholders (civil society, policy makers, producers and researchers) to define common goals, share knowledge, develop prototypes; facilitate innovation and encourage more sustainable behaviour across the sector.

The aim is to establish a pilot living lab in Sweden in order to start an early learning process and identify key opportunities and challenges before the living lab concept can be replicated at full scale in other FISSAC countries. Parallel to the pilot, SP will analyse which key actors should be involved in some countries in the Living lab. A list of additional relevant actors should be identified from different sectors. A pilot case in

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Sweden, where a large number of actors from different sectors are already identified, can act as a pioneer and lead the way for the work in the other countries and help the project partners understand what kind of support is needed in the other countries.

4.4 To be discussed

Depending on the type of project and development stage, a number of issues can be discussed during the upcoming project meetings, webinars and training sessions (Hifab 2015). The discussion will be facilitated by experts on social engagement (e.g. members of the Social Advisory Board) or FISSAC partners with previous knowledge on the topic.

Access to information

- How can we increase awareness about the social benefits of IS?
- Which are the key factors to identify possible synergies?
- What is the most important precondition for IS to become successful in your area?
- Which are the limitations to IS projects (technical, logistics, regulatory, economic..)

Social interactions

- Which are the key actors to coordinate the implementation of possible synergies?
- What kind of collaborations currently exists in your area? (business-to-business)
- Do you see any potential collaboration with local business or organisations?
- What role do you think the public sector should have in fostering Industrial Symbiosis?
- What role do you think IS experts (consultancies, academia) should play in an Industrial Symbiosis network?

Willingness to cooperate

- How can we encourage stakeholders to embrace and being involved in IS?
- Do you have something in particular (energy, materials, services, expertise) that you can offer to someone?
- Alternatively, do you have a specific need that someone else can offer?

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5. Conclusions

Industrial Symbiosis can be a very powerful and important strategic approach to promote sustainability in the European Union. For this reason, the work in FISSAC project is highly relevant, bringing together a wide range of partners and countries. It is important to note that initiatives aiming at promoting sustainability to a larger extent take social aspects into consideration and integrate them, in different ways, in their approaches.

Stakeholders engaged with Industrial Symbiosis projects should embrace an approach towards social and organisational aspects. Social engagement and acceptance can provide a solid basis to the first steps towards Industrial Symbiosis. Communication and trust are essential conditions to organise inter-firm cooperation. Independent platform and forums that facilitate communication and exchange are essential for the development of Industrial Symbiosis.

The opportunities for Industrial Symbiosis to contribute to social sustainability through social innovation as well as the possibilities to mitigate the potential negative impacts to social sustainability will be better captured considering the benefits and risks for stakeholders defined in broader sense.

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6. References

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