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Synergic Circular Economy across European Regions

SCREEN

Deliverable D2.3

SYNERGY GRIDS

- Working document to identify cross regional potential synergies -

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1. Introduction

Cross-regional collaboration on circular economy may become interesting for regions if resources (like knowledge, human capital, technology, R&D, business, etc.) from the collaborative regions are complementary to each other. The focus of the collaboration strongly depends on the stakeholders issues and needs to become globally competitive, as well as the regions characteristics (that were mapped and analyzed in task 2.1 and 2.2).

The participating SCREEN regions reckon that cross-regional collaboration is often justified by the need to support their most important economic sectors as well as their Smart Specialisation Strategy. Consequently, if regions are looking for cross-regional collaboration, the collaboration itself should be aligned with the regions RIS3 and focus sector.

At this point of the project, these collaboration could only be identified based on the provided data and available knowledge of the partners within the SCREEN-project. Deliverable 2.1 provided the Mapping Tool for Data Collection and Deliverable 2.2 provided a local analysis based on the information provided by the regions in the Mapping Tool. Task 2.3 aimed at bringing the regions together in order to identify potential cross-regional synergies. At this point one may not expect a very thorough and detailed analyses, as stakeholder involvement is planned later on in the project. The identified potential cross-regional synergies, should be considered as a starting point to further investigate the justification and to do further local research and interaction with local stakeholders. This further work may lead to the identification of new collaborative projects, if a match between regions stakeholders can be made.

The SCREEN-project is aiming to support and stimulate this matchmaking by doing different kind of preparatory coordination and support actions, like mapping & analyzing, organizing workshops and interaction and stimulating funding. Within the SCREEN-project the objective of Work Package (WP) 2 is “to develop a methodology for the assessment of regional capabilities in the involved regions, grounding on their existing Smart Specialization Strategies”.

This task is focused on the identification of local and cross-regional value chains, and therefore proceeding on the deliverable 2.2 towards a guideline to the potential synergies in cross regional value chains. The outlines and undertaken steps during tasks 2.1 and 2.3 are an important basis for this. Basically, this deliverable offers a working guideline and a framework for the SCREEN-partners on how to get from RIS3 and focus sectors to selecting potential cross-regional synergies. Taking into account the novelty of the approach and the time needed by the SCREEN participating Regions to become confident with this common procedure, this guideline describes an intermediate step and final document on “replicable tools”, according to the SCREEN-projects overall objective, will be produced in the final deliverables.

Therefore this deliverable is a working document specifically conceived forsupporting regions to identify, describe and visualize potential cross-regional synergies. Within the SCREEN WP2 this is the final task and delivers a basis for further investigation and interaction in WP3.

Due to the above considerations, the identified potential cross-regional synergies are being described very generally in order not to limit the interaction with local stakeholders. This is being done in the potential synergy grids in Appendix 4. These Potential Synergy Grids provide a visual overview of the partner regions that could align with a specific synergy, and provide some basic description of the synergy as well as an overview of some of the emerging ideas provided by the SCREEN-partner regions.

This working document is based on the initial information provided by the regions. Based on further investigations regions may conclude that their region should have a better fit with other cross-regional synergies, or that a synergy should be more specified. This is of course inevitable, as the real cross-regional collaboration should be carried and supported by the local stakeholders and this can only be checked during the further steps of the SCREEN project.

2. Methodology

2.1 Data collection & analysis

This deliverable is based on the data provided by the regions participating in the SCREEN project. This data was delivered in the Mapping Tool in WP 2.1 and further analysed on a local level in WP 2.2. Furthermore, an interactive workshop during a project meeting (Rome, March 16th – 17th 2017) was used to start interaction on potential synergies. And a second interactive workshop was used to further detail a synergy.

The set-up applied in the interactive workshops can be used as a blueprint to identify new potential synergies. Of course, also other types of interaction could be applied.

As stipulated in deliverable 2.2 regions reported difficulties in providing data (availability, quality, granularity) and finding a match between their specialization strategy areas and the focus sectors. It was therefore difficult to analyze the data according to original plan. However, it increased the need for more interaction between regions, which was encouraged by the partners as well.

Based on the local analysis the following information was extracted based on the circularity potential provided in D2.2. As explained in D2.2 the circularity potential was aligned with the focus sectors and RIS3. In the further analysis for potential cross-regional synergies, it focused on the regions resources, symbiosis and innovation potential.

The SCREEN-partnership reckoned that societal awareness and regulations did not have primary effect on the cross-regional collaboration, and stimuli (funding) would become important for feasibility once a synergy was identified and investigated, as for the table in the following page

Circularity Potential

Region	Resources	Symbiosis	Innovation Potential
Lazio	Company outputs, like (bio)polymers, biomaterials, waste water and waste from sinataryware production	Agrifood & Energy Agrifood & pharma/cosmeceutical Agrifood & Energy	Recylce and reuse of polymers, rubbers and plastics
Lombardy	Waste from manufacturing Waste from construction waste water Waste management	Manufacturing Construction Waste(water) management Fashion and textiles industry	ICT platforms Manufacturing Waste(water) collection and treatment Construction
Navarra	Waste renewable energy and agri-food industry Waste automotive industry Specific company output, like textile, metal, plastic and energy	methane from waste (for public transport) exchange of plastics	Waste separation Business collaboration
Tampere	Waste paper manufacturing Wastste computers and electronic manufacturing Waste water Waste from construction industry	Agrifood & energy Wood & medical Mineral & ceramics Urban waste and bio waste	Bioproducts, water, energy, composites and textile Digital solutions for CE-collaboration Business model innovation Products and services
Centro	Agricultural waste Mining and quarrying waste Manufacturing waste Wastewater Construction waste Other wastestreams	Agriculture and energy	Integrated waste management Waste water treatment Materials testing Sustainable building Sustainable agriculture Monitoring and management processes with ICT
La Reunion	Agricultural waste Urban waste Construction industry waste	Green chemistry from agricultrural waste Exploitation and valorisation of waste	Energy production (a.o. biogas) Integrated waste management Green Chemistry from agricultural waste
Lodzkie	Manufacturing waste Mining waste	Energy form waste	
Scotland	Waste from electronics and electronic equipment Plastics Biobased fuels Biobased chemicals	Energy from agriwaste Foodwaste to agriculture Energy from waste	Energy from plastics waste De-manufacturing
Crete	Agricultural waste Waste water	Agrifood & energy Cheese Mineral resources	Waste management Waste (water) treatment Agriculture or breeding waste
Fryslân	Waste water	Water & agri-food industry Water & paper manufacturing Water & construction Water & Energy	Resource recovery and valorisation form water Water efficiency in industry/production

Based on this the following theoretical and potential cross-regional synergies could be made:

Themes	Ideas	Lazio	Lombardy	Navarra	Tampere	Centro	La Reunion	Scotland	Crete	Fryslân	Lodzkie
Agriculture & food	Green chemistry form agricultural waste	X		X		X	X	X	X	X	
	Bio-energy from agricultural waste										
	Foodwaste to agriculture										
Waste management	Exploitation and valorisation of waste		X	X		X	X	X			
	ICT to monitor and manage waste										
	Waste from electronics										
(Resources) from water and wastewater	Resource recovery and valorization		X		X	X			X	X	
	Sludgewaste minimalisation and exploitation										
	Water efficiency in agriculture and industry										
Construction	Specific waste streams from construction industry		X		X	X	X				
Plastics	Plastic waste reuse	X	X								
	Plastic to energy										
	Bioplastics										
De- and remanufacturing	Electronics		X		X			X			X
ICT-services for CE	New ICT-platforms		X		X						
	ICT for waste management										
Textiles	Textile waste reuse	X	X	X	X						X
	Waste from textile industries										
Metals	Metal recovery from waste		X	X	X	X					X
	Metal recovy from electronic industry										
	Metal mining										

The further interaction towards the deliverable of this guideline & grids was as follows:

1) T2.3 leader evaluated, provided feedback on the received data and made recommendations for follow-up actions during the project meeting (Rome, March 16th – 17th 2017). The recommendation are described in this guideline.
2) During the same project meeting (Rome, March 16th – 17th 2017), T2.3 leader organized an interactive workshop with support of T2.1 and T2.2 leaders.
3) As the data in the Mapping Tool was often subject to personal interpretation, T2.3 leader delivered specific data check sheets (see paragraph 2.3.1) to each partner explaining their interpretation and asking questions about any uncertainties. An example grid was already presented to visualize the way information was to be used and what it was needed for.
4) Based on the results of the project meeting and the partner feedback received, T2.3 leader suggested six potential cross-regional synergies between regions. Based on the partners feedback some partner switches were processed and one other potential cross-regional synergy was suggested.
5) Together with the draft guideline, the potential cross-regional synergies were presented during the workshop and project meeting in Milan (27th – 28th June 2017). Based on the feedback the potential cross-regional synergies were finalized. The interactive workshop in Milan showed that the preparatory work in WP2 was useful as a starting point for further discussion and investigation in WP3.

The data used for creating the synergy grids is mainly based on existing data from databases, existing policy documents and reports, and knowledge by the participants in the SCREEN consortium. In some cases partners organized internal meetings to collect the information. Towards a further investigation and analysis of the potential synergies towards synergies & complementarities in regions it is also important to start interaction with local stakeholders. Therefor for workpackage 3.1 a guideline has been developed to support partners in the follow-up steps. A draft guideline was presented during the workshop and project meeting in Milan (27th – 28th June 2017) as well.

2.2 Criteria

Based on the Mapping Tool (WP 2.1) the task leaders of workpackage 2 suggested some practical requirements and criteria to look for the potential cross regional synergies. These criteria were shared with the partners during the Rome project meeting on March 16th - 17th 2017.

The common requirements and criteria are defined as following;

Requirement 1	Potential synergies should be aligned and potentially supported by Regions Smart Specialisation Strategies
Requirement 2	Potential synergies should be connected to existing or emerging sectors
Criteria 1	The potential of a synergy is higher if this could be supported by regions capabilities
Criteria 2	The potential of a synergy is higher if this could be supported by regions companies/available technologies
Criteria 3	The potential of a synergy is higher if linked emerging ideas are already available.

Table 1. Requirements and applied criteria for the potential synergy grids

Within the Mapping Tool, consortium partners were asked to provide information on their companies and capabilities, with a specification on R&D and Human Capital Capabilities. These elements were used to classify and connect the regions.

The emerging ideas were considered voluntary, but strongly recommended in the Mapping Tool. Due to the described difficulties in data-analysis, the emerging ideas were included as a guiding principle in the creation of synergies. Emerging Ideas can be seen as (possible) promising regional business cases, yet are unable to (inter)nationally valorize towards the market. This can be due to a lack of business opportunities, absence of R&D/innovation potential or lack of knowledge. Or, these cases are in a pre-mature stage and lack the ability to develop successfully. The importance of emerging ideas as a guiding principle was stressed out in the Rome project meeting as well.

2.3 Applied methodology T2.3

In order to complete this task, three steps are necessary:

1) Data Check and first analysis
2) Interactive Workshop
3) Synergy Grids Database

2.3.1 Data Check

Context

After accomplishing Task 2.1 and Task 2.2, a significant amount of information related to the region is being generated by the Mapping Tool. However, overall this information was not yet tangible and detailed enough for all regions together to identify potential cross-regional value chains.

In order to check the completeness and use-ability of the data an Excel-based method was created, which is presented in this report. The used Excel spreadsheets are available in addition to this report.

Method

In order to check if received data is complete and even applicable, a Data Check for the potential synergy grid was executed. The Data Check is specifically focusing on the first 4 steps of the Mapping Tool: this information is of basic use for Task 2.3., as shown in the following figure.

Check Mapping Tool WP 2.3

Partner	Region	Country	Date Delivery Excell-Tool		Data Complete				Data applicable			
			Draft	Final	Step 1 - RIS3 & SW	Step 2 - Focus Sect	Step 3 - Capabilitie	Step 4 - Emerging Ide	Step 1 - RIS3 & SW	Step 2 - Focus Sect	Step 3 - Capabilitie	Step 4 - Emerging Ideas
REGIONE LAZIO	Lazio	Italy	13-02-2017									
UNIVERSITA DEGLI STUDI DELLA TUSCIA	Tuscia	Italy										
REGIONE LOMBARDIA	Lombard	Italy	13-03-2017									
COMUNIDAD FORAL DE NAVARRA - GOBIERNO DE NAVARRA	Navarra	Spain	24-02-2017									
COMISSAO DE COORDENACAO E DESENVOLVIMENTO REGIONAL DO CENTRO	CCDRC	Portugal	24-02-2017									
WOJEWODZTWO LODZKIE	Lodzkie	Poland										
KRITI	Crete	Greece	15-02-2017									
NEXA - AGENCE REGIONALE DE DEVELOPPEMENT D'INVESTISSEMENT ET D'INNOV	NEXA	France										
KNOWLEDGE TRANSFER NETWORK LIMITED	KTN	United Kingdom	22-02-2017									
Limburg Province	Limburg	Netherlands										
Provincie Fryslan	Fryslan	Netherlands	23-01-2017									
Pirkanmaan liitto	Tampere	Finland	10-02-2017	24-02-2017								

Legenda
Complete/applicable
Partialy incomplete/reasonably applicable
Incomplete/ non-applicable

✓ *Step 1 Data Overview*

This step checks if data is complete and applicable.

The following data was summarized:

- Partner details
- Date of delivery (draft and final version)

Figure 2. Data Check Potential Synergy Grids

- Check on completeness of data
- Check on applicability of data for further analysis

✓ *Step 2 RIS3 Filter*

This step checks if the given RIS3 is coherent with the Smart Specialization Platform. Thus, in order to eliminate the risk of complete different regional ambitions within SCREEN, which are not complementary with the information provided in the EYE@RIS3-Tool of the Smart Specialization Platform (s3platform.jrc.ec.europa.eu).

The following actions were executed:

- Summarize the region's RIS3 area's identified within the Mapping Tool
- Check whether the Mapping Tool area's are coherent with the formal Smart Specialisation Platform

✓ *Step 3 Focus sectors*

This step identifies the given focus sectors per region, generated from the Mapping Tool. Focus sectors are complementary with the NACE-codes. From each region, it will be visible on which sectors they are focusing and already identifies first possible overlap.

The following actions need to be executed:

- Which regions are involved? Fill in these regions.
- What are the sector(s) a region is focusing on? Color this sector.

✓ *Step 4 Remarks/questions Region*

The last step gives the coordinator of the work the opportunity to fill in remarks/questions related to first 4 steps from the Mapping Tool. This includes the RIS3/SWOT, Focus sectors, Capabilities View and Emerging Ideas. This step is necessary to make sure the coordinator understands the input.

It is important to check whether a region has/has not included Emerging Ideas; these ideas functions as the guiding principles for the creation of Synergy Grids (see common criteria, Task 2.1).

The remarks need to be distributed to the region for feedback. The region can either add, delete or enlighten on the remarks.

The following actions need to be executed:

- Create a tab page for each region
- Fill in the regional's name per tab page.
- Add remarks (General, Step 1, Step 2, Step 3 or Step 4).
- Check the presence and applicability of Emerging Idea(s); are these specific?
- Return the feedback to the region

2.3.2 Interactive workshop

Context

The SCREEN Mapping Tool introduced in WP2.1 provides the basic data for collecting potential synergies. Based on these data, theoretical possible synergies can be identified. However, the quality of these synergies depend on the quality and specificness on the data provided.

Based on a comparison of the provided data by the regions, the consortium recognised that being more specific about the RIS-strategies and focus sectors, as well as providing concrete emerging ideas as a guide, supported a good quality exploration on identifying potential synergies.

Additional to data collection and processing, regions pleaded for personal interaction between representatives of the regions. In a workshop on 16th of March 2017 as part of a two-day project meeting this interaction facilitated by an interactive workshop.
This chapter describes the results of the workshop, as well as the usability of such for identifying potential synergies.

Workshop Methodology

The objective of the workshops was to let the regions/partners get acquainted with each other and to identify a Top Five of potential synergies.

It was strongly recommended that the potential synergies aligned with more than one RIS-strategy and fitted within at least one regions focus sector.

The interactive work was done in small groups of approximately 6 to 10 persons from different regions (in the project meeting there were three groups). After the interactive work the results were presented in a plenary sessions with possibility for feedback/questions.

The interactive work was build up with two rounds:

- Round 1: Short pitches (30 min)
- Round 2: Top 5 (1 hour)

Round 1: Short pitches – 30 min	**Round 2: Top 5 – 1 hour**
Participants were instructed to answer to these questions in their pitch: 1) Who you are and from which region; 2) What do you believe is your regions most important specialization for SCREEN (max 2); 3) What do you believe is your regions most important sector for SCREEN (max 2); 4) What synergies and potential value chains fits best with the capabilities and needs of your region (max 2)	Participants were instructed to come up with a Top Five of potential synergies and value chains according to objective. Participants were instructed to discuss these synergies and come up with: 1) Synergy/value chain owners/champions 2) Short description on value chain 3) Short description of value chain

Each group was facilitated by one moderator, presenting the results afterwards. The detailed outcomes of the workshop are added in Appendix 1.

2.3.3 Creating the Synergy Database & Grids

Context

After completing the data check and interactive work among regions (like the Rome workshop), the next step is to focus on identifying potential synergies and creating potential synergy grids. The quality of the data allowed these potential synergies on thematic level, leaving further detailing and investigation for the next steps in WP 3.

The Rome workshop also provided a starting point for the creation of thematic groups (regions collaborating on a specific theme for further detailing and investigation in WP3).

Method

The data provided by the partners were assessed for each thematic group. The assessment was mainly based on the data provided in the Mapping Tool 2.1 regarding:

- RIS3/SWOT & Focus sector
- Companies
- Capabilities – general overview
- Emerging ideas.

An Excel spreadsheet was created to summarize and assess the data. As the regions data quality level has many differences, a programmed quantitative analytical assessment is not possible. Therefore, it should be done on semi-quantitative approach with manual data processing.

The Excel spreadsheet offers a format for regions in which synergy grids are identified by the region itself. The used Excel spreadsheets are available in addition to this report. In order to identify these one could take the next steps.

This requires the following steps.

✓ **Step 1 Identifying partners and thematic description**

The first step is aiming at identifying the potential partner regions and providing a description of the selected theme.

The identification is based on:

- Interest expressed by regions (interactive workshop, bilateral conservations, etc.)
- Alignment with RIS-strategy (check requirement 1 – paragraph 2.2)
- Alignment with focus sectors (check requirement 2 – paragraph 2.2)

For this step regions that expressed their interest were added to the selection. Regions that provided data on the RIS strategy and focus sector that aligned with the thematic synergy were invited to join the synergy.

The partnership is based on a thematic description. This thematic description should ideally be done by somebody with thematic expertise. The thematic description should give a glance at the circular opportunities discussed with the regions and should contain links with the emerging ideas collected in the mapping tool and if possible some potential cross regional value chains.

The partnership should assign a 'lead' to make sure the information is collected and processed. The lead should execute the following actions:

- Check that the RIS strategies of the interested regions align with the synergy
- Add the regions and their applicable sectors (NACE-codes) to the spreadsheet

- Interact with the team on the potential synergy
- Describe the synergy

✓ **Step 2 Classifying partners & Synergy Potential**

The second step is to classify the partners and determine the synergy potentials. Determining the synergy potential is based on a semi-quantitative analysis by the thematic lead partner (ideally in consultation with the partners).

The thematic lead partner should assess the mapping tool based on the information of the interested regions in the mapping tool concerning Companies and Capabilities – general overview. The idea is to create synergies among the existing capabilities – possibly creating exchange of capabilities and cross regional collaboration, rather than exchange of materials.

For this three types of potential synergies could be distinguished:

1. R&D synergy – based on R&D and Innovation capabilities (step 3.1 and 3.2 Mapping Tool)
2. Business synergy – based on companies (step 2.2 Mapping Tool)
3. Human Capital synergy – based on education capabilities (step 3.3 Mapping Tool)

For each type of synergy the semi-quantitative analysis should be executed.

Score	Explanation
1	Support needed – region has no/limited capabilities and needs collaboration for its development
2	Support offered – region has sufficient/high level of capabilities and could support other regions
0	Region has no interest on this type of synergy
?	Additional information or internal decision making is necessary to decide on this potential synergy

Besides the synergy potential, the initial partnership should be classified. This is done in an very practical way either, just by indicating the desired role/position of a region in a partnership working on the potential synergy.

Score	Role	Explanation
1	Supporter	Region offers their assistance and some support in detailing the synergies
2	Partner	Region wants to be involved as a partner, give input and coordinate designated follow-up actions

3	Lead	Region takes the lead on follow-up actions and create a plan/approach for an synergy
?		Region needs additional stakeholder consultation before giving input

✓ **Step 3 Identifying potential complementarities & blind spots**

The synergy potential can be based on regions collaborating on each other's strengths, regions collaborating on identified needs, or a mixture of both**.** The collaboration based on either strengths, needs (or a mixture) will be presented in a list in the Excel spreadsheet and further be visualised in a infographic. The classification of regions with strengths/needs is based on the semi-quantitative analysis done in step 2. The following synergies are distinguished in the list and the grid:

- Complementarity: collaboration based on strengths
- Blind Spot: collaboration based on needs
- Mixture: no list or grid – includes the total consortium and depends on follow up in WP3.

✓ **Step 4 Creation of Synergy Grids**

To make the Synergy Grid more visual, an infographic may be used. There are multiple programs available (free and payed versions). In SCREEN we applied the free version of the web based program PiktoChart.

The thematic lead partner will need to execute the following action(s):

- Create an account at PiktoChart
- Create a new file – SCREEN Synergy Grid
- Fill in the theme and proposing Region
- Add via **Tools > Maps > Regions > Europa** to the format.
- Click on **Edit this map**. In the right column, erase all regions not involved. Add only the regions related to the Emerging Idea.
- Click on **Insert Map**. The map will be inserted in the infographic.
- Based upon the information of the Synergy Grid – Database, create the synergies (R&D, Business and Human Capital) among the involved regions.
- After finishing, **save** and **download** the infographic Synergy Grid. This is possible as a j-peg file or pdf. An **online-preview** is also possible.

✓ **Step 5: Sharing and discussing results**

The Excel spreadsheet and the infographic need to be considered as tools to start discussing and further investigating the potential synergies among the regions. The mapping tool information, grids produced and partnerships created are the starting point for further work to be done in WP3.

3. Results & Discussion

The data acquired with the mapping tool (T2.1), the further local analysis (T2.2) and the first cross regional analysis combined with the interactive work (T2.3) resulted in the identification of seven cross regional potential synergies between the SCREEN partners, and an initial partnership for further collaboration and investigation.

The seven cross regional potential synergies and the initial associated regions are:

Theme	Regions	
Agriculture & food	Navarra	Scotland
	Limburg	Centro Portugal
	Crete	Fryslân
	La Reunion	Lazio
		Łódzkie*
(Smart) Packaging	**Tampere**	Fryslân
	Limburg	Navarra
	Crete	Ile de France
	Centro Portugal	
(Resources from) water and wastewater	**Fryslân**	Crete
	Navarra	Limburg
	Tampere	Łódzkie
	Lombardy	Scotland
		Centro Portugal
Biobased materials & biotechnology	**Limburg**	Tampere
	Crete	Navarra
	Lombardy	Flanders
	Fryslân	Lazio
	Scotland	Łódzkie
	Centro Portugal	
Manufacturing and re-manufacturing	**Lombardy**	Tampere
	Navarra	Centro Portugal
	Fryslân	
(Bio)Waste management	Navarra	Crete
	Tampere	Łódzkie
	Lombardy	
Construction	**Tampere**	

N.B. Bold marked regions are lead theme partners for follow-up work in collaboration within more detailed value chains. For themes (bio)waste management and agriculture & food thematic leaders have not yet "volunteered".

Compared to the theoretical potential cross-regional synergies, it is noticed that:

- (Smart)packaging was introduced as a new theme. However, it was introduced in the workshop as an alternative to 'plastics', as the packaging included the circular use of plastics and needs for production of bioplastics form other sources (like organic waste from agriculture, food industry and waste water).
- Biobased materials and biotechnology were introduced by the region of Limburg during the workshop, having a lot of connections to agriculture and food, like the productions of biochemicals/green chemicals from organic waste. Data of Limburg was not available in deliverable 2.2, therefor it was not included in the theoretical overview. Limburg persuasive arguments mobilised other regions to look for the potential synergies.
- Based on the theoretical overview one should expect that construction, textiles and mining were much more supported by the regions. However, only construction was being suggested by Tampere region. Textiles and mining were not issued at this point.
- Some minor changes were introduced considering the thematic description or potential partnership: some partners decided to join a theme, while others decided to shift or cancel one.

These initial partnerships need to be considered as a starting point for further collaboration on themes that align with RIS-strategies and focus sectors. Next step is to perform a further detailed local analysis with stakeholders, map the local value chains and identify any gaps or emerging ideas to be supported and offered to other regions. This next step is part of T3.1.

One is aware that the identified cross regional collaboration on value chains obviously could target more than one theme (materials, sectors, knowledge, etc.). Therefor these initial partnerships are characterised as open partnerships and upcoming workshops should provide the opportunity to exchange the progress and ideas between themes and come up with cross regional collaboration ideas. The initial partnerships may be adjusted based on this.

Furthermore, the methodology described in the deliverables T2.1, T2.2 and T2.3 supports other partnerships to identify other potential synergies. The interactive work organised within the SCREEN-project as well as other informal initiatives could lead to new partnerships for cross regional collaboration.

In Appendix 1 – 4, the results of the first cross regional analysis and interactive work are presented.

Appendix 2 and 3 show screen-shots of the database containing no data. On demand and on confirmation of the regions the filled spreadsheets are available too.

In Appendix 4 synergy grids are presented for three themes: agriculture & food, resources from water and wastewater, and biobased materials & biotechnology. During the project also other grids will come available depending on the thematic progress.

As an example for other synergies two synergies on water are explained in more detail in Appendix 5. These are about a synergy on sludge and a synergy on resource recovery from water.

Appendix 1: Minutes of workshop 26th – 27th March 2017 (upon request)

Detailed minutes are available upon request. Generally, evaluating the results of the workshop one can conclude that the following top six synergies could be found:

Top 6 potential synergies	Partner(s)
Agriculture & food	Lombardy Navarra Limburg Crete Scotland Centro Portugal Fryslân Lazio Łódzkie
(Smart) Packaging	Limburg Crete Centro Portugal Fryslân Navarra Ile de France
(Resources from) water and wastewater	Fryslân Navarra Tampere Lombardy Crete Flanders Łódzkie Scotland
Biobased materials & biotechnology	Crete Lombardy Fryslân Scotland Tampere Navarra Flanders Lazio Łódzkie
Manufacturing and de-manufacturing	Navarra Lombardy Tampere
(Bio)Waste management	Navarra Tampere Lombardy Crete Łódzkie

Other sectors were mentioned but were not selected in the Top 6. Nevertheless, these could be interesting as well. But as focus is needed, it is suggested to focus at the above mentioned Top 6.

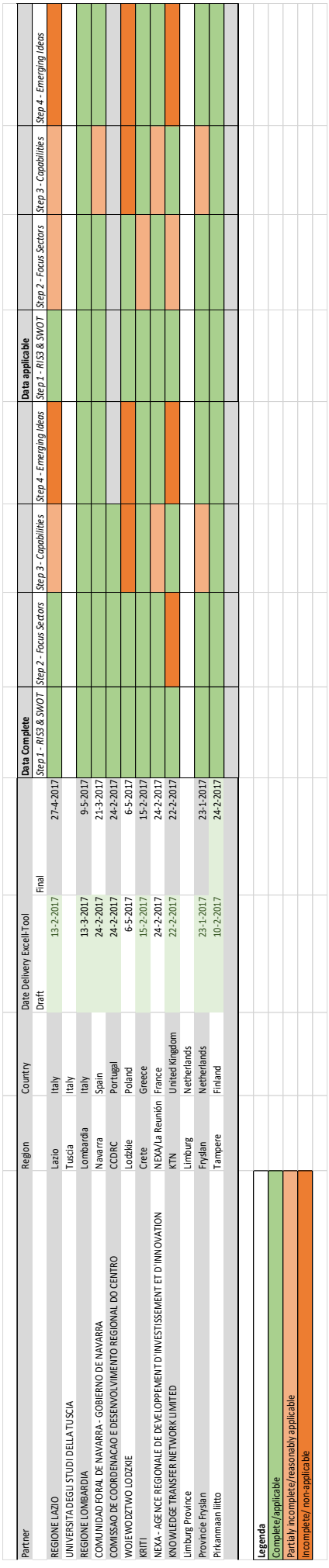
The limited time in the workshop did not allow to answer all the questions that were asked in the introduction. It is suggested to follow-up on these sectors in the next project meeting(s) and further data/information collection. Furthermore, the results also need input from local stakeholders. It is advised to cooperate with local clusters that fit in RIS-strategy towards the organisation of local workshops.

The identified potential synergies are primarily focussed on the potential collaboration and capabilities of regions/sectors. However, collaborative (business) model were briefly discussed but not really further investigated in this stage. It was recognised that these collaborative (business) models could be of importance, and could be added in a next stage of the project (WP 3) when detailing and classifying the value chains.

Also Industrial Symbiosis was briefly mentioned. Based on the rationale that the Industrial Symbiosis is only profitable on a local level, it is recommended to further investigate the opportunities on a local level and connecting these with the above functional value chains if appropriate.

Appendix 2: Data Check Excel Spreadsheet

Data validation sheet



Partner	Region	Country	Date Delivery Excell-Tool		Data Complete				Data applicable			
			Draft	Final	Step 1 - RIS3 & SWOT	Step 2 - Focus Sectors	Step 3 - Capabilities	Step 4 - Emerging Ideas	Step 1 - RIS3 & SWOT	Step 2 - Focus Sectors	Step 3 - Capabilities	Step 4 - Emerging Ideas
REGIONE LAZIO	Lazio	Italy	13-2-2017	27-4-2017								
UNIVERSITA DEGLI STUDI DELLA TUSCIA	Tuscia	Italy										
REGIONE LOMBARDIA	Lombardia	Italy	13-3-2017	9-5-2017								
COMUNIDAD FORAL DE NAVARRA - GOBIERNO DE NAVARRA	Navarra	Spain	24-2-2017	21-3-2017								
COMISSAO DE COORDENACAO E DESENVOLVIMENTO REGIONAL DO CENTRO	CCDRC	Portugal	24-2-2017	24-2-2017								
WOJEWODZTWO LODZKIE	Lodzkie	Poland	6-5-2017	6-5-2017								
KRITI	Crete	Greece	15-2-2017	15-2-2017								
NEXA - AGENCE REGIONALE DE DEVELOPPEMENT D'INVESTISSEMENT ET D'INNOVATION	NEXA/La Reunión	France	24-2-2017	24-2-2017								
KNOWLEDGE TRANSFER NETWORK LIMITED	KTN	United Kingdom	22-2-2017	22-2-2017								
Limburg Province	Limburg	Netherlands										
Provincie Fryslan	Fryslan	Netherlands	23-1-2017	23-1-2017								
Pirkanmaan liitto	Tampere	Finland	10-2-2017	24-2-2017								

Legenda
Complete/applicable
Partialy incomplete/reasonably applicable
Incomplete/ non-applicable

RIS3 Filter				
Objective				
Identifying broad RIS3 Ambition/Area's | coherency with Smart Specialisation Platform				
Partner	**Region**	**Country**	**SCREEN RIS3 Area's Mapping Tool**	**Check Smart Specialisation Platform**
REGIONE LAZIO	Lazio	Italy	Aerospace; Life Sciences;cultural heritage;digital creative industries;agrofood;Green economy	**Complementair**
REGIONE LOMBARDIA	Lombardia	Italy	Advanced manufacturing; environment and green chemistry industry; agribusiness	**Complementair**, including Aeronautics and Space, Cultural and creative industries, sustainable mobility
COMUNIDAD FORAL DE NAVARRA - GOBIERNO DE NAVARRA	Navarra	Spain	Renewable Energy & Natural Resources	**Complementair**, including Biomedicine; Business services;ecofriendly ageing;education; environment and waste;health care services;mechatronics;medical equipment;sustainable construction;sustainable outrism;sustainable vehicles
COMISSAO DE COORDENACAO E DESENVOLVIMENTO REGIONAL DO CENTRO	CCDRC	Portugal	Agrobusiness;Forestry;Sea; ICT;Materials;Tourism	**Complementair**, including Advanced manufacturing&industry;alternative (energy)sources;ICT; Health & Life Sciences
WOJEWODZTWO LODZKIE	Lodzkie	Poland	innovative agriculture and agrifood; energy	**Complementair**, including Advanced construction, IT&Telecommunications, medical industry; modern textiles;
KRITI	Crete	Greece	Agroculture;culture & tourism; environmental	No RIS3 found
NEXA - AGENCE REGIONALE DE DEVELOPPEMENT D'INVESTISSEMENT ET D'INNOVATION	NEXA	France	(Tropical) Bioeconomy; experential ecotourism; resillient, low-carbon economy	**Complementair, including aquaculture; biofuel; environmental monitoring; fishing; lifesciences; marine energy; watertechnology**
KNOWLEDGE TRANSFER NETWORK LIMITED	KTN	United Kingdom	Environment & Energy;Food&Beverages;Marine Energy;Life Sciences	**Complementair**, including Creative Industries;Financial & Business Services;Tourism;Education
Limburg Province	Limburg	Netherlands		
Provincie Fryslan	Fryslan	Netherlands	Watertechnology;Agrofood&Dairy	**Complementair**, including Sensortechnology, Energy, Healthy Ageing;
Pirkanmaan liitto	Tampere	Finland	Bioeconomy;Sustainability;Manufacturig;High level of Expertise as a succes factor	No RIS3 found

RIS3 Filter sheet

Focussectors									
NACE Sectors	**Lazio**	**Lombardia**	**Fryslan**	**Crete**	**Tampere**	**Scotland**	**Navarra**	**Centro**	**Reunion**
A1 - Crop and animal production, hunting and related service activities									
E36 - Water collection, treatment and supply									
C32 - Other manufacturing									
J61 - Telecommunications									
C20 - Manufacture of chemicals and chemical products									
B8 - Other mining and quarrying									
C26 - Manufacture of computer, electronic and optical products									
E38 - Waste collection, treatment and disposal activities; materials recovery									
M74 - Other professional, scientific and technical activities									
C23 - Manufacture of other non-metallic mineral products									
A2 - Forestry and logging									
C30 - Manufacture of other transport equipment									
C29 - Manufacture of motor vehicles, trailers and semi-trailers									
H52 - Warehousing and support activities for transportation									
F42 - Civil engineering									
A3 - Fishing and aquaculture									

Focus sector screening

SCREEN	
Name	Region
General	
Step 1 Remarks	
1.1-2RIS3 & SWOT	
Step 2 Remarks	
2.1 Focussec-tors	
2.2 Companies	
Step 3 Remarks	
3.1 Capabili-ties View	
3.2 R&D Cap	
3.3 Innovation Cap	
3.4 Education cap	
Step 4 Remarks	
4. Emerging ideas	

Model sheet for remarks on regions Mapping Tool input

Appendix 3: Spreadsheet Synergy Potentials

Workpackage 2 - task 3 - Mapping of potential synergies

Synergy Grid 7	Name of theme
Theme name	Short explaination about relationship theme to circular economy, with links to the collected emerging ideas. If possible stipulate focus sectors and capabilities as well.

Applicable NACE - sectors	Name of theme															
	Partner	Partner	Partner													

Synergy Potential - Legenda
X this NACE sector is present in the region

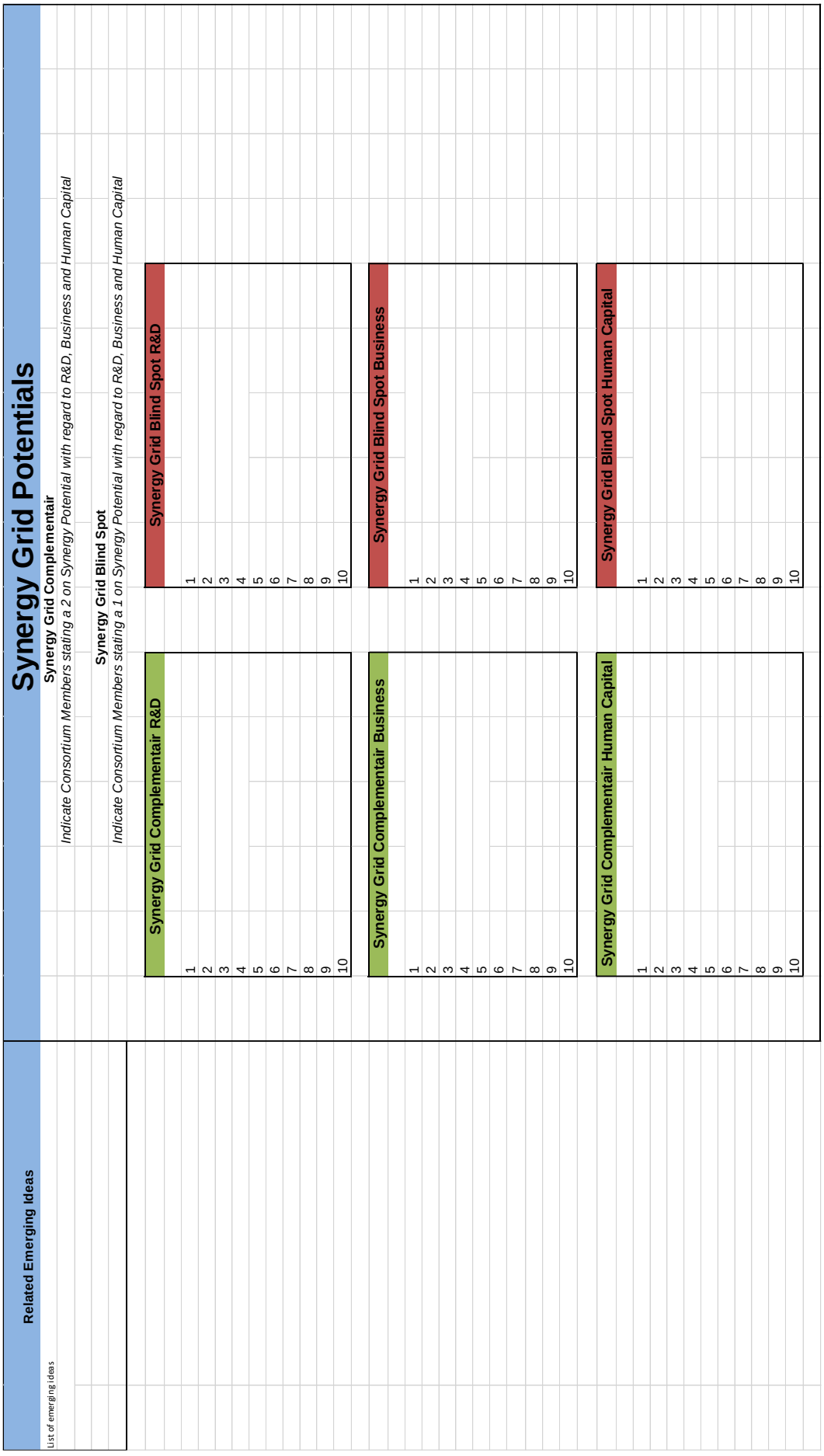
Synergy Potential	Name of theme															
Synergy potential exists with regard to	Partner	Partner	Partner													
1.R&D-Infrastructure																
2.Business-infrastructure																
3.Human Capital Infrastructure																

Synergy Potential - Legenda
1 Support needed - region has no/limited capabilities and needs collaboration for its development
2 Support offered - region has sufficient/high level of capabilities and could support other regions
0 Region has no interest on this type of synergy
? Additional information or internal decision making is necessary to decide on this potential synergy

Partnership building																
Synergy potential exists with regard to	Partner	Partner	Partner													
Partnership																

Synergy Potential - Legenda
1 Supporter: Region offers their assistance and some support in detailing the synergies
2 Partner: Region wants to be involved as a partner, give input and coordinate designated follow-up actions
3 Lead: Region takes the lead on follow-up actions and create a plan/approach for an synergy
? Region needs additional stakeholder consultation before giving input

Model for semi-quantative analysis for potential synergies



Model for collecting the synergies and emerging ideas

Appendix 4: Three examples of Potential Synergy Grids

SCREEN
Synergic CirculaR Economy across European regioNs

Potential Synergies in (resources from) water & wastewater

Description
Resource recovey from water and wastewater is aiming at:
1) recovering the valuable organic and inorganics from abstracted ground- and surface water, industrial process water and waste water contain valuable resources;
2) recovering energy (heat and biogas) from wastewater and domestic used water;
3) saving water, harvesting & using rainwater, water recycling.

Important sectors associated to these synergies are waterauthorities, animal and food production (primary agrofood sectors) as well as food & beverage manufacturing, wood processing industry, waste collection and also construction of buildings/urban areas.

Emerging Ideas
Resource recovery from wastewater (energy, nutrients, cellulose, bioplastics, neo-alginate)

Water in smart & circular cities

Rainwater harvesting and use in construction and agrofood sector

Industrial water separation and reuse

Concentrating milk at the farm

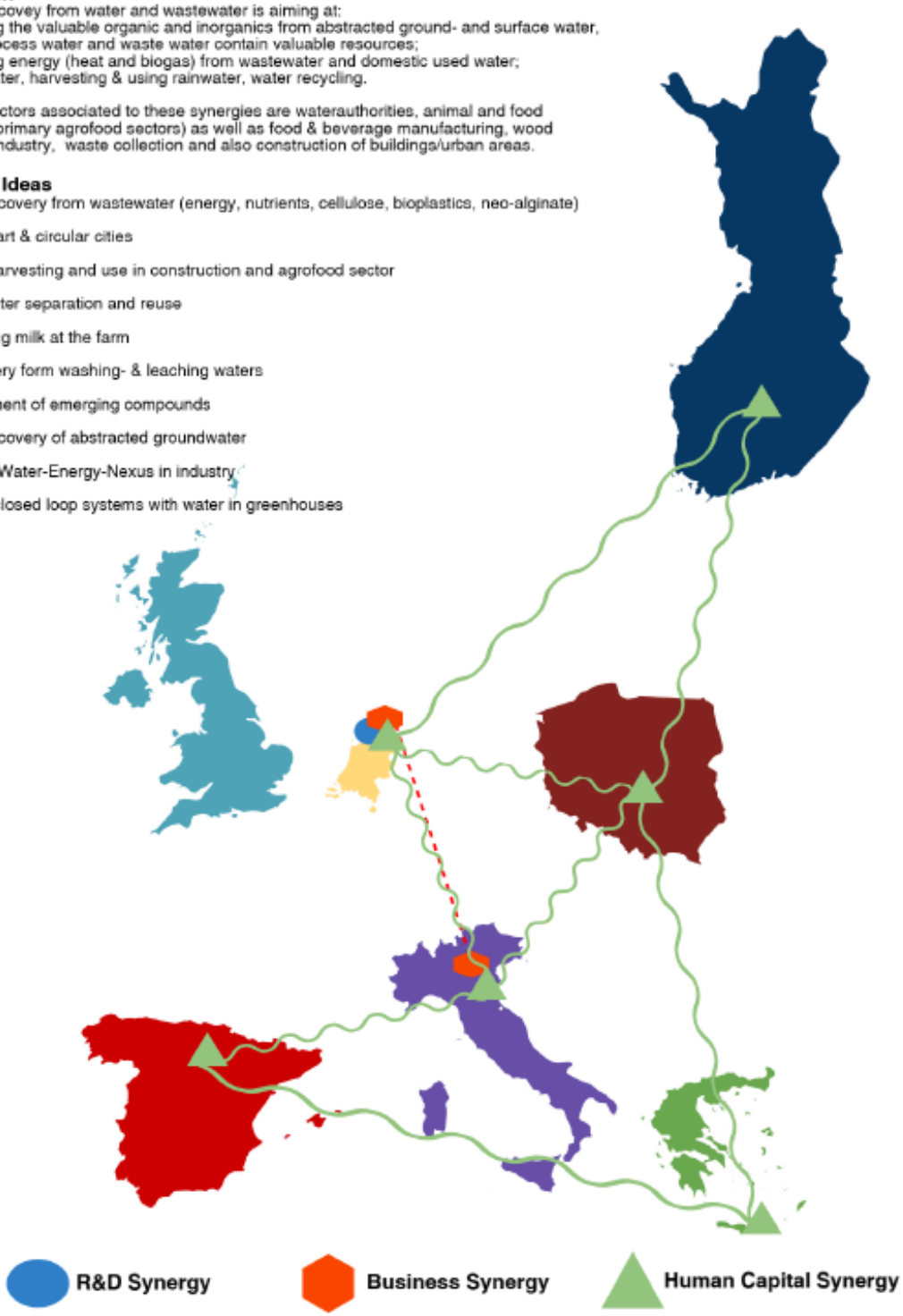
Metal recovery form washing- & leaching waters

Water treatment of emerging compounds

Resource recovery of abstracted groundwater

Solutions in Water-Energy-Nexus in industry

Creation of closed loop systems with water in greenhouses



SCREEN
Synergic CirculaR Economy across European regioNs

Potential Synergies in (Resources from) water and wastewater Blind Spots

The regions presented in this Grid all have issues and ideas in relation to (resources from) water and wastewater. However, the regions may need support from other regions on the field of R&D, business or human capital (as indicated by the three colors)

SCREEN
Synergic CirculaR
Economy across
European regioNs

Potential Synergies in Biobased Materials & Biotechnology

Description
Industrial biotechnology has the potential to intensify production, without using additional Agricultural land needed for food production or other kind of natural resources. This theme can be associated with other Synergy Grids. Business, R&D and HC infrastructures are generally suffieciently available in this grid. It is suggested that partners should start interact and sharing their capabilities and needs.

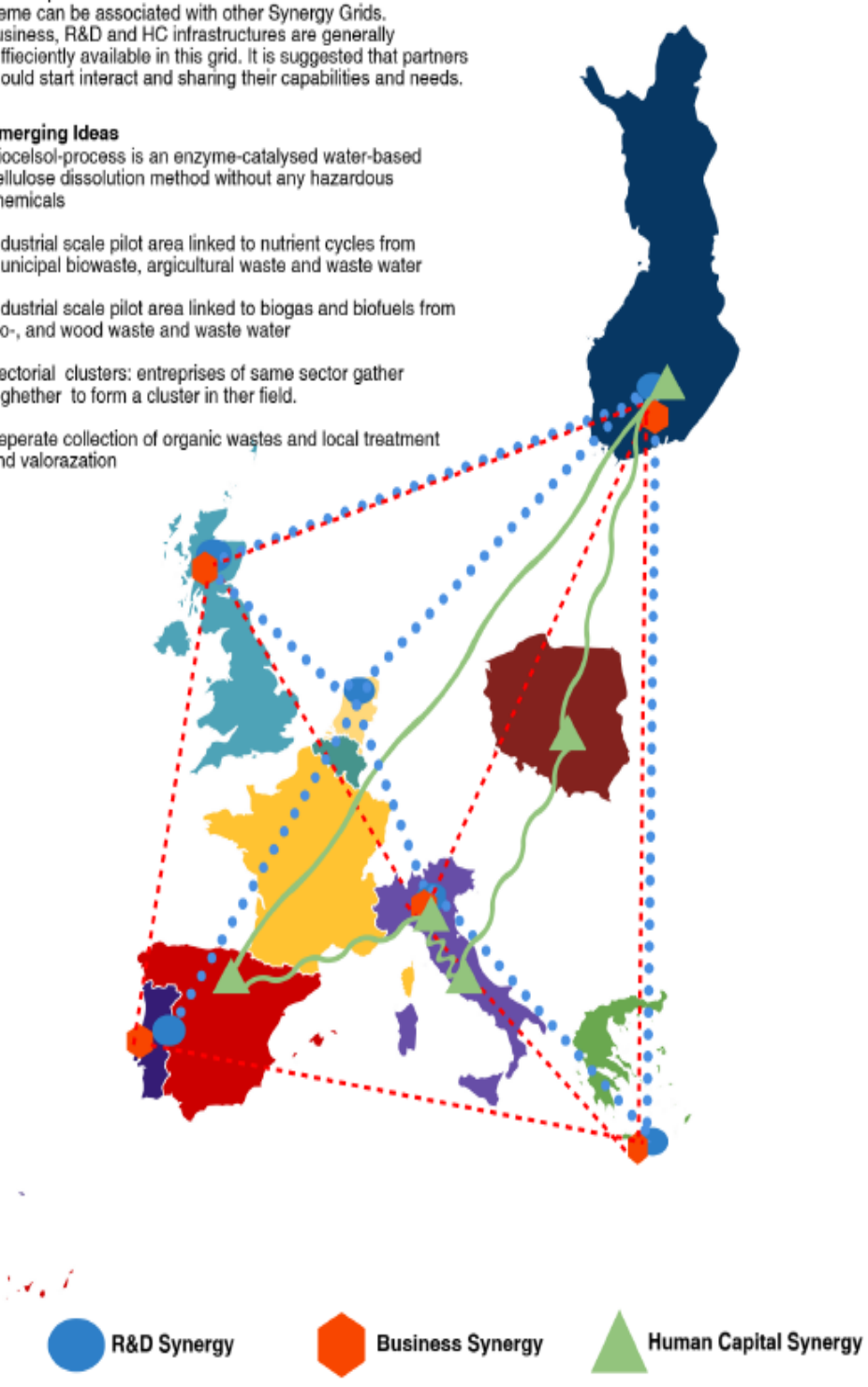
Emerging Ideas
Biocelsol-process is an enzyme-catalysed water-based cellulose dissolution method without any hazardous chemicals

Industrial scale pilot area linked to nutrient cycles from municipal biowaste, argicultural waste and waste water

Industrial scale pilot area linked to biogas and biofuels from bio-, and wood waste and waste water

Sectorial clusters: entreprises of same sector gather toghether to form a cluster in ther field.

Seperate collection of organic wastes and local treatment and valorazation



R&D Synergy Business Synergy Human Capital Synergy

SCREEN
Synergic CirculaR
Economy across
European regioNs

Potential Synergies in Biobased Materials & Biotechnology Blind Spots

The regions presented in this Grid all have issues and ideas in relation to Biobased Materials & Biotechnology. However, the regions may need support fromother regions on the field of R&D, business or human capital (as indicated by the three colors)

SCREEN
Synergic CirculaR
Economy across
European regioNs

Potential synergies in Agriculture & food

Description

Organic waste in agrifood production, processing and consumption needs to be prevented/reduced and what remains needs to be collected for other use (resource for energy, packaging, animal feed, etc.)

Biotechnology can play an important role for increasing yield and preservation. And for recovering resources, applying biorefinery on agrifood products and producing biobased chemicals.

Limited water resources make it necessary to invest in water efficiency/recovery measures, and rainwater harvesting technologies.
Water technology is enabling technology for closed loop systems and environmental emission reduction.

Emerging Ideas

Reuse of waste materials from agriculture and food transformation industry

Application of biotechnology to improve yield and preservation

Biodegradable / circular packaging for Agrifood distribution

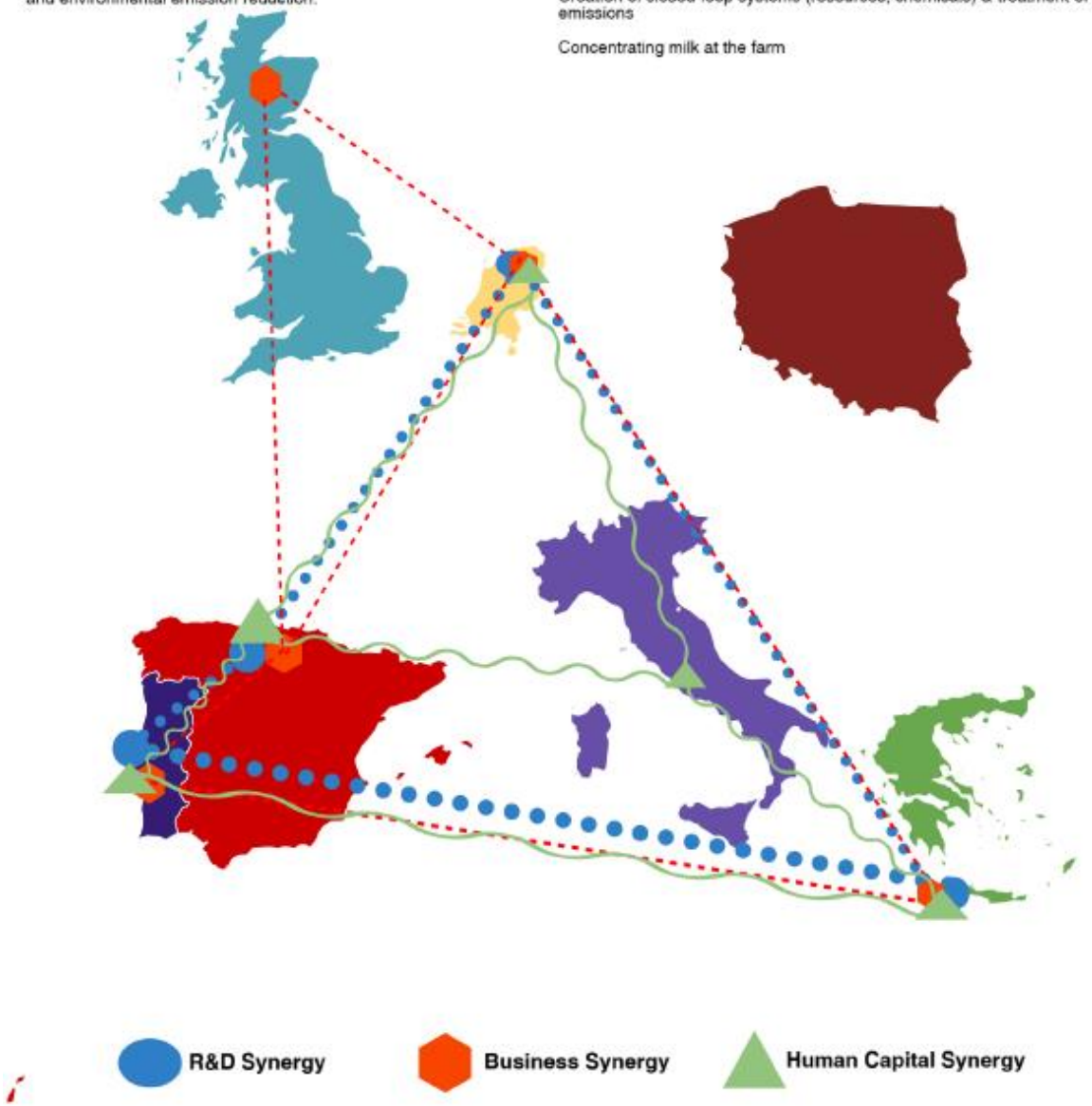
From organic foodwaste to feed for animal breeding

Use of organic waste for energy production

Water efficiency and water harvesting solutions

Creation of closed-loop systems (resources, chemicals) & treatment of emissions

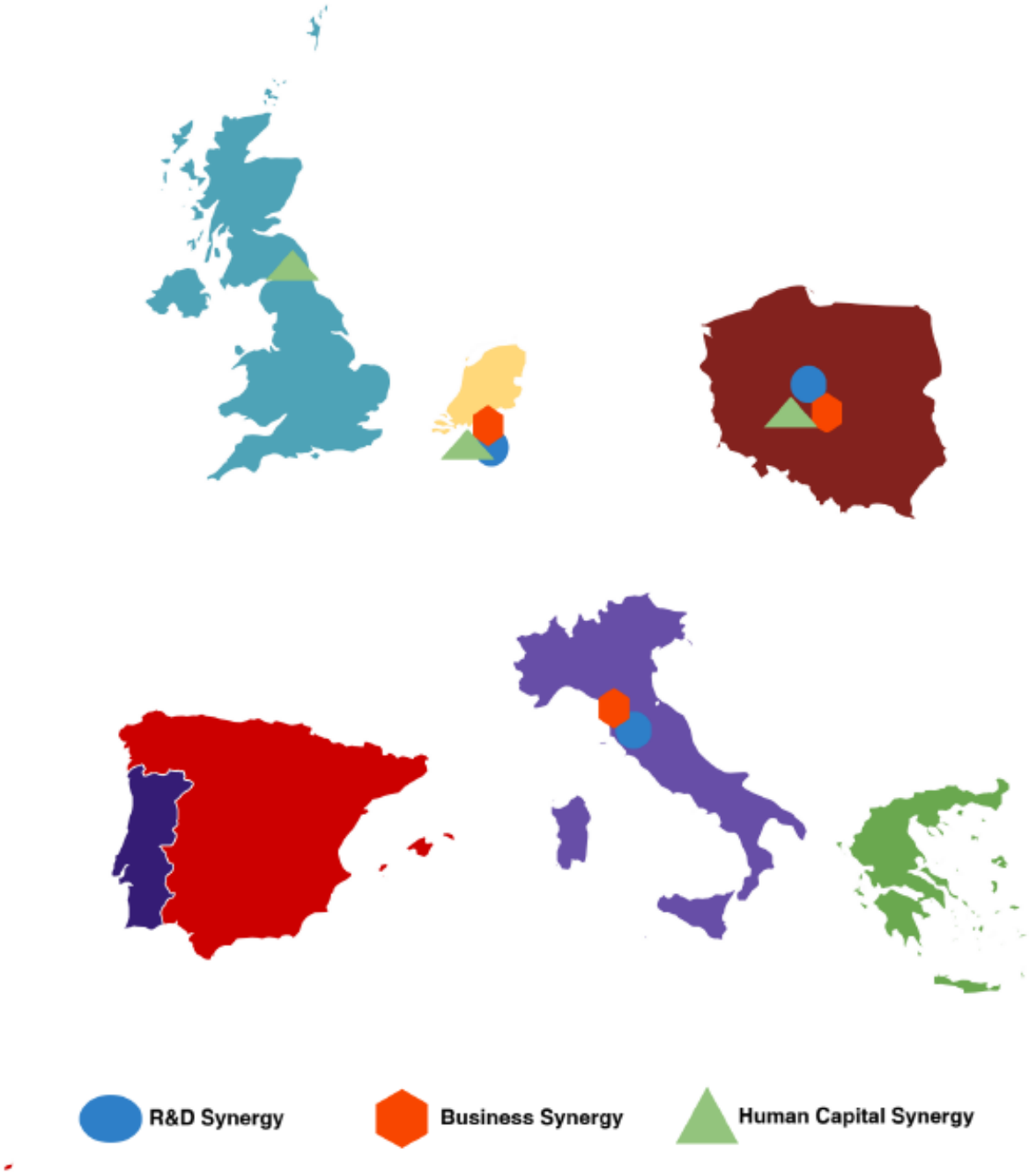
Concentrating milk at the farm



SCREEN
Synergic CirculaR Economy across European regioNs

Potential Synergies Grid Agriculture and food Blind Spots

The regions presented in this Grid all have issues and ideas in relation to (resources from) Agriculture and Food. However, the regions may need support from other regions on the field of R&D, business or human capital (as indicated by the three colors)



Appendix 5: Two water-related synergy examples

Title
Exchange for circular solutions with sludge
Description
The treatment and disposal of sewage sludge is an expensive and environmentally sensitive problem. It is also a growing problem world-wide since sludge production will continue to increase as new sewage treatment works are built and environmental quality standards become more stringent. With some traditional disposal routes coming under pressure, and others such as sea disposal having been phased out, the challenge facing sludge managers is to find cost-effective and innovative solutions whilst responding to environmental, regulatory and public pressures. Recycling and use of wastes are the preferred options for sustainable development, rather than incineration or landfilling, but with sewage sludge this is not straight forward because of perceptions over contaminants, pathogens and its fecal origin, particularly by the food retailers. If future quality standards for sludge and the receiving environment are made too stringent, the agricultural outlet may become untenable for the water utilities resulting in sludge being disposed of by other means that offer the utilities greater operational and financial security, but which may be less acceptable in the long-term. Sludge is composed of by-products collected at different stages of the wastewater treatment process. It contains both compounds of agricultural value (including organic matter, nitrogen, phosphorus and potassium, and to a lesser extent, calcium, Sulphur and magnesium), and pollutants which usually consist of heavy metals, organic pollutants and pathogens. The characteristics of sludge depend on the original pollution load of the treated water, and also on the technical characteristics of the waste water and sludge treatments carried out. Sludge is usually treated before disposal or recycling in order to reduce its water content, its fermentation propensity or the presence of pathogens. Several treatment processes exist, such as thickening, dewatering, stabilization and disinfection, and thermal drying. The sludge may undergo one or several treatments. Once treated, sludge can be recycled or disposed of using three main routes: recycling to agriculture (land spreading), incineration or landfilling. Other, less developed outlets exist, such as silviculture, land reclamation, and other developing combustion technologies including wet oxidation, pyrolysis and gasification. Each recycling or disposal route has specific inputs, outputs and impacts. New and innovative technologies and solutions are developed these recent years in order to reduce the amount of sludge generated, to improve sludge quality and/or to improve the recovery of resources form sludge.
Barriers/problems
In general, regions reckon the lack of knowledge to make the best decision to deal with the sludge being generated form waste water treatment plants. As the investments in sludge management infrastructure is very high, it is important to have a clear overview in the possibilities for dealing with sludge (and its impact in circular economy impact), before investment decisions should be made. For more circular solution focusing on recycling and resource recovery, regions are facing several barriers, like regulation, regional and cross-regional collaboration, development of feasible business models for market penetration, etc. Regions reckon that there is no ‘one-solution-for-all’, but every region needs a solution taking its regional circumstances into account. These regional differences also make it difficult to coordinate efficient international information exchange.
Opportunities/solutions
Regions belief that a collaborative platform focusing on the exchange and development of knowledge, development of demonstration projects and training/education is a good starting point to stimulate the uptake of more circular solutions for sludge. Ofcourse, regional stakeholders responsible for sludge production and those responsible for dealing with sludge, should be involved in this platform. This platform should focus on the regional cases, innovative solutions, resource training, and provide knowledge about circular solutions for sludge. It is also recommended to develop a decision-making-framework that supports the decisions on sludge related investments.

Title
Exchange and demonstration on 'resource recovery' from water
Description
Driven by environmental, economic, and ecological benefits, resource recovery from waste has started to draw attention worldwide. Recovering resources from water and wastewater can provide an alternative and economically viable source of resources supporting the resilience of human and natural systems under water stress. Resources from the water cycle can be water itself, energy (organic or thermal) and components such as nutrients and metals. The feasibility of a solution strongly depends on the regional context and the value chains that can be organized. Important incentives here are scarcity, legislation, availability of value chains actors, etc. A range of new initiatives are underway to promote and accelerate the development and uptake of resource recovery science and technologies. Innovation on resource recovery in the water cycle has been developing fast, but examples of large scale and marketable applications from current scientific innovations are scarce. Also more basic solutions are needed to overcome water scarcity issues. Due to climate change some regions are facing water scarcity issues more frequently and need to change their behavior and infrastructures in order to save water, to optimize the water use and to reuse the water. This means that water infrastructure leakage should be minimized, water users should be come more aware of their water use and ways to reduce it, water should not be contaminated with chemicals that could not be removed anymore, etc.
Barriers/problems
In general, developing a technically and economically feasible business model is recognized as the most important barrier to build a value chain based on resources recovered form water. The key issue here is how to move from research to practice, while also taking into account: a. the market potential for the resource recovered, b. appropriate public policy, regulation and institutional arrangements to support and accelerate resource recovery and c. stakeholders' needs well integrated with technologies, markets, policy, new initiatives, current research and practice. More specific these issues, concern the competition with 'regular' raw materials based on quality, price and continuation. However, local solutions are expected to be interesting as it allows the loops to close and makes long transportation unnecessary. Also legislation and awareness are mentioned as barriers to adopt resource recovery solutions.
Opportunities/solutions
Regions belief that a collaborative platform focusing on the exchange and development of knowledge, development of demonstration projects and training/education is a good starting point to stimulate the uptake of more circular solutions for water. Ofcourse, regional stakeholders should be involved in this platform. This platform should focus on the regional opportunities and value chains, development of innovation facilities, innovative technological and non-technological solutions, resource training, and provide knowledge about circular solutions for innovative technologies. Driving forces behind initiatives to adopt a technology can differ in geographical context as well as at the stage of implementation. Legislation, technical feasibility while economic viability, environmental stability and social acceptance are the most important factors for full-scale implementation. Actors vary depending on the country or local context. The private sector, through its collaborations with governments and through public-private partnerships, is said to help leverage innovation and adoption of new science and technology. Some target businesses as the primary source of innovation which, provided with the right environment, is a critical player in the development, demonstration, commercialization and dissemination of technology. One should be aware that these opportunities count for municipal and industrial waste water treatment plants, and also target agricultural and industrial companies using significant amounts of freshwater and/or emitting significant amounts of contaminated/used water. These industries situated in areas with fresh water scarcity could be targeted to create more awareness of their water use and environmental impact, and to provide them with solutions and training to save water or to prevent water from being contaminated permanently.