MUSIC

Market Uptake Support for Intermediate Bioenergy Carriers

D3.3: Set of Stakeholder Factsheets

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Task:	T3.1: Stakeholder identification and interest assessment
Task leader:	Deutsches Biomasseforschungszentrum gGmbH (DBFZ)
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PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
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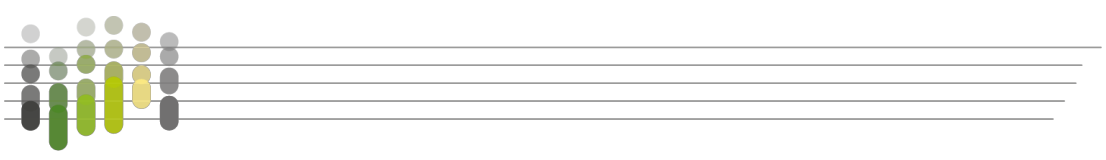

EXECUTIVE SUMMARY

Stakeholder engagement activities are key for successful implementation and market introduction of novel technologies. However, prior to engaging with the respective stakeholders, their needs need to be considered. The set of stakeholder factsheets provides insights to the different categories of stakeholders within the case studies and suggests next steps for action.

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Abbreviations

Dx.x	Deliverable
WP	Work Package
Tx.x	Task

1 Introduction

"Intermediate bioenergy carriers (IBCs) are biomass that is processed to energetically denser materials, analogous to oil, coal and gaseous fossil energy carriers. This means they are easier to transport, store and use. The MUSIC project will support market uptake of three types of IBCs by developing feedstock mobilisation strategies, improved cost-effective logistics and trade centres. IBCs covered in MUSIC include pyrolysis oil, torrefied biomass and microbial oil. […] They can be used directly for heat or power generation or further refined to final bioenergy or bio-based products. IBCs contribute to energy security, reduce greenhouse gas emissions and provide a sustainable alternative to fossil fuels in Europe." (MUSIC Website, WIP Munich, 2020) Within the MUSIC project, WP3 (Stakeholder engagement and mobilisations) focuses on engaging different groups of stakeholders, and assessing their views on IBC, with the aim of developing specific and strategic recommendations on supply chain development.

Stakeholders play a crucial role when considering the market uptake of technologies or products or of IBCs as in this particular project. In order to consider and engage with these stakeholders, the following questions need to be clarified (Clarkson, 1995, Freeman, 1984):

1. What is a stakeholder – in general and in the context of the MUSIC project?
2. Who are the key stakeholders in the individual case studies?
3. How can these stakeholders be engaged?

This document aims to provide answers to these questions. Firstly, a definition of "stakeholder" is given which is then translated into the context of the MUSIC project, answering question 1. In order to answer question 3, the third chapter of this deliverable provides general information on stakeholder engagement activities. Further information on concrete activities regarding stakeholder engagement can be found in WP7 and in Task 3.7 of WP3 (regional engagement workshops). In order to better understand the needs of different stakeholders and hence decide on how to engage them properly, stakeholder factsheets were developed for each case study to provide guidance for the further work in WP3 and WP5. These stakeholder factsheets can provide answers to questions 2 and 3. How the stakeholder factsheets are structured is described in Chapter 4. The information provided in this deliverable aligns with D5.1 (Regional bioenergy settings) and the slides in the Annex of D2.1 (Lessons learned from earlier projects).

2 What is a Stakeholder?

Based on the definition by Freeman (1984) a stakeholder is "any group or individual who can affect or is affected by the achievement of the [projects] objectives". The level of (financial) risk is a common way to classify stakeholders, typically into share- and stakeholders. (Grant and Jordan, 2015; Johnson et al., 2017). In this context, we deviate from the terms share- and stakeholder and instead distinguish between "immediate", "broader" and international stakeholders. Immediate stakeholders bear some form of risk as a result of having invested some form of capital, human or financial, something of value, in a firm (Clarkson, 1995); hence they can also be considered shareholders. In the context of IBCs, we can distinguish between (a) upstream:

biomass producers, biomass production industries, e.g. (associations of) farmers, agro-industries, foresters, forest industries, or (b) downstream: IBC buyers or users, or (c) IBC producers themselves or (d) IBC technology suppliers. **Broader stakeholders** are placed at risk as a result of a firm's activities, but without the element of risk there is no stake (Clarkson, 1995). In the MUSIC context, these can be local, regional or national actors in the case study regions including GOs and NGOs, e.g. local authorities, policy actors, activist groups, other economic actors/ networks, relevant associations. Furthermore, we consider **international stakeholders** including GOs and NGOs, e.g. European authorities, policy actors, activist groups, other economic actors/ networks, relevant associations. This last group is less relevant for the activities in WP3 and WP5 but further considered in WP7.

Table 1 provides an overview of the immediate and broader stakeholders which can be relevant in the context of the different case studies.

Table 1 Stakeholder Categories and Examples (based on Freeman, 1984 & Clarkson, 1995)

Category	Examples
Upstream	biomass producers, biomass production industries , e.g. (associations of) farmers, agro-industries, foresters, forest industries,…
Downstream	IBC buyers or users
IBC producers	
IBC service providers	technology, logistics, finance
Policy	national, federal state, municipal level
Society	community, media, private individual, NGOs, activist groups,…

In the column “category”, we distinguish between six stakeholder groups. Under “examples” different organisations are included, which can fit in the respective category. Furthermore, it needs to be considered whether these organisations are under private or public ownership as this can influence the way they interact with other stakeholders or how decisions within that organisation can be made. Figure 1 visualises how the different stakeholder categories influence each other. This image will also be included in the stakeholder factsheets (Chapter 4) to shows which stakeholder category is considered in that particular factsheet.

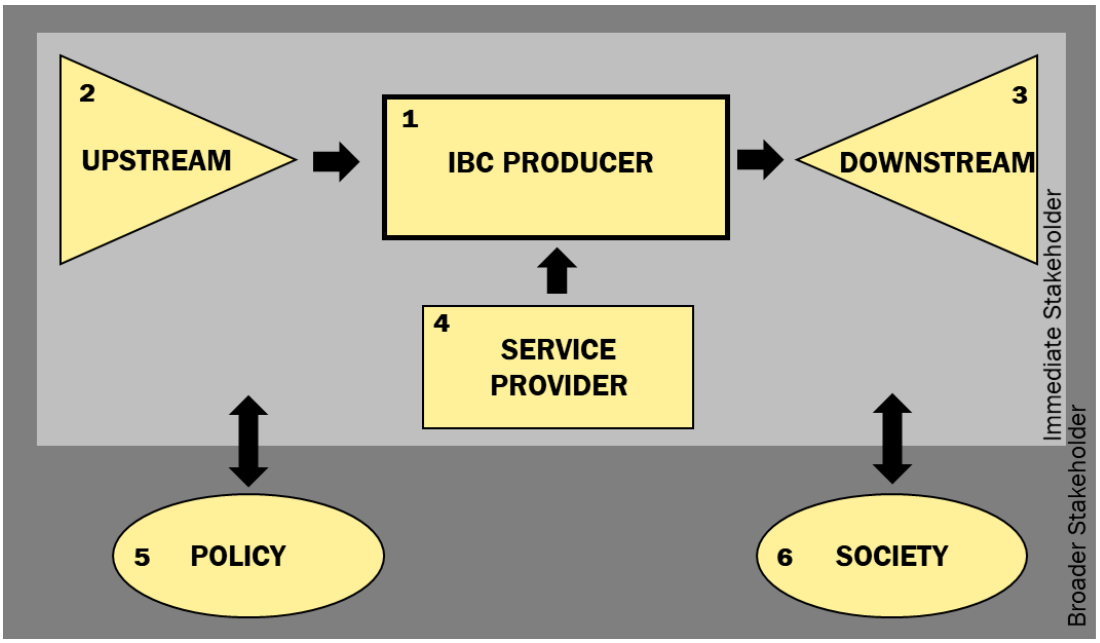


Figure 1 Visualisation of the Different Stakeholder Categories in Table 1

3 Engaging with Stakeholders

Once the different stakeholders relevant for the respective case study are determined, engagement measurements can be considered. First, it needs to be distinguished whether the engagement is for the purpose of data collection or dissemination of information (Merriam and Tisdell, 2015). This, in many cases, influences the means of engagement. General information which should be considered when interacting with stakeholders is presented in the Annex of D2.1 (Lessons learnt from previous projects).

Within the activities of WP3, three means of engagement with stakeholders are considered: interviews, surveys and workshops. How these different methods are utilised is/will be described in D3.6 (workshops) and D3.5 (interviews, surveys).

Outlook: In the next steps, especially in T3.3 (D3.5), stakeholders are considered further and categorised. To engage with the different stakeholders Mitchell et al.'s 1997 model on stakeholder salience is considered. This then leads to the stakeholder assessment matrix by Aapaoja and Haapasalo (2014) from which clear actions regarding certain stakeholders can be derived.

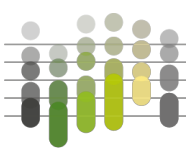
4 Stakeholder Factsheets

The stakeholder factsheets provide a first overview of the different stakeholders who are involved or need to be involved in the different case studies. This information is primarily based on D5.1. The stakeholder factsheets can provide guidance when further developing the case studies, as they indicate which stakeholder categories are already involved in the case study or whether there is an imbalance, e.g. upstream stakeholders are needed while downstream stakeholders are part of the CS team.

Furthermore, they provide information on what could motivate the stakeholders to partake in the project and how they could be engaged with (see Chapter 3). The factsheets are to be used jointly with the stakeholder lists (D3.1 and D3.2). The stakeholder factsheets provide information on stakeholders in each of the six stakeholder categories defined in Chapter 2.

Considering the information in the stakeholder factsheets across the four case studies, these observations can be made:

(1) All case studies are demand side driven. Hence, it is crucial to engage with upstream suppliers and determine how they can be motivated to provide their resource (feedstock) for the use in IBC production facilities.
(2) Lessons learnt and synergies are expected between the Italian and the Greek CS as they both source agricultural feedstock. Based on the observations in these two case studies it might be possible to draw conclusions for other Southern European countries.
(3) With regard to the corporations involved in the International and the Italian case study, it is important to carefully determine the motivation for this demand side drive of IBC technologies. A better understanding of that motivation can support the role out of IBC technologies across other multi-national corporations.



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Annex: Stakeholder Factsheet

In this annex, the stakeholder factsheets for each case study can be found in the following order.

- Sweden & Finland
- Italy
- Greece
- International

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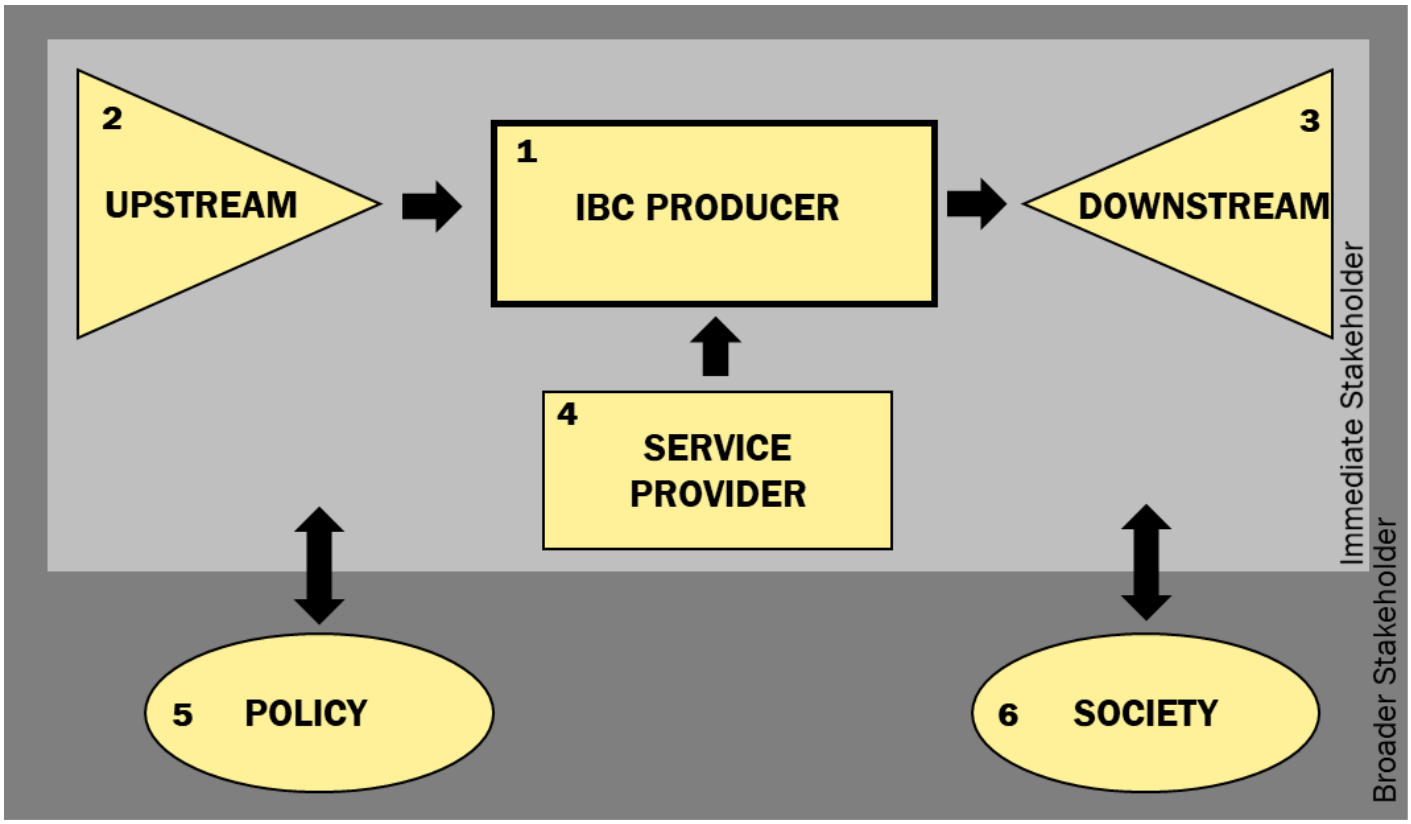
D3.3 Set of Stakeholder Factsheets

Case Study: Sweden & Finland

Categories of Stakeholders



Category 1: IBC Producer

Status quo: In this CS, the technology is already proven (EMPYRO). However, it is unclear who will operate such plants in the future. Will an independent third party (e.g. energy provider) invest in such a plant and operate it or will the plant be operated by the wood-processing organisation? The latter would have the advantage that feedstock supply and plant operation would lie with one organisation. This can improve communication and efficiency along the supply chain.

Next steps:

- ✓ Determine under what conditions it might be lucrative for a wood-processor to invest in an IBC plant
- ✓ Determine under what conditions it might be lucrative for a forester to invest in an IBC plant
- ✓ Approach wood-processing organisations
- ✓ Determine under what conditions a forester, in the case of young trees, might be interested in investing in an IBC plant

Category 2: Upstream

Status quo: The resources considered in this CS are forestry biomass, either by-products of the wood-processing industry or forestry by-products (e.g. young trees). As these resources could already be used in other processes, it is important to consider competing uses and to identify organisations, e.g. sawmills which are currently not utilising these by-products or could utilise them more efficiently. As of now, no feedstock supplier is part of the CS team. With feedstock supply being crucial to the success of market implementation, suppliers should soon be approached.

Next steps:

- ✓ Determine why a wood-processer/forester might be interested in providing his feedstock for IBC applications
- ✓ Approach wood-processing organisations
- ✓ Quantify feedstock at the wood-processing locations
- ✓ Young trees: Quantify and map the availability of this feedstock to determine locations of possible plants

Category 3: Downstream

Status quo: In this CS, downstream means the part of the supply chain from the IBC production plant until the pyrolysis oil – upgraded to maritime fuel – reaches its final destination in the tank of a ship bunkering at a Dutch port. It is important to clarify responsibilities along that supply chain and determine when the product changes ownership. This is crucial for an appropriate risk assessment and for insuring the product appropriately. As pyrolysis oil is a liquid fuel, it needs to be carefully considered how the product is transported. This means to select partners along the supply chain who have experience with handling such products, have the required certifications and can take the necessary precautions. As the downstream supply chain is such a significant and complex part of the CS, it is difficult to distinguish between "downstream" and "service provider" (logistics) in some cases.

Next steps:

- ✓ Consider when the product could change ownership as this dictates whether an organisation can be considered "downstream" or "service provider"
- ✓ Consider what impact that decision can have on risk management and insurance

Category 4: Service Provider

Status quo: The technology and IBC plant service is currently covered by BTG/BTG-BTL. However, it needs to be determined who will provide such services once the project duration is over. With regard to logistics providers, the right partners need to be selected, downstream as well as upstream. Furthermore, it needs to be considered who carries the risk at this point: the IBC producer, the logistics company or the IBC user → When does the pyrolysis oil change ownership?

Next steps:

- ✓ Downstream:
  - ✓ Consider/select harbours (downstream & upstream) regarding the following: proximity to wood-processing industries, proximity to national rail services, harbour infrastructure, tolls and taxes in the harbour, ability to process chemicals or fuels, proximity to pyrolysis upgrading facility
  - ✓ Consider means of transport to NL or potentially elsewhere; determine pros and cons of tank container vs tanker lorry and tank ship → which quantities/road-transport distances are sufficient for either
- ✓ Upstream: consider transport from wood-processing facility to IBC plant, transport by lorry necessary or conveyer belt or forklifts on site sufficient

Category 5: Policy

Status quo: At the moment, three countries are involved in this CS: Sweden, Finland and the Netherlands. Although all three countries are part of the EU, national legislation varies. Furthermore, especially if the pyrolysis oil goes into maritime applications, it needs to be carefully considered which country is eligible to claim any GHG and CO_2 emission savings/reductions and the REDII quota based on EU and national law.

Next steps:

- ✓ Consider national and EU law carefully with respect to GHG and CO_2 emission savings/reductions and REDII quota (refer to D2.3 for EU level)
- ✓ Consider whether other applications, apart from maritime fuels, might have a higher impact with regard to GHG and CO_2 emission savings/reductions
- ✓ Consider in which other EU counties the upgrading to fuels could make sense based on legislation (relevant for further market implementation)

Category 6: Society

Status quo: With regard to the advanced CS, societal issues should be minimal, as wood-processing industries are located in industrial areas. The introduction of an IBC plant does not affect the local communities in any other way than already existing structures and industries. For the strategic CS, the locations of possible IBC plants should be considered carefully to determine whether local communities or rural villages might have an issue with increased transport (e.g. lorries transporting forest residues/young trees) through their community/village.

Next steps:

- ✓ Strategic CS: Consider rural infrastructure and communities when selecting feedstock sourcing strategies and potential IBC plant locations
- ✓ Consider the attitude of national/international activist groups who have an issue with using forestry resources for energy applications

Conclusions

Two things become apparent when considering the stakeholders in this CS:

(1) There is an imbalance in CS partners between upstream and downstream supply chain. It is crucial to involve feedstock suppliers (foresters, wood-processing organisations) as soon as possible, as feedstock security is crucial for market uptake of the technology.

(2) The downstream supply chain is extremely complex and it needs to be carefully considered when the product (=pyrolysis oil) changes ownership as this determines the stake of an organisation and therefore whether it is a downstream partner or service provider.

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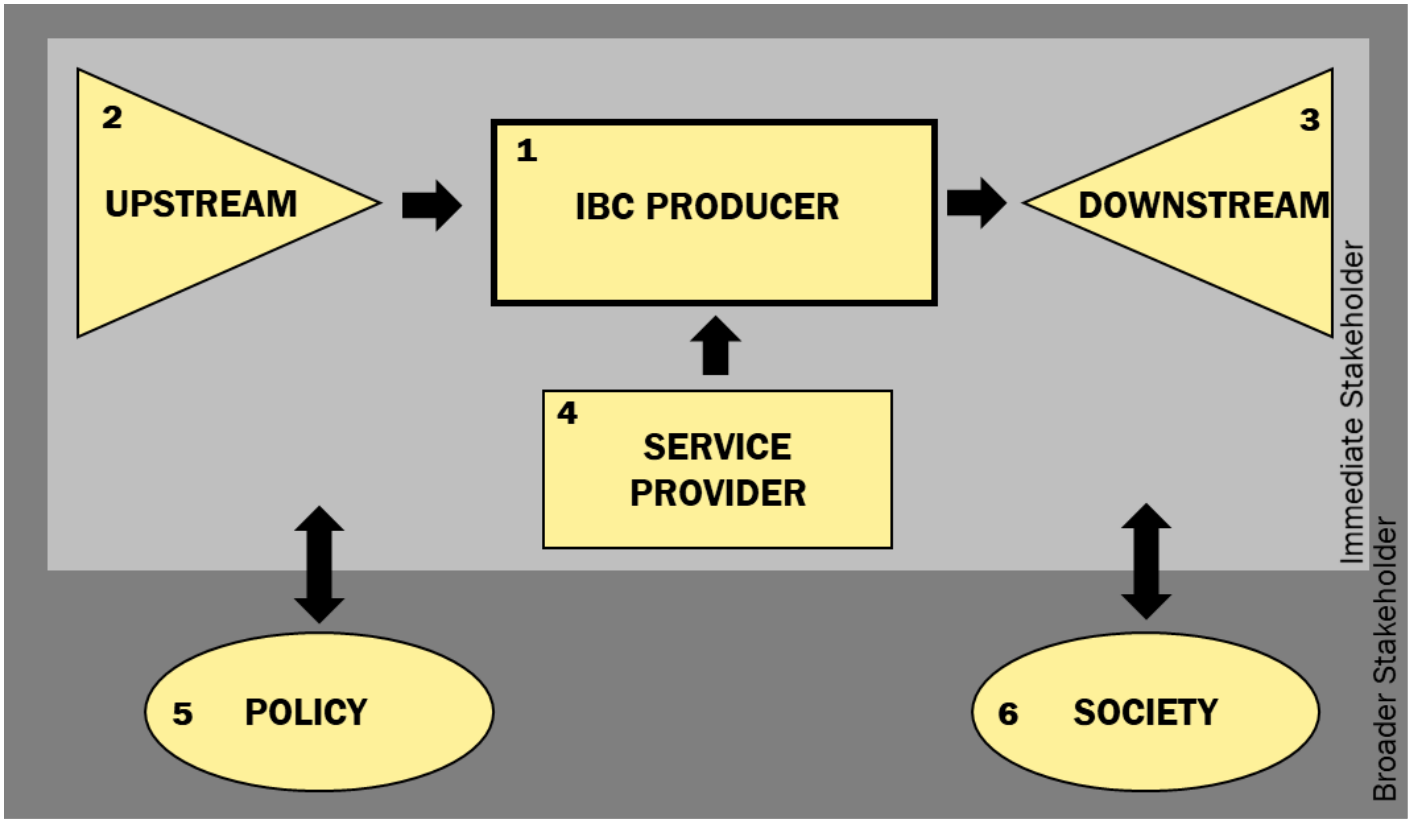
Market Uptake Support for Intermediate Bioenergy Carriers

D3.3 Set of Stakeholder Factsheets

Case Study: Italy

Categories of Stakeholders



Category 1 & 3: IBC Producer, Downstream

Status quo: In the case of both Italian CS (advanced and strategic), the IBC producer will also be the user of the IBC for industrial applications (steelmaking and bio-refining). In the strategic CS, the refined microbial oil can be distributed/marketed further, hence ENI is not the final customer; however, existing downstream structures can be utilised for this, hence it is not considered further. In both cases, the IBC production is demand driven through the industrial corporation. In order to determine whether the cases are replicable or a role out is possible, the motivation behind this demand needs to be considered carefully.

Next steps:

- ✓ Determine the motivation of the industrial partners and check, whether other organisations in similar industries (e.g. cement, steel, other metals) have similar motivations but not stay in direct regional competition regarding feedstock supply → indicates role out/replicability. Motivations could be:
  - ✓ Corporation wants to be greener (consider: is this a strategy of the regional/national division or part of the corporate strategy across business units and countries
  - ✓ Legislation/policy pressure in a certain national context
  - ✓ Societal pressure in a certain national or regional context

Category 2: Upstream

Status quo: Currently, no feedstock suppliers are part of this CS team. As a secure feedstock supply is crucial for the long term success of the IBC plant, farmers and farmers associations need to be engaged with soon. However, it is good that the CS partners can build on pre-existing collaborations.

Next steps:

- ✓ Determine under which circumstances a farmer is willing to supply the feedstock and what other viable options farmers have for selling that feedstock
- ✓ Clarify which logistic concept is lucrative for the famers; this indicates who carries the risks of seasonal deviations (e.g. storage, losses due to weather, management of logistics, provision of means of harvesting and transport)
- ✓ Approach farmers regarding their willingness to provide feedstock
- ✓ Quantify feedstock and determine collection points (important to later determine between centralised and decentralised collection system)
- ✓ Consider decrease of pruning residues due to further Xylella infection or decrease of availability of sick olive trees to reduced Xylella infection → long term feedstock supply

Category 4: Service Provider

Status quo: Service providers, especially with regard to upstream logistics play a crucial role in this CS. The agricultural residues need to be harvested, processed (e.g. shredded), stored and transported to the IBC plant. As the feedstock is a seasonal good, this further increases the complexity of the upstream supply chain.

Next steps:

- ✓ Compare centralised vs. decentralised concepts of feedstock storage and pre-processing
- ✓ Determine when the feedstock changes ownership as this dictates whether an organisation is a service provider or an upstream partner
- ✓ Consider physical requirements for collection points and centralised storage, pre-processing such as existing infrastructure, lorries, etc.

Category 5: Policy

Status quo: This closely links to IBC producer and the downstream supply chain. It needs to be carefully considered how the national legislation influences the corporation, e.g. is national policy a key motivator to invest in IBCs. Furthermore, not only legislation regarding IBCs or fuels is important in this CS, agricultural legislation should be considered as well, especially with regard to possibility of nutrient cycles or returning IBC by-products back to the agricultural partners.

Next steps:

- ✓ Determine agricultural legislation and whether incentives, subsidies or restrictions apply to agricultural operations
- ✓ Determine whether a similar advantageous policy setting exists at other plants of the same corporations

Category 6: Society

Status quo: With regard to the location of the IBC plant and the usage of the IBC, societal issues should be minimal, as the partner corporations are already established in the area. The introduction of an IBC plant does not affect the local communities in any other way than already existing structures and industries. However, the provision of feedstock and the associated logistics could raise societal issues. It needs to be determined whether local communities or rural villages might have an issue with increased transport (e.g. lorries transporting agricultural residues) through their community/village or might refuse the development of new infrastructure (e.g. collection points, access roads for large lorries).

Next steps:

- ✓ Consider rural infrastructure and communities when selecting feedstock sourcing strategies
- ✓ Consider the attitude of national/international activist groups who have an issue with using the Xylella infected olive trees

Conclusions

Two things become apparent when considering the stakeholders in this CS:

(1) There is an imbalance in CS partners between upstream and downstream supply chain. It is crucial to involve feedstock suppliers (farmers and their associations) as soon as possible, as feedstock security is crucial for market uptake of the technology.

(2) The implementation of IBC technologies is demand side driven through large corporations. For the replicability and further role out of the technology it is crucial to understand the motivation behind this demand side drive.

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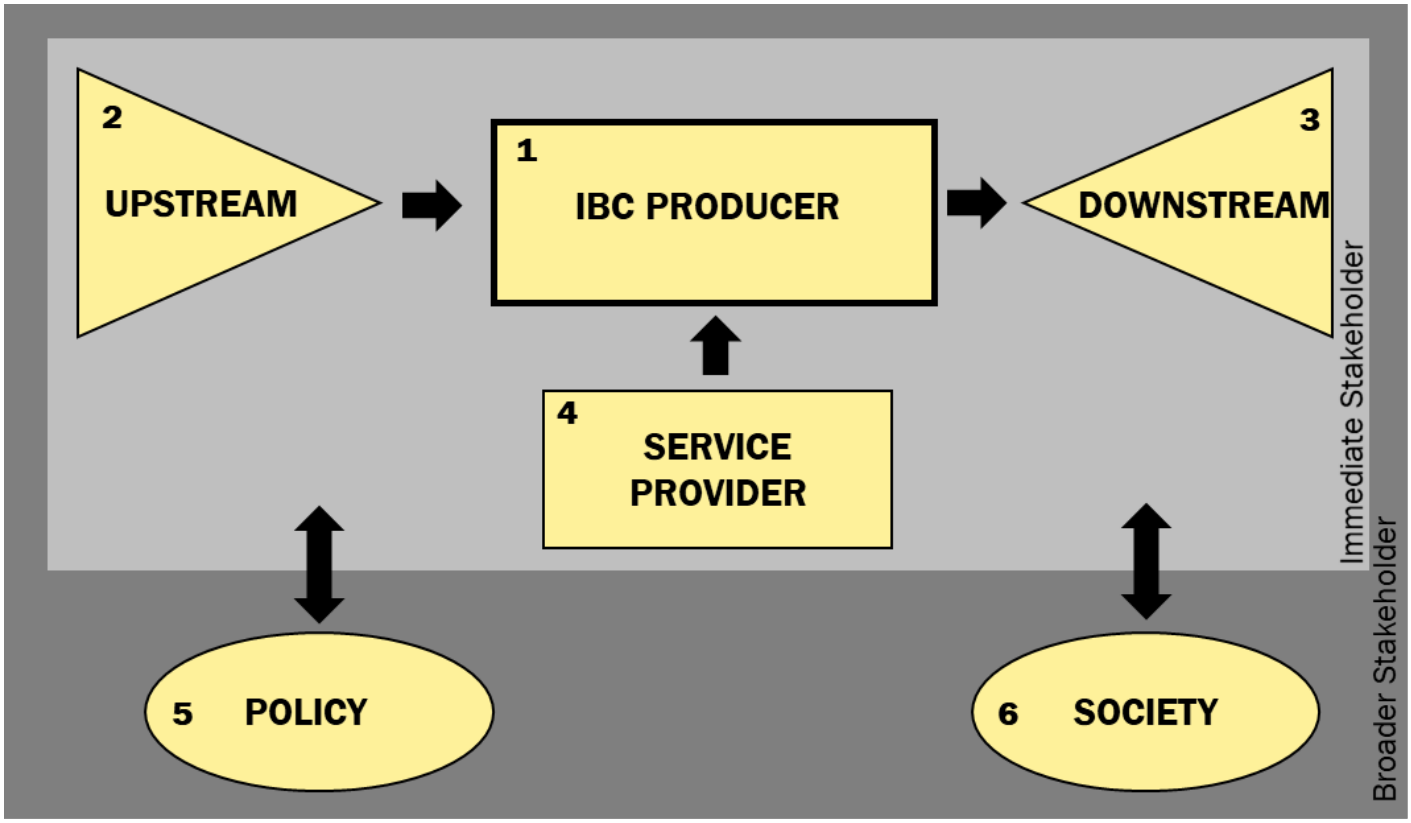
D3.3 Set of Stakeholder Factsheets

Case Study: Greece

Categories of Stakeholders



Category 1 & 3: IBC Producer, Downstream

Status quo: In the case of the Greek CS, it is anticipated that the IBC producer and the user of the IBC will be the same organisation. The IBC will be used for district heating applications in the advanced case study. The motivation arises from policy pressure regarding GHG and CO_2 emission savings/reductions. As these policy requirements apply to other regions/organisations in Greece, potential other operators for a future role out are considered in the advanced case study. These include large-scale implementation at multiple regional (district) heating plants and relevant industries (e.g. cement, quick lime or magnesite) in the same region.

Next steps:

- ✓ Establish a collaboration with the envisaged district heating partner as soon as possible
- ✓ Determine the motivation of the industrial partner and check, whether this motivation also applies to operators of other district heating operators (linked to policy)
- ✓ On the downstream end, it is important to consider whether IBC by-products can be used further and be reintroduced to the agricultural organisations the feedstock originated from in order to maintain nutrient cycles

Category 2: Upstream

Status quo: Currently, no feedstock suppliers are part of this CS team. As a secure feedstock supply is crucial for the long term success of the IBC plant, farmers and farmers associations need to be engaged with soon.

Next steps:

- ✓ Determine under which circumstances a farmer is willing to supply the feedstock and what other viable options farmers have for selling that feedstock
- ✓ Clarify which logistic concept is lucrative for the famers; this indicates who carries the risks of seasonal deviations (e.g. storage, losses due to weather, management of logistics, provision of means of harvesting and transport)
- ✓ Approach farmers regarding their willingness to provide feedstock
- ✓ Quantify feedstock and determine collection points (important to later determine between centralised and decentralised collection system)
- ✓ Consider a variety of feedstock to decrease issues related to seasonality

Category 4: Service Provider

Status quo: Service providers, especially with regard to upstream logistics play a crucial role in this CS. The agricultural residues need to be harvested, processed (e.g. shredded), stored and transported to the IBC plant. As the feedstock is a seasonal good, this further increases the complexity of the upstream supply chain.

Next steps:

- ✓ Compare centralised vs. decentralised concepts of feedstock storage and pre-processing
- ✓ Determine when the feedstock changes ownership as this dictates whether an organisation is a service provider or an upstream partner
- ✓ Consider physical requirements for collection points and centralised storage, pre-processing such as existing infrastructure, lorries, etc.

Category 5: Policy

Status Quo: This closely links to IBC producer and the downstream supply chain. It needs to be carefully considered how the national legislation influences the organisation as here the national policy a key motivator to invest in IBCs. Furthermore, not only legislation regarding IBCs or fuels is important in this CS, agricultural legislation should be considered as well, especially with regard to possibility of nutrient cycles or returning IBC by-products back to the agricultural partners.

Next steps:

- ✓ Determine agricultural legislation and whether incentives, subsidies or restrictions apply to agricultural operations
- ✓ Determine whether a similar advantageous policy setting exists at other plants of the same corporations
- ✓ As current legislation is assumed the main motivator for the implementation of IBCs technologies, monitor the legislative developments carefully as they might increase or decrease motivation

Category 6: Society

Status quo: With regard to the location of the IBC plant and the usage of the IBC, societal issues should be minimal, as the partner corporations are already established in the area. Actually, the technology should be received positively, as the local communities profit directly from green energy/heat. However, if this is results in a price increase for heat, societal issues might arise. However, the provision of feedstock and the associated logistics could raise societal issues. It needs to be determined whether local communities or rural villages might have an issue with increased transport (e.g. lorries transporting agricultural residues) through their community/village or might refuse the development of new infrastructure (e.g. collection points, access roads for large lorries).

Next steps:

- ✓ Consider rural infrastructure and communities when selecting feedstock sourcing strategies
- ✓ Consider how changing heat prices might affect local communities
- ✓ Engage with regional community representatives early on

Conclusions

Two things become apparent when considering the stakeholders in this CS:

(1) There is an imbalance in CS partners between upstream and downstream supply chain. It is to promptly establish a collaboration with the envisaged district heating partner as they are not only the user of the IBC but should also be the IBC producer, covering to central roles in the IBC supply chain.

(2) This case study considers a range of potential heat users, including district and individual heating systems. This means that potentially societal issues might be higher, in particular when fuel substitution would lead to higher heat prices.

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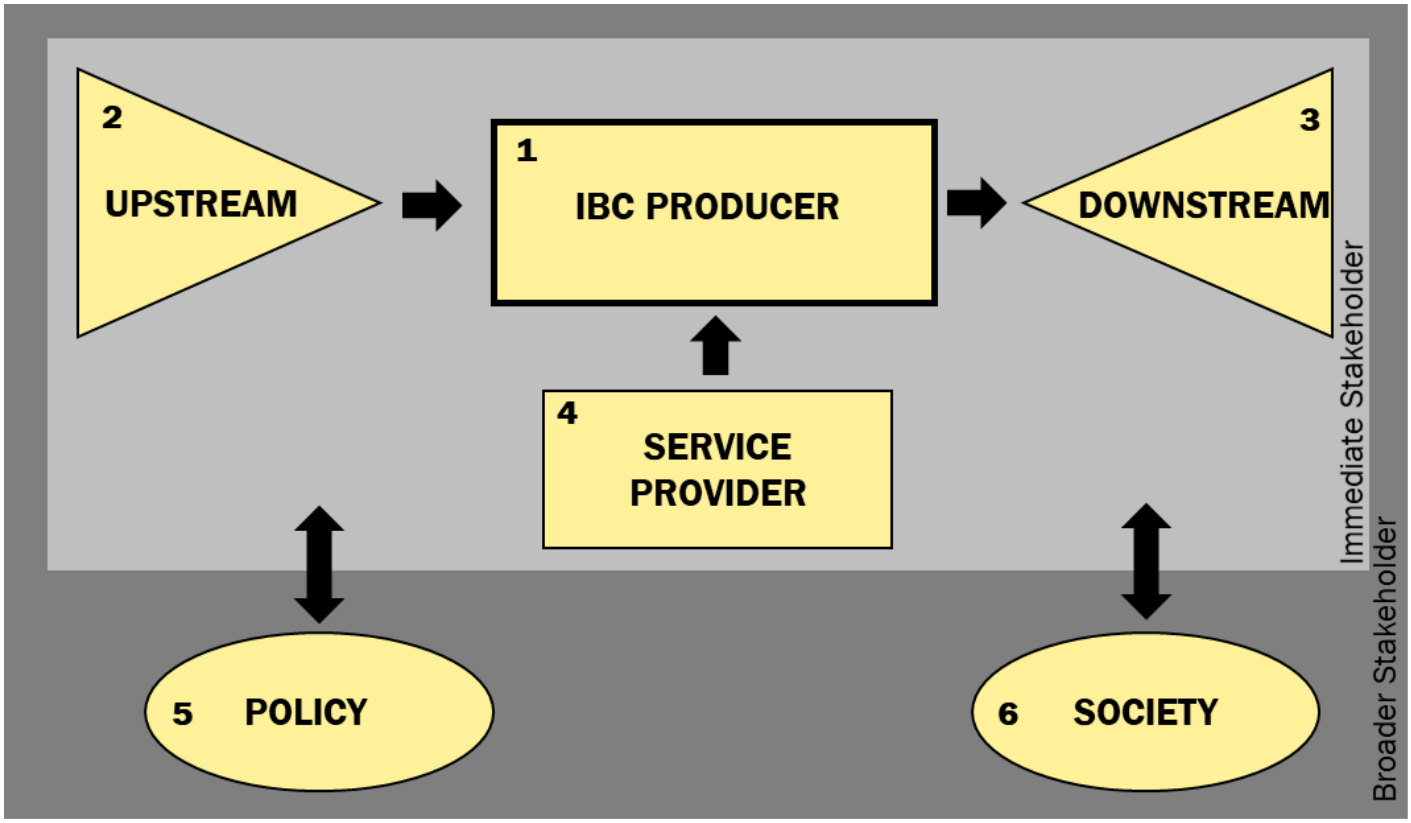
Case Study: International

Categories of Stakeholders



Category 1 & 3: IBC Producer, Downstream

Status quo: Status quo: In the case of the International CS, the IBC producer and the user of the IBC for industrial applications (steelmaking) are already collaborating; hence, these categories are considered together. In this case the IBC production is demand driven through the industrial corporation. In order to determine whether the cases are replicable or a role out is possible, the motivation behind this demand needs to be considered carefully.

Next steps:

- ✓ Determine the motivation of the industrial partner and check, whether other organisations in similar industries (e.g. cement, steel, other metals) have similar motivations but not stay in direct regional competition regarding feedstock supply → indicates role out/replicability.
- ✓ On the downstream end, it is important to consider whether IBC by-products can be used further. They might be classified as waste as the feedstock for the IBC process was classified as such. This could limit the usage pathways of by-products significantly

Category 2 & 4: Upstream, Service Provider

Status quo: The feedstock for this CS is waste wood. With an established collection system and waste management processes, the logistics related to this feedstock are not further considered here. However, it is crucial to determine the available amounts and how changes in wood waste legislation could impact that availability or lead to higher prices (e.g. because the need to be transported over longer distances or pre-treated)

Next steps:

- ✓ Determine when the feedstock changes ownership
- ✓ Determine who is responsible for the pre-treatment/pre-processing of the feedstock
- ✓ Establish long term collaboration with waste management company
- ✓ Determine which other suppliers of waste wood in the required class operate in other regions and hence could provide feedstock for other IBC plant locations following the same approach as the International CS

Category 5: Policy

Status quo: At the moment, several countries are involved with regard to feedstock sourcing. Although all countries are part of the EU (with the exception of the UK, should waste wood be imported from there), national legislation varies. Therefore, national and EU legislation and possible changes thereof regarding the handling of waste wood needs to be considered carefully when determining long term sourcing strategies.

Next steps:

- ✓ Consider national and EU law carefully with respect to waste wood processing and handling
- ✓ Consider in which other EU counties similar legislation is applicable, which could indicate that IBC plants based on the same feedstock might be feasible there

Category 6: Society

Status quo: With regard to the location of the IBC plant and the usage of the IBC, societal issues should be minimal, as the partner corporation is already established in the area. The introduction of an IBC plant does not affect the local communities in any other way than already existing structures and industries. However, the provision of feedstock and the associated logistics could raise societal issues. It needs to be determined whether local communities or rural villages might have an issue with increased transport (e.g. lorries transporting waste wood).

Next steps:

- ✓ Consider infrastructure and communities when selecting feedstock sourcing strategies

Conclusions

Two things become apparent when considering the stakeholders in this CS:

(1) There is an imbalance in CS partners between upstream and downstream supply chain. It is crucial establish a good collaboration with waste management companies for further role out of the technology.

(2) The implementation of IBC technologies is demand side driven through a large corporation. For the replicability and further role out of the technology it is crucial to understand the motivation behind this demand side drive and its replicability.

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