EPIC

Symbiotic bio-Energy Port Integration with Cities by 2020

D4.3 - Report on the success factor and barriers of the development of the EPIC bio-mass communication- and logistic tool

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Introduction

The EPIC communication and logistic tool is a web based application that brings bio- and waste resources needs and offers together.

Based on a resource database with more than 100 different resources and resource groups, registered users (after a short and secure registration process) can communicate their offers of unused bio- or waste-resources to a regional market place. On the other side, parties who demand resources can also publish their needs in the same way, by specifying volumes, time frames, prices and locations. The mechanism of offers and demands and interfaces to existing communication systems guarantees a permanent actuality and dynamic real-time information of resource flows. Offers and demands can created manually over a dialog with the graphical user interface (GUI) or direct over a web-services interface from existing local IT-systems in companies.

In a statistic section, many information about the resource availability and needs in a geographical region can be displayed. The distance between sources and sinks initiate a logistic flow over a distance, which can be monitored with the associated logistic costs in different transport modes.

The EPIC communication and logistic tool based on the experiences with the Regio-Power logistic tool which only supports a small amount of wood-based resources.

Purpose of the Tool

New technologies and a new thinking about the use of bio- and waste-resources make many former unused materials and wastes a valuable commodity. This opens chances for a better environment as well as new and sustainable business models. To foster this process, the information about available new and formerly untapped resources and resources needs in a given region should be more transparent. It is NOT the goal of the tool to exchange existing market structures with new online methods, but to provide better information on alternative sources and users.

The potential addressed users can be divided in the "Primary Interested Group" (PIG) - group of users, which have primary interest to use the tool as additional communication canal for their resource handling and "Target Groups" (TG) - the group of stakeholders, which will be addressed by the primary group.

Target group - potential investors: The statistic section of the tool gives a good overview about available resources from different resource groups, their geographical distribution in the region and the corresponding statistic logistic costs. This information allows a clearer calculation of potential investments.

Target group - bio-and waste producers and distributors: Offering former unused bio-and waste material gives an additional income and perhaps a new business when offers and demands fits in a region.

Target group- service providers and logistic companies: The activation of untapped bio- and waste resources brings orders to transport companies and service providers to harvest, collect, sort or handle the resources.

Development of the tool

The EPIC communication and logistic tool based on the RegioPower-feedstock market for lignocelluloses biomaterial (industry logs), developed in the ERA-NET-bio-energy project "RegioPower". In the EPIC project, the functionality of the tools was significantly expanded to realize and support more uses cases in the circular economy.

The development of the EPIC communication and logistic tool can be divided in two areas:
The technical software development and the development of concrete use cases under usage of this tool.

The *technical development* includes the expansion of the resource database and the standardization of resource descriptions in a more formally way which allows the integration of any kind of resources in the database and their description via special features, norms and conditions. Other areas of the technical development were the interface section to include external information sources on different communication ways, the integration of the logistic calculation table in the search results and geographical area and the new user authorization procedure on a more secure way.

The *development of use cases (UC)* in four different port sides should demonstrate the functionality and the benefit of the tool in different political, geographical and business areas.

To this purpose, scenarios with different stakeholders were prepared in the regions about the ports of Wismar, Rostock, Mantova and Malmö. These scenarios were discussed with the partners and for the region as realistic and useful estimated.

The development of the use case cover a special part of resources from that region, shows the potential of available resources or the needs of them and foster in this way the regional development.

The first step is to identify the PIG´s in this UC, the next steps are the identification of Target Groups and motivation factors to use the tool.

The following use cases were setup in the regions:

UC Wismar: "Woodchips demands"

UC Rostock: "Straw demands"

UC Mantova: "Animal waste offers"

UC Malmö: "Swedish farm products"

UC Wismar "Woodchip demands"

Resource group: Woodchips in different qualities
Primary interest group (PIG): producer from biomass heating systems for small & medium enterprises and private households, consumers of woodchips - KWB-Austria, Fröhling, Heizomat, Sommerauer & Lindner
Target groups (TG): Potential producers, farmers, dealers and investors for woodchip production and sales - State forest MV, Forstwirtschaftliche Vereinigung MV, Biotherm GmbH, 22 regional farmers
UC-area: Northern Germany, 200km around Wismar, 168 places of Interests - Biomass heating systems

UC-Description:

Focus of this use case is the primary interest from producers of new heating technologies systems - biomass heaters for small and medium enterprises and private households to give her clients a good and secure biomass access. Heating with woodchips is, in opposite to fossil heating systems and also to pellet heating systems, a relatively new technology on the market. The biomass resource is available and a chance for investors and farmers to establish a new market for her biomass product woodchips. To foster this market, the EPIC logistic tool makes woodchips demands - locations and installed heating power transparent and activates local farmers and investors to give her offers to the tool. The logistic function displays the transports costs of the biomass in relation to the distances between produces and consumer. This opens opportunities for more regional located producers.

In the project use case, 163 locations of biomass heating systems with her specific needs are registered during the project frame and all of them got offers from regional registered woodchips producers. This process is on the way to a more dynamic market.

Benefit for PIG: Get better overview about the biomass market and prices
Benefit for TG: Get overview about the demands of a region

The use case started in july 2015 over 6 month with the two PIG´s "KWB" and "Fröhling"- heating technology producers. They supported 163 users by defining her anual needs. This PIG adressed her needs to the TG "Woodchips producers and dealers" primary to the associations of forest owners and farmers. During the test period, 10 produces created an own account for offering woodchips.

In summary the use case was successfull for the heating owners, getting more offers and a transparent market overview about the new bioresource "woodchips". The woodchips producers get a new market canal for selling her products with better forecast. The test period from 6 month was to short for getting more traffic on the platform because the planning and harvesting phase for this resource is approximately one year.

UC Rostock "Straw demands" - for stone coal power plant

Resource group: Straw from the agricultural sector
Primary interest group (PIG): KNG-Stone coal power plant in the Rostock harbour, Rostock Fright Port (RFH)
Target groups (TG): Regional farmers in Mecklenburg-Vorpommern, Biomass Importers via Rostock harbour
UC-area: Northern Germany, 200km around Rostock, potential interest area Baltic sea

UC-Description:

The KNG-stone coal power plant in the Rostock harbour imports coal via Rostock port and produces electrical and heating energy for the market. In the actual situation, the renewable energy production with windmills and biogas facilities produces more electrical power as the market needs which leads to lower market prices for the electrical energy at the EEX -Leipzig energy exchange. In the result, the stone coal power plant is mostly only a stand-by facility with high standard costs and minimum production with additional costs for carbon-dioxide emission certificates.
To change this situation, with the help of the EPIC project and a regional research institute, the management starts the planning for a co-fire system for straw - biomass from farms.
 The use of straw reduce the emission certificate costs, allows more constantly energy production for steam and electrical energy and perspectives the high stand-by costs of the power plant.

The critical factors in this planning are the conversion technology investments and the logistic costs for the biomass procurement. To get a clearer view about the biomass potential in the region, the EPIC logistic tool should help to capture of all available straw biomass in the region from farmers they are interest to sell her waste product. The total volume of straw is known from statistic data, but the availability on the market with the relevant logistic costs are unknown factors.

For this reason, the EPIC logistic tool was presented and discussed with the regional farmers, biomass associations and research institutes with the goal to offer the biomass to the market.

Involved in this process were the Bauernverband Mecklenburg-Vorpommern, Forstwirtschaftliche Vereinigung Mecklenburg-Vorpommern and the Landesforschungsanstalt Mecklenburg-Vorpommern.

Benefit for PIG: Get overview about the available straw biomass with corresponding logistic costs
Benefit for TG: Opens a new market for a former waste product

The use case started in october 2015 over 4 month with the PIG "KNG" stone coal power plant. The PIG adressed her needs to the TG "Bauernverband Mecklenburg-Vorpommern" an association of regional farmers. During the test period, the "Landesforschungsanstalt Mecklenburg Vorpommern" supported 8 farmers by offering her bioresource straw for the following year.In summary, the test period of 4 months was to short for getting a clear feedback, because the use case was implemented to support the planing phase for the KNG co-firering project with available materials.

UC Mantova: "animal waste offers"

Resource group: Organic waste from animal farms
Primary interest group (PIG): Farmers and local energy agencies
Target groups (TG): Potential investors in Bio-refinery industry
UC-area: Mantova region, 100km around Mantova

UC-Description:

In the Mantova industry region works some petrochemical facilities. This industry is on the way to change to more Bio- chemical products and to find new investors for this new bio-based industry. To foster this process, with the help of the EPIC logistic tool the existing bio- and waste resource from the region around Mantova should be collected. In this region many animal farms producing the famous original Italian cheese and ham and export theses products in all over the world. The concentration of the animal farms in this region led to a big amount of animal waste with high disposal costs. The collection of these special kinds of bio- wastes over an geographical region and the offer of these resources on a regional market shows the potential of the region. In the statistic section of the EPIC tool, this collected resource potential is visible.

This motivates potential investors in bio-based industry to calculate investments with realistic resource and logistic costs and on the other side helps the local farmers with additional business with former untapped resources.

Benefit for PIG: Offer a former untapped bio-resources and finding potential investors
Benefit for TG: Get a realistic overview about available bio-resources in the region

UC Malmö "Swedish farm products"
Meeting with Lantmännen about EPIC Logistic Tool
Present: Ellen Corke, City of Malmö and Mikael Jeppsson Head of Purchase at Lantmännen

Background from web
Lantmännen is an agricultural cooperative rooted in Swedish farming and owned by about 29,000 farmers around the country. Lantmännen's objective is to contribute to the profitability of its owners' farms and optimize the return on their capital in the association.

Lantmännen's business concept is to processes farmland resources in a responsible manner. Through their expertise and their businesses from field to fork, they lead the development of the grain value chain. Lantmännen operate in an international market in which Sweden constitutes the foundation of their business activities.

Purchase process
Lantmännen buys their resources directly from the farmers, and makes a wide range of products; from just drying the grain and sell it (in Sweden or for export) to making products to end costumers, such as flour, bread and pasta. The farmers are free to sell and deliver their resources as they like and they have two choices regarding form; either directly to a Lantmännen (or other actor storage) or otherwise they own their own drying equipment and storage facility which makes it possible to

deliver directly to costumer. Main driving force for a deal to happen is the price. Lantmännen offer several different types of agreements to the farmers that lets the farmers decide on how and when to deliver, economic risks etc. The price varies a lot over time, and the farmer sells the product to Lantmännen when the price is high, but this time point does not necessarily fits with a market demand. In these cases Lantmännen storage the crops until they have a buyer, and they also take the economic risk of any differences in the selling price.

At each of Lantmännens facilities a biomass residue is produced; straw, husk, dust etc. This waste product is also produced at each farmer. If the farmer have an animal production they use this "waste" directly (straw, hay, silage), but if they don´t they either cut it and spread it in their land, or sell it to a neighbour with animals.

Feedback on the tool

At the meeting the purpose of the tool, and possibility for Lantmännen to use it was discussed, here are some key conclusions:

- For the conventional product, the product that Lantmännen buys, there is already a very solid market base and it is also very clear how the contacts should be handled. Farmers know where to go, who to call and there is also a web based solution for them to use. Therefore they don't think the tool would add value for them as it tends to get to advanced (the grains they buy come in many different qualities, i.e. 5 different qualities for barley)
- For the conventional product Lantmännens role is important since they guarantee; good (or correct) quality, delivered in time (storage capacity) and someone to turn to with any complaints etc (safe to buy from). If trade was made directly between farmers or farmers to costumer for conventional products, this guarantee would disappear.
- The tool could be very interesting for trade between farms, trade with biomass residue. This product varies more, i.e. whether conditions can affect the harvest, and give large amounts in some periods. Many farmers that trade between farms have long term connections and know their options, but it isn't always the case and in these cases a tool such as this could really be helpful.
- Even though Lantmännen did not see a clear use area in their own business, they can really appreciate the value of such a tool for other businesses such as wood or organic residues. Their spontaneous feedback was that it gave a really good overview with the map, and the list with possible options to choose, and good that it included transport. It was easy to use as well. It seems like a good method to show a market, or market possibilities, _at unestablished markets._

Success factors and barriers

The EPIC logistic tool offers new possibilities to display the untapped bio- and waste resources in a region, potential demands and a clear calculation basis with dynamic data input and realistic logistic costs. The EPIC logistic tool has NOT the goal to exchange existing communication and business relations in the resource trade with online functionalities. Provide a section and provide information

on how the tool was tested, and how the feedback was collected – that resulted in the following findings.

The methods to implement, test and evaluate differs from the kind of use cases. In all cases, the implementation of use cases starts with the identification of the PIG. The PIG defines their Target Group and organizes in this structure the data dialog with offers and demands. The timeframe for the testing phase with support from the project partner SST was approximately 5 months. At the end of the testing phase, a final interview about the results took place.

Clarify what indicators like

In the summary of the meanings, comments and experiences concerning the practical use of the tool the following main success factors **(S↑)** and barriers **(B↓)** in technical and organizational terms can be listed: The following points are not listed after priorities because the special perspective determines the weights.

- **1.(B↓) Graphical User Interface (GUI) should be more target oriented:**
  The resource database of the tool contains currently more the 100 bio- and waste resources in different groupings. This allows to give a good overview about the bio- and waste resource potential over a region in the statistic section. The selection possibility of all resources in the tools is not optimal for the support of special target groups. . To reach the Target groups on an optimal way, the input surface should be target group oriented (Woodchips - offers and demands in a look and feel for heating and forest-background ; Waste resources more in waste handling pictures, ...)

  2. (B ↓) National particularities and languages:
  The EPIC logistic tool platform with the graphical user interface (GUI) and the resource database are currently designed in English language. To reach a wider range of users in the target groups with different backgrounds in the project countries, the national language for the GUI would be necessary.
  The norms and preferences to describe resources in detail may be different in the partner countries. That requires to observe these national particularities for the implementation of successful use cases.

- **3. (S ↑) Support for local target groups by resource managers:**
  The actors they should use the EPIC logistic tool works in different fields in his daily business. To inform these stakeholders about the EPIC logistic tool and the new possibilities in newsletters and local meetings is NOT enough to reach a critical mass on users in the platform. Important success factor for the EPIC logistic tool is a regional resource or energy manager, who works as a kind of super user and can address the special Target group with own reputation. This could be a manager on **an association or a resource dealer. The requirements of spec**ial user groups should define the further development of the tool.

- **4. (S ↑) Motivation of users - show a clear benefit by using the Tool:**
  The motivation of users to give input in the tool in form from offers and demands is IMPORTANT to get dynamic data for the platform near real time. If a business model can

display the clear benefit for a user or target group, the system will be support by these motivated users.

- 5. **(S ↑) Interfaces and mobility support:**
  To cover a critical mass of untapped and available resources in a region, alternative interfaces for data input are required. The platform supports generally different data interfaces as well as mobile devices for automatic data exchange with other IT-systems from resource producers (energy companies, biogas refineries) or via manual data input via smartphone. Promulgated aforementioned conditions (point 3) a quick and easier integration of existing dynamic resource data is possible.

- 6. **(B ↓) Business protection, shareholders influences and strategic business goals:**
  Despite the aforementioned positive conditions for using the EPIC logistic tool, the strongest barrier against giving input into the EPIC resource database are the business restrictions of companies, the shareholder structure and their interests and other strategic business factors. In opposite the public interest to show a clear overview about the resource potential of a region, the interests of a private company is primary to make business with his knowledge and trade canals. This includes the protection of these structures and avoids data input in a public canal.
  Example 1: A local city energy provider with 50% shareholders from the municipality and 50% from a global energy company with the main business "gas distribution" over his infrastructure is not interested to support biomass energy systems from competitors in his region.
  Example 2: The main business of a private disposal company is collecting waste, sort the waste and sell the waste commodities to the market over the existing trade canals. The disposal company use his special knowledge over the waste commodities for his business and will protect this and will not give any information about this business if is not regulated by law. (f.i. emission regulations)

- 7. **(B ↓) Public and private organization structures in the partner countries:**
  Additionally to the aforementioned restrictions, the cooperation between public and private organizations, enterprises and municipalities is necessary to get an optimal overview about the untapped bio- and waste resources as requirement for the good development of a circular economy. This cooperation will handled in different ways in the partner countries - from a good and long term strategic cooperation till public tenders for contracts with enterprises every two years. These different conditions have also influence of the use of a common logistic tool for a region.

Conclusions and Recommendations.

Summarising the key findings

One important objective in the development of the circular economy is the detection of untapped bio- and waste resources and their integration in effective business processes.

To reach that goal, many participants in the processes are to convincing and barriers have to overcome. This process requires time and tools to speed it up.

One usefull tool is the EPIC communication and logistic tool, that supports with innovative methods the findings and communication of partners along business with processing of untapped bio- and waste resource.

The EPIC communication and logistic tool works not alone, it is a usefull accelerator for creating new processing, but depending of the concrete situation, many others activities are necessaty to establish this new process. The 4 use cases shows good examples for different success by using that tool.

One main sucess factor is the existence of a "Primary Intersted Group" (PIG), a group of users they know the process to establish and know her Target Groups (TG) to motivate to work in this process. For this PIG, a communication and logistic tool could be very helpfull to speed up this process. Depending the concrete use case, starting on national level to border-crossing processes, different further barriers have to overcome for success.

Next steps

Based on the experiences from the uses cases of this project the following next steps are planned:

- The concept of the expansion of the resource database with many differnet bio- and waste resources and their grouping is very usefull because it gives a good overview about different resource flows in the region and supports potentials investors. To get a better overview about this flows, the active user base has to expand in the same way. To reach that goal, based on the successfull use cases, the communication interfaces of the tool has to be more tailored to the special target groups and the sucessfull functionality has to cover more regions step by step.
- This expansion process of a special use case will crossing borders and in this case it will be necessary to harmonisize different national regulations and particularities for the process.
- The motivation of users to use such a tool is a clear benefit in a business process. Thats why, a business model for providing the tool itselfs- to guarantee the further development - has to be establish.
- Additional functionalities, like "Converter-boxes" to highlight the right technologies to convert bio- and waste resources in higher quality products, will be develope with intersted PIG´s.