Guidance for CSPs: collecting stakeholder views on barriers and enablers to innovation

Aims

- These questions/points (see table 1) are about barriers and enablers to implementing the innovations and/or solutions identified by the stakeholders in your case study.

Background

We would like to identify and explore barriers and enablers for innovation in practice. Often, this is framed as 'barriers and enablers for the implementation of (technical) innovations developed by research'. The common hypothesis is that the 'end users' of such innovations just lack the knowledge (as a main barrier for uptake). From the WP3 perspective, we understand that the situation can be very different, and a range of e.g. economic, social and practical (and even legal) issues could be restricting innovation, individually or in combination with one another. This is of interest to VALERIE because we want to show that innovation is more than just using research outputs.

We would like to use examples from the WP3 case studies to understand what affects the uptake/acceptance of innovations because the cases contain a variety of 'innovations' (not only technical innovations provided by research, but also social and management innovations provided by peers or co-developed by stakeholders and advisors, for instance). As discussed in Toulouse, you could investigate this topic by having a discussion **in a meeting with a group of stakeholders, and/or also in interviews with individual stakeholders**. It will be important to have a range of views to avoid the risk of strong bias, if only a few people are included.

Instructions for CSPs

1. **Select one innovation per case and define it in general terms** (e.g. the use of wood ash for forest fertilization on mineral soils, or the use of cover crops in outdoor pig farming). The obvious choice is the innovation being trialled in your case, however you may want to broaden this to a more general set of innovations that might share the same sorts of barriers and opportunities (e.g. intercropping; field soil assessment). The WP3 team will talk to you before the meeting and/or interviews, about this choice.

   For group meetings, the selection/definition of which innovation to consider can be done with stakeholders as part of the meeting, whereas for interviews the CSPs will need to select and define the innovations in advance (in discussion with WP3 team). The key thing is that the **same innovation** is discussed with all the stakeholders consulted, in each CS.

2. **Identify the barriers and enablers for 'uptake' of the innovation.** The questions/issues (see table 1) are grouped into 6 key areas where we expect barriers and enablers to be identified. Please use these points under each area as a guide to your meetings/ interviews with stakeholders and technical experts.

   We suggest you:

   Use a Force Field Analysis (FFA) (a very simple exercise) to structure a group discussion or interview. This is a way of identifying and scoring barriers and enablers (see guidelines and worked example below) and provides a consistent output for all CSs. After this, check that you have covered the 6 main issues in the table: are the barriers/enablers related to specific categories? If some categories were not mentioned, check if this is right or did we simply forget/neglect this?

   If you do not want to do FFA there are other options for collecting this information:
   a. Lead an open group discussion/interview based around the 6 categories and points in the table
   b. Start the discussion in a very open way: 'imagine that farmers (or forest owners) should start doing this [example of innovation]: what would encourage them to do it, and what would hinder them?' It could be helpful to use sticky notes to write down on two charts everything they can think of, and then discuss these collectively in a group. After this, then check what you have covered against the questions in the 6 main categories: are the barriers/enablers related to specific categories? If some categories were not mentioned, check if this is right or did we simply forget/neglect this?

   Make sure that you note down the different stakeholders' separate views (e.g. as expressed by research, advisory, farmers/forest owners, supply chain, customers, government, NGOs, society etc).

   NB In a group session, the discussion may tend to converge towards a common understanding, while interviews can diverge into very different views. Interviews could therefore require more intensive analysis by the CS leader to draw balanced or common conclusions.

3. **Collect detailed information** from your stakeholders, in these discussions. It is important to make **good (extensive) notes**. Be as specific as possible e.g. instead of 'farmers' say 'elderly farmers with a small farm' or 'large intensive farmers'; or rather than 'advisers' say 'commercial advisers or government advisers', or 'technical agronomic advisers' or 'representatives from the fertilizer companies', etc.. It is strongly recommended that you assign somebody at the meeting to make

detailed notes, so that you can concentrate on facilitating and encouraging the discussion. Better still, you could tape-record the session.

4. **Write a report** using the 6 issues as the main headings (around 400 words per sub section)

Provide as much detail and explanation as you can, preferably with quotations, not just noting comments as bullet points (though bullet point lists can be useful for summarizing issues to the participants, during the discussion).

Discussion points for case study stakeholders - barriers and enablers to implementing the innovations

Written by: Apila Group Ltd.

Case study: Wood ash as fertilizer in forests

Innovation: Business model to enhance the utilization:
An economical symbiosis is formed, consisting of (1) one **contractor** serving (2) a group of distributed small-scale energy generators (**Producers**), located close to each other. In addition, (3) forest management organization participates the symbiosis to provide adequate information of wood ash fertilization possibilities to the (4) forest owners, a fourth group of actors in the symbiosis.

The actual business model is created for the contractor. The contractor may be a present forest contractor that already delivers fuelwood for producers. In the business model, the contractor also provides service to granulate the ash formed in the energy production with a mobile granulator (loose ash) or with a screener crusher (self-hardened ash). If needed, the contractor also provides storage (big bags or silo), prepares informative labels and commercializes the granulated material. Contractor also has the equipment to spread the fertilizer to forest, and this can be done simultaneously with the forest/fuelwood harvesting.

Stakeholders/technical experts consulted (type and number; meeting/interview format):

Research facilities & consultancy	12, workshop
Den Herder Michael	EFI
Joensuu Samuli	Tapio Oy
Kokkonen Anssi	Karelia Ammattikorkeakoulu Oy
Lindholm Tapio	Suomen ympäristökeskus
Matilainen Mervi	Apila Group Oy Ab
Merenheimo Tiia	Aalto-yliopisto
Partanen Birgitta	Helsingin yliopisto
Rasilainen Tiina	Apila Group Oy Ab
Rinnepelto Pirjo	Apila Group Oy Ab
Räsänen Mauri	Maaseuturahasto
Salminen Pirjo	MMM
Äijälä Olli	Tapio Oy
Distributed energy generators	6, workshop
Hirvonen Teuvo	Enon Energia Oy
Kauhanen Taina	Nurmes
Kauppinen Jyri	UPM-Kymmene Oyj
Parviainen Paavo	Juuan kaukolämpö Oy
Pikkarainen Matti	Nurmeksen Lämpö Oy

Saarinen Eeva	Vapo Oy
Forest management	4, workshop
Kammonen Arto	Metsähallitus
Kuittinen Simo	Otso Metsäpalvelut Oy
Nousiainen Mika	Suomen metsäkeskus
Julkunen Kalevi	
Ash handling method producers	3, workshop
Kiviniemi Sakari	Rakeistus Oy
Mäentausta Olli	Mfibrils Oy
Räisänen Mikko	Ecolan Oy

1. Information

- *Awareness of the innovation*
  The idea for the business model was refined in the workshop, during the negotiations with producers and other participating stakeholders. Most of the producers in North Karelia were familiar/presented this particular idea as solution for ash utilization: a common contractor with a mobile granulator who would travel from one producer to the other. The resulting business model was described in a public summary report of the workshop, delivered to all participating stakeholders.

- *Ease and cost of accessing relevant information*
  Information concerning the business model is presented in a summary report of the workshop. This will be delivered to all participants, and may be published in public, too.
  The information needed to implement the business model:
  i) The apparatus needed: easily from internet without costs. The data was also presented during the seminar/workshop.
  ii) The service provided: business model will be designed as an economical platform, creating a symbiosis network between the stakeholders. Information will be readily available to all participating actors during the contract negotiations.

- *Capacity to understand the potential value of the innovation*
  The innovation is a symbiosis network of stakeholders, creating value for each of them. All the participating stakeholders were able to understand its benefits, and also willing to create a profitable model for the incoming contractor (not participating the workshop).

- *Effectiveness of advisory/ extension services to support farmer with the innovation*
  The forest owners are aware of the possibilities to utilize ash as fertilizer, and relevant data is available through internet. On the other hand, the usage of ash is

still very minimal, and during the workshop, also the possibilities to enhance the demand were considered.
Based on the negotiations, external services and advisory is required. This can be provided by forest management organizations, in cooperation with the contractor responsible for the actual work in forests. Information of the benefits should be delivered, and also the calculations of the actual needs of the soil for fertilizers. The selection of the fertilizer (ash plus boron or nitrogen) should also been done by professionals, e.g. existing forest management service providers.

- *Ability to collect sufficient information on the innovation, and to try it out on the farm*

  Sufficient information can be collected from the networks of producers and forest owners.

  Implementation of the business model can be piloted: An idea of local piloting arouse by a university of applied sciences, together with a few producers. One known contractor will be contacted in near future.

- *How does this set of issues relate to the different positions/understandings of different groups of stakeholders?*
  All the stakeholders participating the workshop found the solution relevant. Some competition between stakeholders may arise: the novel business model will capture a market share from present ash fertilizer producers and service providers (both participating the workshop). On the other hand, the present service has not filled the needs of the producers, and only fair competition can profit the economy of the small-scale energy production. Co-operation with the existing actors is also possible.

  It was assumed, that the contractor will come outside the stakeholder groups participating the workshop. It is crucial, that the stakeholders willing to participate the symbiotic model are accepted, and vice versa.

2. Economic considerations

- *What are the costs versus the benefits of using the innovation?*
  Present expenses related to the utilization of ash are relatively low, since smaller amounts of ash can be utilized in various ways. Yet, handling, storage, logistics and manwork/equipment needed to spread the ash cause unwanted costs, and a new solution is required to ease the burocracy and enhance the utilization of ash as fertilizer.

  For the contractor taking the responsibility of the actual business, investment costs are moderate, and public funding is possible for business development. The cost of the service for the producers and utilizers depends on the actual costs of

the contractor: logistics and manwork. While refining the final business plan and economic symbiosis, the costs has to be settled in order to satisfy the demands of each participant. As a result, paying to the contractor for treating the ash, will only have a minor effect on the costs of producers.

Forest owners will benefit for the business model, since the ash is planned to be spread simultaneously with other forest management operations, saving time.

The ecological benefit: Granulated ash is a valuable fertilizer that can be used instead of artificial fertilizers. Utilizing ash as a fertilizer is a part of circular economy in wood production, and it also helps to compensate the CO_2 emissions of wood burning.

- *Will the innovation make the SH more competitive?*
  Currently, the ash from heat production is a problem for some producers. Loose ash is expensive to store and to transport, and even if it is utilized as a fertilizer, its spreading is difficult and slow. A contractor who granulates the ash, stores it and spreads it in forests at appropriate time, eases the work of producers and saves their time for other duties.

  It is proven that wood ash enhances the forest growth, so using it as a fertilizer in forests will be beneficial to forest owners. It is supposed that the price of ash fertilizer will be competitive when compared to other fertilizers.

  A thesis titled *The effect of circulating nutrients of ash to the cost structure of distributed energy production* will be prepared during 2017 by one of the cooperators in Puutuhka -project (Mervi Matilainen, Apila Group Ltd.).

- *Are there costs preventing its uptake*? *Explain what the costs are (e.g. new machinery, more labour) and how do they differ for different SHs?*

  The service will become too expensive for the stakeholders in symbiosis, if the direct (actual) costs concerning the workload of contractor are too high. The costs has to be calculated and negotiated beforehand to minimize the risk.

- *Are there economic risks involved in using the innovation? Explain what the risks are (e.g. uncertain effect on yield/quality, volatile markets, loss of contract) and how they differ for different SHs(e.g. different levels of resilience between farms)*

  The services should be priced in such a way that they are not too expensive for the producers but will still make the business profitable for the contractor. While the business model is based on economical symbiosis of certain group of actors, major risks are i) producers leaving the symbiosis, and ii) the market of the final product remaining too small.

In addition, the quality of the ash always depends on the quality of fuelwood. If the product cannot be accepted as fertilizer, other possible utilization possibilities has to be found, and additional costs for this has to be covered.

- *Are there any economic incentives for the innovation?*
  Costs of storage and treating of loose ash are lowered.

  Price of granulated ash as forest fertilizer should be competitive with other applicable fertilizers; spreading costs of the fertilizer could be lowered.
  Due to the enhanced growth of forest, indirect economic benefits are possible.

  New business possibility will benefit the contractor, by creating a sustained platform for operations and a known group of customers.

- *How do these economic incentives relate to different groups of stakeholders?*
  Lowered cost of the ash fertilizer (as spread) will benefit the forest owners; additional indirect benefits are possible as forest growth is enhanced.
  The costs for producers are lowered; indirect effect can possibly be seen in the energy price.

3. Technical/ agronomic

- *Does the innovation work in the bio-physical context/farming system? Is it compatible?*

  The innovation fits well in forest economy, as the inorganic nutrients removed during harvesting, are returned to forests. The business model is planned to fit to the present network of forest management operations and energy production, and no additional actors (subcontractors) are needed.

- *How difficult is the innovation? Are there agronomic/technical risks involved?*
  The business model utilizes only existing technology. Wood ash is proven to have a beneficial effect on forest growth. No agronomic or technical risks are expected.

- *Does the innovation require extra skills, knowledge, education, training? For the advisors and/or for the farmers? Will farmers need to learn it from a trusted source? – consider whom*
  The contractor has to learn to use the granulator, but the device is simple and does not require any special skills from a person who is used to use e.g. agricultural or forestry machines. Also the devices that are used to spread the granulated ash in forests are simple and easy to learn.

The producers do not need any new skills.
Additional services (delivered by forest management organizations) for the forest owners were described earlier.

- *Do the SHs have sufficient levels of scientific understanding/ technical competence to make full use of the innovation?*
  Yes. No special skills or higher scientific understanding are needed.

- *How does this relate to different groups of stakeholders?*
  The contractor has the responsibility to learn to use the granulator and to spread granulated ash correctly and effectively. Producers need not to learn any new skills.

4. Social

- *Do SH personal motivations and values prevent uptake?*
  No. Loose ash causes problems to producers, and it is expected that the value of the innovation will be well understood.

- *Do cultural aspects (e.g. traditional ways of doing things, accepted behaviours, habitual attitudes) prevent uptake? For example farmers say 'we've always done it this way – why change now?'*
  The heat producers have been waiting for a new way to treat their ashes.
  Only smaller distributed energy producers have stated, that they have a working system, and no need for new solution.
  Using ash as fertilizer in forest has a long tradition in Finland.

- *Are there supportive social networks, peer support if SH want to learn about or uptake up the innovation?*
  The results of the workshop are available. The R&D facilities participating the workshop can be contacted for more information. There are also companies and contractors who granulate and/or spread the granulated ash in small scale, and they are willing to share their information and experience, if needed. Also some of the producers have experience on spreading their ashes.

- *How does this relate to different groups of stakeholders?*
  The economical symbiosis should be created between producers, contractor and forest management organizations. All the data needed can be collected and utilized within this group of stakeholders.
  The symbiosis supports the contractor when he is starting his operation. The producers benefit if the operation starts smoothly and without problems.

5. Institutional

- *Are there policy measures (subsidies, regulations, controls) that prevent or enable the use of the innovation? What are these?*

The production and quality of wood ash used as a forest fertilizer is regulated. Producers are responsible for product acceptance.
Ashes from different producers need to be analyzed separately before commercialization, and they cannot be mixed if the requirements are not filled. In general, pure wood ash usually fits well in these limits, and offsets can be avoided by controlling the quality of the fuelwood.

- *Is the advisory/extension service (or supply chain support) equipped to support SHs with new innovations? For example are they well trained, component, innovative, well resourced, reasonability priced or the opposite?*
  The analyses of the ash will be performed by accredited laboratories.

  Advisory services may be needed if the contractor applies economic support for purchasing the devices and starting the business. The funding parties are generally open to new innovations and aware of new technical solutions.

  Services for the forest owners are readily available (forest management organizations) but still some lobbing is to be done to accelerate the selling of the solution.

- *How does this relate to different groups of stakeholders?*
  Currently, the ash producers have taken care of analyzing their ashes, and that is not expected to change.
  The contractor may need to be in contact with funding parties to be able to start the business. The contractor needs to know that the ash he gets will be qualified to be used as a fertilizer.
  The forest management organizations should be notified of the expectations.

6. Market/supply chain issues

- *In what way will using the innovation impact upon retailer/processor contracts and conditions, food assurance scheme requirements or the prices or market shares potentially available to producers?*

  The suitable contractor is already a cooperator, fuelwood provider, with producers. If there are other fuelwood providers acting with the producers of the symbiosis, some negotiations are to be carried out to solve possible overlapping. Subcontracting is possible.

  Currently, the producers have spread their ashes in their own forests by themselves, or given the ashes to forest owners for free or for a small fee. While building up the business, contracts will be made between the contractor and producers for treating the ashes, and also between the contractor and forest owners for selling and spreading the granulated ash.

The innovation has no impact on food assurance schemes.

As the granulated wood ash is not very expensive, it is not expected to have an effect on the price of fuelwood sold for the producers. If the granulated ash is used instead of artificial fertilizers, the market share of artificial products will shrink.

- *Does the supply chain (and specific actors within the chain) support innovation by farmers/foresters and if not, how does it discourage innovation and why?*

  The supply chain is expected to be mostly supportive. Some actors may try to question the benefits of wood ash as a forest fertilizer to prevent it to replace artificial fertilizers.

- *How do these aspects relate to different actors in specific supply chains?*

  Other fuelwood providers may be against the new business, if their contracts with the producers are in a risk to be finished/altered.

  Forest owners and producers are supposed to support the innovation, as it is beneficial for them: forest owners get ecologic fertilizer that is proven to enhance forest growth, and producers get rid of their ashes.

  Producers and sellers of artificial fertilizers may be against the innovation, as it is expected to reduce the need of artificial products.

Force Field Analysis (FFA)

FFA helps you think about barriers and enablers for implementing an innovation.

- To carry out a FFA describe you innovation in the middle of a piece of paper or whiteboard
- Then list all the enablers (opportunities) on the left side and all the barriers in a column on the right side
- Score each factor and add up the scores for each column.
- Draw this as an output diagram (see example below)
- You can then evaluate the most significant enablers and barriers and think about how these can be supported or overcome
- Check that you have covered against the points in the 6 main categories (in table): are the barriers/enablers related to specific categories? If some categories were not mentioned, check if this is right or did we simply forget/neglect this?

Force Field analysis worksheet

Enabler	Score	Innovation: Business model for economical symbiosis to utilize ash as fertilizer.	Barrier	Score
1. Information				
Awareness	5			
Availability	4			
Understanding	5			
Effectiveness of services	4			
Piloting ability	4			
Stakeholders	3			
2. Economic				
Cost versus benefit	4			
Competitiveness	4			
Low costs	4			
Risks				2
Incentives	3			
Stakeholders	3			
3. Technical				
Compatibility	5			
Easiness	4			
Skills needed	3			1
Enough competence	3			1

Stakeholders	3					
4. Social						
Motivation	3					
Culture	4					
Social networks	2					
Stakeholders	3					
5. Institutional						
Policy					2	
Support needed	2					
Stakeholders	2					
6. Market/supply chain						
Present contracts					2	
Support from the supply chain	2					
Reflect to actors					2	

Force Field Analysis output diagram for Finland ash fertilizer use: Worked Example