

**BONUS RETURN**

**Reducing Emissions by Turning Nutrients and Carbon into Benefits**

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**Deliverable No: D.6.2 – Regional exchange and learning event 1**

**Ref: WP (6) Task (6.6)**

**Lead participant: Stockholm Environment Institute**

**Date: 2018-06-25**

BONUS RETURN has received funding from BONUS (Art 185), funded jointly by the EU and Swedish Foundation for Strategic Environmental Research FORMAS, Innovation Fund Denmark, Academy of Finland and National Centre for Research and Development in Poland.

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Deliverable Title	<b>D 6.2 – Regional exchange and learning event 1</b>
Filename	BONUSRETURN_D.6.2_Regional exchange and learning event 1
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Date	25/06/2018

Start of the project: 01/05/2017  
 End of the project: 01/05/2020  
 Project coordinator: Stockholm Environment Institute (SEI)

#### Dissemination level

<input checked="" type="checkbox"/>	PU	Public.
<input type="checkbox"/>	PP	Restricted to other project partners.
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<input type="checkbox"/>	CO	Confidential, only for members of the consortium.

## Table of Contents

1	INTRODUCTION .....	4
1.1	Project Objectives .....	4
1.2	Project Structure .....	6
1.3	Deliverable context and objective .....	6
1.4	Outline of the report .....	6
2	DELIVERABLE 6.2 REGIONAL EXCHANGE AND LEARNING EVENT 1 .....	6
2.1	Keynote speakers .....	7
2.2	Roundtable Discussions.....	10
	Summary of the discussions .....	10
2.3	Lessons Learnt .....	11
3	APPENDIX 1 ROUNDTABLE DISCUSSIONS .....	11
4	APPENDIX 2 AGENDA .....	14
5	REFERENCES .....	14

## 1 INTRODUCTION

The degradation of the Baltic Sea is an ongoing problem, despite investments in measures to reduce external inputs of pollutants and nutrients from both diffuse and point sources. Available technological and management measures to curb eutrophication and pollution flows to the sea have not been adapted adequately to the contexts in which they are being applied. Furthermore, measures are often designed based on single objectives, thereby limiting opportunities for multiple benefits.

In addition, there is a general sense that measures to address the deterioration of the Baltic ecosystem are primarily technologically-driven and lacking broader stakeholder acceptance, and the “experts” who define these measures have little engagement with industry, investors, civil society and authorities. This problem is exacerbated by governance and management taking place in sectoral silos with poor coordination across sectors.

As a result, research shows that regional institutional diversity is presently a barrier to transboundary cooperation in the Baltic Sea Region (BSR) and that actions to achieve national environmental targets can compromise environmental goals in the BSR (Powell et al. 2013). The regional dimension of environmental degradation in the BSR has historically received weaker recognition in policy development and implementation locally. However, developments in recent years suggest a new trend with growing investments in environmental protection supporting social, economic, and territorial cohesion.

The BSR is an environmentally, politically and economically significant region and like other regions globally, its rapid growth needs to be reconciled with the challenges of sustainable development in a global setting that demands unprecedented reductions in GHG emissions. This poses a truly wicked problem exacerbated by the fact many of the challenges in BSR will also magnify in a changing climate. In order to navigate the uncertainties and controversies associated with a transformation towards a good marine environment, BONUS RETURN will enact an innovative trans disciplinary approach for identifying and piloting systemic eco-technologies.

Focus will be on eco-technologies that generate co-benefits within other interlinked sectors and which can be adapted according to geophysical and institutional contexts. More specifically, emphasis will be given to eco-technologies that reconcile the reduction of present and future eutrophication in marine environments with the regional challenges of policy coherence, food security, energy security, and the provision of ecosystem services.

### 1.1 Project Objectives

The **overall** aim of BONUS RETURN is to improve the adaptation and adoption of eco-technologies in the BSR for maximum efficiency and increased co-benefits.

The **specific objectives** of the project can be divided into 6 categories presented below. These categories are interlinked but for the purpose of providing a step-wise description, the following overview of each category proves useful. BONUS RETURN will:

#### 1) Support innovation and market uptake of eco-technologies:

- Contribute to the application and adaptation of eco-technologies in the BSR through an evidence-based review (systematic map) of the developments within this field.
- Contribute to the development of emerging eco-technologies that have the capacity to turn nutrients and carbon into benefits (e.g. bio-energy, fertilizers), by providing an encompassing framework and platform for rigorous testing and analysis.

- Development of decision support systems for sustainable eco-technologies in the BSR.
  - Contribute to better assessment of eco-technology efficiency via integrated and participatory modelling in three catchments areas in Finland, Sweden and Poland.
  - Contribute to methodological innovation on application and adaptation of eco-technologies
- 2) Reduce knowledge gaps on policy performance, enabling/constraining factors, and costs and benefits of eco-technologies**
- Assess the broader socio-cultural drivers linked to eco-technologies from a historical perspective
  - Identify the main gaps in the policy environment constraining the implementation of emerging eco-technologies in the catchments around the Baltic Sea
  - Inform policy through science on what works where and under which conditions through an evidence-based review (systematic map and systematic reviews) of eco-technologies and the regional economic and institutional structures in which these technologies evolve.
- 3) Provide a framework for improved systematic stakeholder involvement:**
- Develop methods for improved stakeholder engagement in water management through participatory approaches in the case study areas in Sweden, Finland and Poland.
  - Enact a co-enquiry process with stakeholders into opportunities for innovations in eco-technologies capable of transforming nutrients and pollutants into benefits for multiple sectors at different scales.
  - Bring stakeholder values into eco-technology choices to demonstrate needs for adaptation to local contexts and ways for eco-technologies to efficiently contribute to local and regional developments.
  - Disseminate results and facilitate the exchange of learning experiences, first within the three catchment areas, and secondly across a larger network of municipalities in the BSR.
  - Establish new cooperative networks at case study sites and empower existing regional networks by providing information, co-organize events and engage in dialogues.
- 4) Support commercialization of eco-technologies:**
- Identify market and institutional opportunities for eco-technologies that (may) contribute to resource recovery and reuse of nutrients, micro-pollutants and micro-plastics (e.g. renewable energy).
  - Identify potential constraints and opportunities for integration and implementation of eco-technologies using economical models.
  - Facilitate the transfer of eco-technologies contributing to win-win solutions to multiple and interlinked challenges in the BSR.
  - Link producers of eco-technologies (small and medium enterprises - SMEs), to users (municipalities) by providing interactive platforms of knowledge exchange where both producers and users have access to RETURN's envisaged outputs, existing networks, and established methodologies and services.
- 5) Establish a user-driven knowledge platform and improve technology-user interface**
- Develop an open-access database that maps out existing research and implementation of eco-technologies in the BSR. This database will be intuitive, also mapped out in an interactive geographical information system (GIS) platform, and easily managed so that practitioners, scientists and policy-makers can incorporate it in their practices
  - Develop methodologies that enact the scaling of a systemic mix of eco-technological interventions within the highly diverse contexts that make up the BSR and allows for a deeply interactive media of knowledge.

## 1.2 Project Structure

BONUS RETURN is structured around 6 Work Packages that will be implemented in three river basins: The Vantaanjoki river basin in Finland, the Ślupia river basin in Poland, and Fyrisån river basin in Sweden.

Work Package 1: Coordination, management, communication and dissemination.

Work Package 2: Integrated Evidence-based review of eco-technologies.

Work Package 3: Sustainability Analyses.

Work Package 4: Environmental Modelling.

Work Package 5: Implementation Support for Eco-technologies.

Work Package 6: Innovative Methods in Stakeholder Engagement.

## 1.3 Deliverable context and objective

The current deliverable (D. 6.2) is part of WP 6. The objectives of WP 6 are to *serve as the platform to enable a co-enquiry process between stakeholders and the project. At the regional level the 40 municipalities connected to the Race for the Baltic will act as a sounding board to provide input to the EBR in WP2. Stakeholder platforms will be established at the case study sites to support the identification of eco-technologies for analysis in WP3, WP4 and WP5. These platforms will serve as opportunities to further test, develop, adapt and use the eco-technologies based on the assumption that their effectiveness depends on context, as defined by institutional, economic, social and bio-physical barriers and opportunities. WP6 will thus contribute to understanding historical drivers, policy instruments and governance structures and local needs with regards to implementation of the selected eco-technologies in the three case study sites. WP6 will be responsible for developing and facilitating an innovative game system, using the empirical materials generated throughout the project to support the co-learning environment and more specifically mediating the interactions and critical reflection between the WPs and between the project and stakeholders.*

This deliverable gives an overview of the programme during BONUS RETURN's first Regional and Learning Event held in Helsinki on the 30<sup>th</sup> of May 2018.

## 1.4 Outline of the report

Section 2 introduces the purpose and scope of the Regional Event. Sub-section 2.1 explains the approach, methods used, and topics included in the event. Sub-section 2.2 summarizes the key arguments from each of the thematic roundtables discussions. The agenda, participant list, and power point presentations are attached as separate files.

## 2 DELIVERABLE 6.2 REGIONAL EXCHANGE AND LEARNING EVENT 1

The purpose of the Regional Event was to facilitate learning exchange between the project's partners and local stakeholders and a broader network of (industry, government, private sector, universities) contacts in the BSR.

In line with BONUS RETURN's approach of engaging with all the sectors involved in the circular economy of the Baltic Sea, we sought to bring together actors to the same platform in order to facilitate a cross-sectoral discussion on the topic.

The event consisted in a mixture of short and focused keynote speeches that set the scene for the afternoon group discussions. Experts from the private, public, and research sectors were invited to present their work and link it to the challenges in the BSR to contribute to the event's objectives:

- To facilitate learning exchange between the project's partners and local stakeholders and a broader network of (industry, government, private sector, universities) contacts in the BSR
- To discuss opportunities and challenges for systemic innovations and eco-technologies in the BSR
- To surface systemic decision support approaches for identifying and implementing systemic innovations and eco-technologies in the BSR.

## 2.1 Keynote speakers

Following an introduction to the BONUS RETURN project, **Akko Karlsson**, representative of Kalmar Regional Council, Deputy Member of Euro Region Baltic (ERB), a Politician of the Green Party (MP) in Sweden, and a member of the South Baltic MC-Sweden delegation spoke about her experiences and challenges with "Circularity in the BSR Policy Context". She noted the difficulty of integrating the regional and the national into the local and underlined the importance of always linking macro-level discussions back to the every-day life. An example of this is Kalmar's awareness raising work with "what circulates in our water circulates also in our bloodstream".

As part of this initiative, the municipality tested inhabitants' blood for chemicals under the Stockholm Convention on Persistent Organic Pollutants, many of which can be directly linked to chemicals in water streams. Another example is the cooperation between the Swedish University of Agricultural Sciences (SLU) and the municipality of Västervik to rehabilitate the bay while reducing and reusing phosphorus by using water pumped from the bay as fertilizer in surrounding fields.

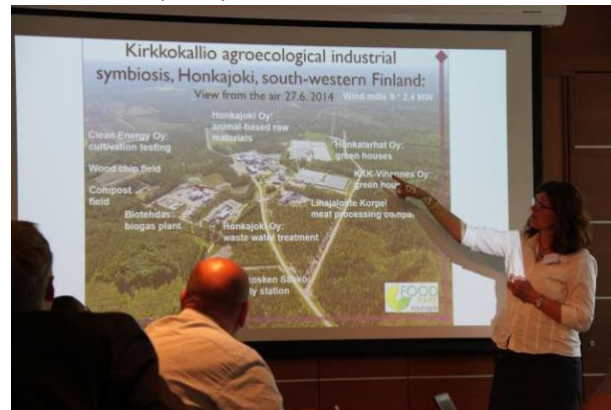
A third example is the greening of cement, a material that contributes to 5-6% of global emissions each year. In a public-private cooperation between Linneaus University and Heidelberg Cement (the world's fourth largest cement producer), the project is using algae to capture the CO<sub>2</sub> released during the cement manufacturing process, by bubbling the exhaust fumes from the limestone kilns through algal cultures contained in hundreds of bags.

As the algae photosynthesize they use the CO<sub>2</sub>, removing it from the fluid gas, and converting it into food for growth, just as plants do on land. Algae also produces oils and proteins which have many uses e.g. as supplementation to animal or fish feed. This means not only is the cement manufacturing process less environmentally harmful, the algal carbon capture system gives added value benefits.

Akko's presentation was followed by **Marcus Svedberg**, Senior Advisor to the recently established Stockholm Sustainable Finance Centre who spoke about "The Role of Blue/Sustainable Finance in Circular Economy: what is it and how can we access it?" Marcus highlighted how timely sustainable finance in the BSR is: there are plenty of problems (water quality/ overfishing/ biological diversity), but also plenty of solutions, and on top of that there is no lack of capital (multilateral financial institutions with convening power, institutional investors with key interest in the issue). What has yet to be determined is the appropriate financial instruments: Baltic Blue Bond, other fixed income instruments, public/private equity, concessional/grant funding, etc.

A third presentation on "Local demands for circular solutions in the BSR" was held by **Eija Hagelberg**, advisor to BONUS RETURN and Project Director to the JÄRKI project at the Baltic Sea Action Group. Eija talked about the Nutrient Neutral Municipality project (2015-2020) which is part of the Ministry of the Environment's RAKI program and aims to implement nutrient recycling in the municipalities where nutrients originate, or as close to their origin as possible. Pilot municipalities in the project was Vehmaa, Mynämäki, Taivassalo, Turku, Pori and Nakkila from the regions of

Satakunta and Southwest Finland. In Turku, the municipality has explicitly included nutrient recycling as part of the city’s strategy, but there are a number of challenges: there is a need for basic training for public officers on circular economy and public procurement and contracts; there is a clear need for facilitators/consultants/extension services to help go through the procurement procedure; there is a lack of basic knowledge on circularity amongst politicians, so more education throughout the strategy process is necessary; economic calculations and use of evidence, legal assistance to navigate local and national regulations across sectors to enable holistic planning; and practical examples on best practices or procedures to build capacity.



*Figure 1 Eija Hagelberg, advisor to BONUS RETURN and Project Director Järki, Baltic Sea Action Group*

**Marc Klaus**, Director for Race For The Baltic and a close boundary partner to BONUS RETURN spoke about their work “Engaging municipalities; practical examples in the BSR” where he highlighted three examples of circularity in Värmdö/Vaxholm with small scale sewers, in Kalmar with mussel farming and in Panevezys to develop green infrastructure for storm water. Through these experiences, Marc highlights how financing is not always the problem, but instead personnel resource constraints in local municipalities; (lack of) political motivation and consistency; the know-how and right tools for procuring innovation; and calculating environmental/economic/social benefits from solutions are some of the common challenges highlighted in their Accelerator Program.

After the four presentations, keynote speakers engaged in a panel discussion facilitated by Uppsala University, to which the audience was quickly invited to participate. Interesting questions such as the role of science in a future blue finance/bonds market, reliable data as a potential criterion for disbursing loans, cities’ challenges for carrying out adequate monitoring, and how deficient monitoring in turn impacts the ability to innovate and implement, were posed to the panel.





Figure 2 Karina Barquet (SEI), Eija Hagelberg, Marc Klaus, Marcus Svedberg, Akko Karlsson, and Eva Friman (UU)

Before the end of the morning session, the 3 winners from the Nutrient and Carbon Reuse Challenge had the chance to present their eco-technologies. In their 5-minute pitch, **Aquacare** reminded us how nothing is waste if used in the right way. Their innovation is already reducing phosphorus like no other technology currently is able to, with minimal footprint, and with the potential to go below 100 €/Kg P removed. Their test plant is currently based in Canada. Through BONUS RETURN, Aquacare will be able to develop their phosphorus recovery technology.

**Terranova** addresses sewage sludge. Their technology can break down the cellular walls of the biomass, produce coal and separate out the phosphorus. Their plant is set up in China and negotiations are ongoing in South Korea. For cities with waste water treatments producing more than 15 0000 tons of sludge /year, they are the best solutions for drying sludge and promise energy recovery from sludge, reduction of sludge disposal cost, reduction of greenhouse gas emissions, and recovery of phosphorous.

Apart from winning BONUS RETURN Challenge, **RAVITA**, has also been selected as a “government key project” in Finland. Their technology is able to recover phosphorus directly from wastewater and generate phosphoric acid and MAP/DAP which are excellent sources of phosphorus and nitrogen free of ammonia. Their pilot plant is located in Viikinmäki wastewater treatment plant.

## 2.2 Roundtable Discussions



*Figure 3 Nearly 40 participants attended the first BONUS RETURN Regional Exchange and Learning Event*

The afternoon session started with a presentation of BONUS RETURN's serious game (being developed in WP6). In the presentation, Steven Bachelder explained how the different pieces of the project -which resemble the circular economy of the BSR- will come together through this decision support tool that will merge the policy, the finance, the social, and the technical/environmental aspects of the circle. The presentation helped frame the subsequent group discussions where. Below is a description of each of the topics and the notes from each of the tables. Participants were asked to select a table according to the subject they found most interesting. The division of participants was quite equal amongst the four tables.

Table 1 addressed "Risk and reward of circularity – How policy frameworks at the regional level can be adapted to support the implementation of systemic innovations at the local level?". Table 2 discussed "the social dimension of circular economy and how to overcome cultural challenges in the circular transition". Table 3 brainstormed on "How can entrepreneurship support the shift to a circular economy? What kind of investment is needed?". And Table 4 discussed way of "Creating a "community of practice" for circular solutions (using the Serious Game System to foster systemic reflections and insights for improving systems thinking and practice). A summary of the key topics discussed at each table can be found in Appendix 1.

### **Summary of the discussions**

Some of the key insights from the discussion include the need to obtain greater coherence between regional and local policy, more synchronization of existing directives at the regional level, and greater local understanding of how to utilize regional and international policy instruments (e.g. Agenda 2030) to accelerate circularity. In connection to this, the disconnect between national-level governments and cities was clear. A result is that available policy options at the local level, often framed in terms of procurement rules, do not reflect the macro-discussions of sustainability and

circularity. Today procurement rules in cities often focus on obtaining the best price and not the most sustainable option.

The disconnect between global sustainability discourses, national government agendas, and local priorities is also reflected on the lack of interest and engagement of the wider public. Lack of incentives and appropriate policy that fosters circularity further widens this gap between what citizens consider is important, what research identifies as crucial, and what policy opts for implementing. Greater engagement of society, particularly farmers, is necessary to close the circle.

Lack of public interest coupled with lack of policies result in poor conditions for innovation uptake at local levels. Eco-technological innovation for a circular economy needs to be better framed in terms of service provision. At the same time changing the mindsets of decision-makers away from “quick fixes” that are often not sustainable in the longer term could produce a change towards procuring services instead of procuring “machines”. Adopting national legislations in favor of circularity could send the right message to the private sector and create better conditions for innovation and local uptake. At the same time, financing for higher-risk projects (e.g from the EU or national funds) needs to be made available, and these in turn, need to penetrate public procurement in cities.

Bringing together all the different sectors is no easy task. Participants thus brainstormed on the idea of a support tool that could convene the relevant actors in a game-like setup. Aside from being a tool for bringing together a community of practice, it could also enable structured discussions about sometimes difficult issues.

### 2.3 Lessons Learnt

In the process of arranging the event, the consortium realized the number and variety of ongoing regional and thematic events competing for stakeholders’ time and interest. This made the task of convening the right people very difficult, and although in the end, the event was well attended with only two cancellations, we realized the need to join efforts with other parallel projects and initiatives. Cooperating with others is also the right approach to bridge the different sectors at a larger scale, exchange knowledge, convey the BONUS RETURN message and outputs, and support other well-established platforms.

The discussions from the round tables highlighted different challenges across the research, policy, civil society, and innovation sectors that are relevant beyond the project. These discussions also highlighted clear areas of opportunity where increased targeted policies need to come into place together with the right financial incentives. Along this process, research has a key role to generate knowledge and inform on *what works where and under which conditions*. This knowledge needs to be transferred beyond the academic circles and trickled down to society. We are certain that if key sectors, like agriculture, see clear opportunities with the right financial incentives for addressing the underlying problems that generate eutrophication in the BSR, actions will take place.

## 3 APPENDIX 1 ROUNDTABLE DISCUSSIONS

Table 1. Risk and reward of circularity – How policy frameworks at the regional level can be adapted to support the implementation of systemic innovations at the local level?

Table 1 started by identifying the *existing barriers in policy frameworks*

- National legislation can be contradictory to regional policy. E.g. there is a lot of legislation around building a new wastewater treatment plant. A set of actors or municipalities don’t know the legislation ruling other sectors or municipalities.

- How to interpret legislation?
- Infrastructure, quantities (for instance of food needed) doesn't correspond to what local producers can provide. Current structures don't create enabling environment for this.
- Demographic/geographic issues and infrastructure challenges/transport and connectivity challenges associated to these.

After reflecting upon the barriers, the group moved on to *identify opportunities for change*:

- Policy can be a trigger, but the challenge is not to store it on shelf but rather turn into a living practice
- Can Agenda 2030 be a catalyst? We have heard about it, but implementation is difficult and quite large. In Finland for example, Agenda 2030 is more a central government discourse with few or no apparent linkages to cities. Central government has not brought it down to the municipal level.
- Perhaps what is needed to socialize Agenda 2030 is to highlight its potential (marketing/branding, a tool for financing initiatives, etc).
- No one is looking at the whole agenda, but at bits and pieces. This is contradictory to the circular economy approach
- The economy of municipalities is pretty bad. So, there is a need to think differently. In that thinking we might look at ways of doing things differently.
- What are the possibilities of Agenda 2030, particularly with regards to municipalities needs and linked to a circular approach?
- Change in political administration is changing and that might hinder the discussion and progress towards the Agenda
- How to break with the silos? Who should provide this general birds-eye view?
  - o City council
  - o The mayor
- Water Framework Directive? Different measurements across countries to measure water quality which makes it difficult to synchronize values at regional level.
- What is the price of water? Who owns the water?
- Ecoforum Hyvynkää to raise awareness of environmental issues: waste, water, air quality
- Is there an impact evaluation or is there a circular economy framing/logic behind big investments? E.g. if the municipality buys cars, do you buy cars that consume local fuel, pollute the least, or the cheapest ones?
- Rethinking public procurement: currently "cheapest option" is ruling in local procurement competitions. Rethink procurement to include sustainability. Alternatively start valuing different by taking into account long-term impacts and broader geographical areas to account for longer-term and wider-regional environmental impacts. This is particularly relevant for downstream/upstream areas.

Table 2. The social dimension of circular economy and how to overcome cultural challenges in the circular transition

A question discussed in the group was that of how to get those not interested in the environment to get more engaged? The group concluded it is more efficient to focus on the ones who have an interest, particularly forerunners and early adopters. Provide a platform where they can meet and

exchange ideas. This can potentially have a snowball effect within their individual spheres of influence.

There seems to be generational gap between older and younger farmers, where often young farmers are very active and interested in environmental issues. Furthermore, nutrients is not a very sexy topic. Perhaps we need to change their image and change the narrative? For instance, farmers who also hunt would be in favor for creating the habitat for attracting more game to the fields and at the same time saving the Baltic Sea. Communicate differently with different groups of actors/farmers to create motivation and don't expect to be able to address a whole group; instead focus on a few key individuals and build upon that trust. Peer-to-peer learning is perhaps the most important thing among farmers (and other groups). However, time is essential when working with farmers. You must develop circularity in small steps and it takes time. Often short-term projects do not have this time.

Table 3. How can entrepreneurship support the shift to a circular economy? What kind of investment is needed?

Table 3 started the discussion by exploring what makes circular economy different, when and where will investments be needed? The circular economy goes beyond developing a single product. Rather it opens up the possibility of providing services to companies or cities. So, the product is the service. Some cities are not interested in just buying a wastewater treatment plant, they want the problem solved. This includes services to take care of the problem. Such service is valued higher by decision-makers than a single product.

So, if services are valued higher and offer more longer-term solutions, *what makes it difficult to do the transition from single products to services?*

- The “not in my backyard mindset” is a barrier. Education and awareness around impacts at local and personal levels could help
- Is it more attractive to buy the service rather than the machine?
- Public showing off is opportunity for policy makers. Machines promise quick-fixes while services require long-term and recurring investments and maintenance.
- Changes in environment, e.g. price of oil or waste, can provide business opportunities and should be captured.
- Fires and waste deposits, incineration is cheapest way to get rid of waste.

*How where and when is money required and how to introduce it in an efficient way?*

- There is a need to adopt a national strategy for nutrient regulation with a clear goal, which sends clear signals to the companies concerning the path they should take.
- Investment is needed to be able to scale up innovations that have not entered markets
- In Germany, good funding until the end of the pilot processes and investment in industrial scale processes, otherwise everyone is waiting for a reference forever.
- Pilot is proof of concept, industrial scale requires customers and a market
- Inventor → pilot → industrial scale. There is a need to enable networking for the transfer from pilot to industrial scale, where other types of partners are needed. Bring those actors together.
- Networking across sectors is key. It is difficult to convince the industry to adopt or test the technology.
- Different sectors put together, example energy and farms with biogas production on the farms.
- Exposure to potential customers earlier in the process, get a feeling for whether the product or its price is relevant. This way, it is easier to adjust at early stages.

- Innovation companies need to work more closely together with customers (in a co-creation manner)
- Create platforms for companies/inventors to develop ideas
- Some conferences/fairs can provide opportunities for cooperation.

Table 4. Creating a "community of practice" for circular solutions (using the Serious Game System to foster systemic reflections and insights for improving systems thinking and practice)

- Distinction between Serious Game and Serious Game System (SGS). Serious Game is an artefact with prescriptive learning outcomes, while Serious Game System generates the learning outcomes through playing the game.
- What does it mean by "playing the game"? Single player or multiple players? Stakeholder dialogue generated within the "playing" process will be transferred into the system.
- Reconciling the regional interest and the local interest by incorporating the temporal aspect (short term, medium term, long term) into the SGS.
- It is important that the game helps to break sectoral silos in decision-making processes, bring other sectors on board and encourage reflections on their own actions (transcending stakeholder involvement and consultation).
- Incorporating regulatory boundaries into the game system, simulating changes in regulations or governance as uncertainty.
- The game can serve as a platform to facilitate meetings or conversations for a network of people with common interests/goals when they cannot be in the same room.
- Digital game would be preferable for broader access. However, it should not replace social interactions (the game should enable these interactions).
- The SGS can be a platform to meet and interact with other stakeholders. For instance, for innovators/entrepreneurs, they can get a sense of the potential and applicability of their innovation, i.e. if their innovation or solution would be of interest to any stakeholder, if it can be applied further than its original market.
- We need to define who the big players are, who the small players are in the game system. Different actors have different sizes and thus different impacts. A group of small actors can join forces to make larger impacts.
- The game should be available in local languages to make it accessible and comfortable for local stakeholders. In addition, the more visual it can be, the better.

#### **4 APPENDIX 2 AGENDA**

See attached.

#### **5 REFERENCES**

Powell, Neil, Maria Osbeck, R. K. Larsen, K. Andersson, G. Schwartz, and M. Davis. 2013. "The Common Agricultural Policy Post-2013: Could Reforms Make Baltic Sea Region Farms More Sustainable?" Stockholm Environment Institute (SEI).