Delivery of sustainable supply of non-food biomass to support a "resource-efficient" Bioeconomy in Europe

## Workshop on
## Sustainable supply of ligno-cellulosic biomass in Europe
***First results and tools testing of the S2Biom project***

## On the occasion of the European Sustainable Energy Week (EUSEW)

**16 June 2015**

# WORKSHOP SUMMARY

# (Deliverable D10.8)

## About S2Biom project

The S2Biom project - Delivery of sustainable supply of non-food biomass to support a "resource-efficient" Bioeconomy in Europe - supports the sustainable delivery of non-food biomass feedstock at local, regional and pan European level through developing strategies, and roadmaps that will be informed by a "computerized and easy to use" toolset (and respective databases) with updated harmonized datasets at local, regional, national and pan European level for EU-28, Western Balkans, Moldova, Turkey and Ukraine. Further information about the project and the partners involved are available under www.s2biom.eu.

### Project coordinator

FNR
Fachagentur Nachwachsende Rohstoffe e.V.

### Scientific coordinator

Imperial College London

### Project partners

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SYNCOM
CERTH CENTRE FOR RESEARCH & TECHNOLOGY HELLAS
CPERI
IUNG
SDEWES CENTRE
INRA SCIENCE & IMPACT
CENER
circe
European Commission
CENSUS-BIO
ABE
WIP
IINAS International Institute for Sustainability Analysis and Strategy
CEI CENTRAL EUROPEAN INITIATIVE
btg biomass technology group
biomass research

## Workshop Presentations

All presentations held at the workshop are available at the project website under: http://www.s2biom.eu/en/news-events/events.html.

## Workshop Summary

The S2Biom Workshop was opened by **Ludger Wenzelides**, FNR and **Calliope Panoutsou**, Imperial College who presented a brief overview of the aims and activities of the S2Biom project.

The objective of S2Biom is to support the sustainable delivery of non-food lignocellulosic biomass at local, regional and pan-European level through developing strategies and roadmaps that will be informed by a "computerized and easy to use" planning toolset (and respective databases) with up to date harmonized data for EU28, western Balkans, Turkey, Moldova and Ukraine.

S2Biom research work covers the whole biomass delivery chain from primary biomass to end-use of non-food products and from logistics, pre-treatment to conversion technologies. The spatial level of analysis both for the toolset and the databases will be NUTS1 (country), NUTS2 (regional) and NUTS3 (local level).

S2Biom is implemented along three dedicated themes. ***Theme 1 on "Data & Tools"*** investigates current and future sustainable lignocellulosic biomass costs and supply (domestic and from imports) in EU28; Western Balkans, Moldova, Ukraine and Turkey and elaborates common operating data, models, and tools representing the entire biomass supply chain. ***Theme 2 on "Strategies & Roadmaps"*** aims at developing a vision, strategies, implementation plans and an R&D roadmap for the sustainable delivery of non-food biomass feedstocks at pan-European level based upon data provided by theme 1 and a thorough assessment of policies and regulations for supplying the future bioeconomy. Finally, theme 3 on ***"Validation and Project outreach"*** is concerned with the implementation of case studies, stakeholder engagement and education and public awareness activities.

Detailed information on the S2Biom project is available at: ***www.s2biom.eu***.

An introduction to the tools and databases developed in the framework of S2Biom – Theme 1 was presented by **Berien Elbersen**, DLO and **Nicklas Forsell**, IIASA. The following specific tools are implemented within S2Biom:

- biomass ***cost supply*** tool
- tool for viewing characteristics of ***conversion and pre-treatment technologies***, biomass hubs and yards and matching biomass to technologies
- tool for viewing ***market demand and policies*** for biomass for bioenergy and biobased products
- tool for optimal design and evaluation of ***biomass delivery chains*** and networks at local, national and European scale

These tools are embedded in a General User Interface (GUI) to facilitate easy and widespread use of S2Biom results by stakeholders. The current status of the GUI and detailed user instructions were presented by Ms Elbersen (see Fig. 1).

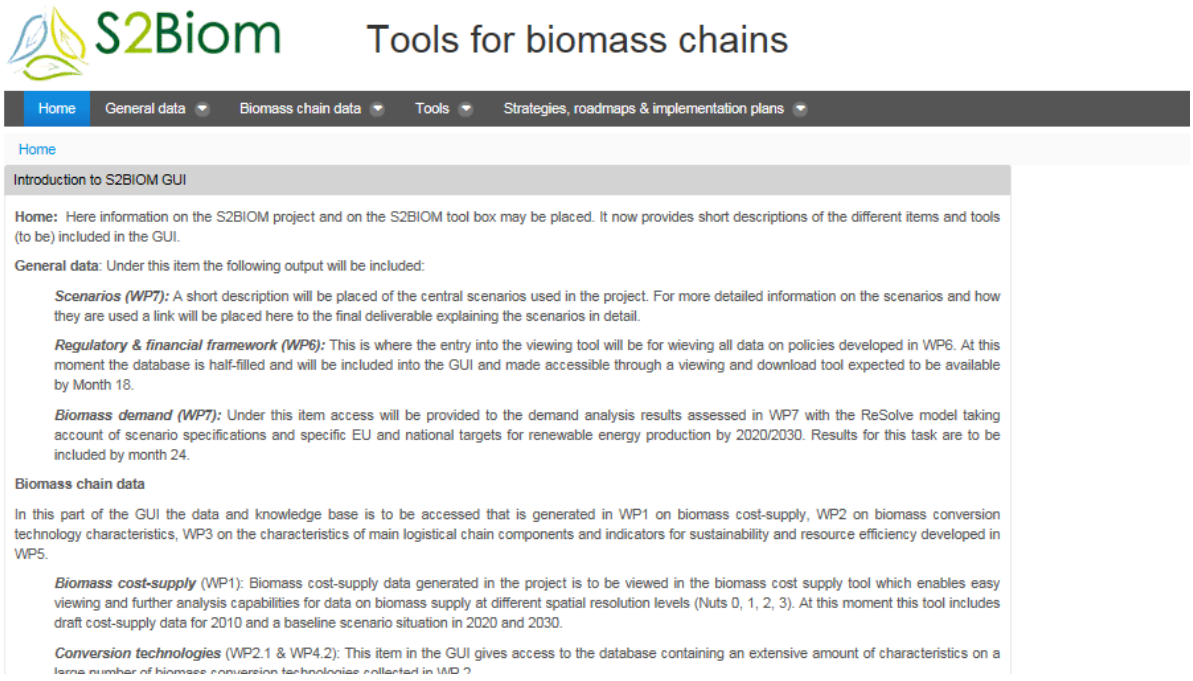


Figure 1: Screenshot of S2Biom General User Interface (GUI)

Mr. Forsell presented the tool "***BeWhere***" which is used within S2Biom for EU wide-national and regional full chain assessments. This model is commonly used to analyze the cost-competitive location of new conversion facilities, biomass collection sites and transport routes as well as technological combinations for reaching demand targets. For local assessments S2Biom employs the tool LOCAgistics that is currently developed for a selection of regions in Europe in order to evaluate the spatial implications and the environmental and economic performance of the solutions suggested by the BeWhere tool for new biomass conversion pathways.

**Panel Discussion on Methodological Approaches**

This panel discussion was moderated by **Luc Pelkmans**, VITO and involved the following panelists: **Matthias Dees**, University of Freiburg, **Douwe van den Berg**, BTG, **Bert Annevelink**, DLO, and **Berien Elbersen**, DLO.

The following ***discussion questions*** were posed to the workshop participants:

1. Now that you have seen an overview of the full toolset in S2BIOM, are there tools/data missing?
2. The cost-supply viewing tool is planned to incorporate a baseline biomass potential for lignocellulosic biomass. What are the four main criteria that need to be taken into account for quantifying the baseline potential for forest, agricultural and/or waste biomass?
3. What aspects are critical in setting up local/regional biomass delivery chains which need to be addressed in the full chain assessment tool supporting the design and environmental and economic evaluation of local biomass delivery chains?
4. What needs to be done to ensure that end-users have trust in the output of the S2BIOM toolset and start using it?

During the discussion it was highlighted that the available resource potential to be analyzed in the S2Biom tools strongly depends on "***competing uses***" which are usually difficult to quantify and may change over time due to market demand or public perception. S2Biom representatives responded that from the starting point "technical potential" the application of minimum sustainability criteria will result in a so-called "sustainable potential". From this potential only competing uses for food and feed production as well as for paper production will be subtracted.

Furthermore, the S2Biom project will ensure ***maximum transparency*** with respect to all data and assumptions used (including biomass potential as well as competing used for e.g. soil fertility vs. straw removal). Data sources (e.g. EUROSTAT or national statistics) will always be clearly indicated, thereby also facilitating continuous up-date of the data and toolsets.

It was mentioned that the BeWhere model today only includes bioenergy applications. An extension of the model to bio-based chemicals and other products of the bioeconomy is not planned, but is generally possible.

A further factor influencing the available resource potential was underlined by the workshop participants, namely the ***yield levels*** of lignocellulosic energy crops and agricultural crops (affecting the potential of residues). Yield levels are variable over time and depend on specific locations. Furthermore, they depend on the coice of crops to be planted on land available for biomass production.

Finally, the dependence of biomass cost levels on whether it is certified or not, and problems with the (EUROSTAT) categorization of wastes and by-products were brought to the attention of the S2Biom consortium.

After the coffee break **Calliope Panoutsou**, Imperial College presented an overview of the S2Biom ***Theme 2 on "Strategies & Roadmaps"*** in order to set the stage for the second panel discussion round. The following main activities will be performed within theme 2:

- Provide clarity - for industry, investors and other stakeholders - on sustainability requirements for the different value chains addressed in the project and to support the future development of an agreed methodology for the calculation of environmental footprints, e.g. using life cycle assessments.
- Provide a structured overview of all elements of economic and regulatory frameworks that relate to the sustainable delivery of non-food biomass at different levels of governance across Europe (i.e. local, regional and pan-European), and to develop coherent policy guidelines (with a set of indicators) that will allow policy makers from the respective levels of policy determination to quickly appreciate the support frameworks that exist and the most efficient ways to apply them for the future use of biomass in a sustainable manner.

- Define the optimal pathways (by employing the RESOLVE model) towards a low-carbon bio-based economy that focuses on stimulating the prioritised biomass applications from 2020 up to 2030.
- Develop a vision, strategies, implementation plans and an R&D roadmap for the sustainable delivery of non-food biomass feedstocks at pan-European level.

**Panel Discussion on Strategies and R&D Roadmaps**

This panel discussion was moderated by **Rainer Janssen**, WIP Renewable Energies and involved the following panelists: **Leire Iriarte**, IINAS, **Luc Pelkmans**, VITO, **Marc Londo**, ECN, and **Calliope Panoutsou**, Imperial College.

The following ***discussion questions*** were posed to the workshop participants:

1. How can sustainability safeguard biomass supply and foster the development of bioeconomy? Please suggest three key issues you consider of outmost importance in a cross sector sustainability framework.
2. Policy information in the tool: what information would you look for? Policy guidelines: Please suggest good practices to inform them.
3. Which is the biggest uncertainty in bioeconomy? Please suggest three biomass-to-chemical options expected to generate high demand in 2020 and 2030, estimate order of magnitude and reason why?
4. How ambitious a European Vision for lignocellulosic biomass can be? Please suggest three opportunities and three potential threats to implementation

The following key issues for a ***cross sector sustainability framework*** were identified by workshop participants:

- Soil organic content
- GHG mitigation potential (including carbon debt)
- Land use change, use of marginal lands
- Use of wastes and residues
- Land use efficiency
- Competition with food production
- Biodiversity
- Cascading use of biomass

Furthermore, it was stated that sustainability safeguards need to be applied to the whole sector (food and energy).

With respect to policies it was underlined that the implementation of measures mandating cascading use of biomass would be very difficult. Alternatively, policy options should be investigated that promote cascading use and thus “steer” markets in this direction.

With respect to the bioeconomy it was stated that biorefining processes need to be developed that minimize by-products and create value for all product streams. However, caution is needed as prices for bio-based chemicals may drop if produced in larger volumes and as it may be rather challenging to find promising markets for all bio-based products from biorefineries. On the other hand, using biomass feedstock to replace fossil resources in existing refineries often causes technical problems and leads to cost increases. In addition, today it is difficult to get credits for biomass use in existing refineries.

**Parallel Session 1: Validation and Interactive Testing**

**Peter Canciani**, CEI and **Ludger Wenzelides**, FNR moderated the session on Validation and interactive testing and presented an overview on S2Biom theme 3 on ***“Validation and Project outreach”.***

The key output of theme 3 are a number of case studies in EU28 (e.g. Burgundy, Upper Rhine Region, Miajadas and Zaragoza (Spain), Finland) as well as Western Balkan Countries, Ukraine, Moldova and Turkey launched to validate the Strategies, Roadmaps and the Toolbox (SRT) from the users’ point of view, and to gather further factual data and to support ex-ante impact assessment. Activities performed in theme 3 include:

- To involve stakeholders with a participatory approach into the development of SRT for ensuring that their needs are incorporated into the design.
- To involve stakeholders for field testing of the tool through case studies.
- To approach stakeholders along the value chain at various levels to “market” the SRT during and after testing and to support dissemination, exploration and improvements through constant interaction and feedback.

Finally, within this session interested workshop participants were invited to test the S2Bio toolset under the guidance of Berien Elbersen, DLO.

**Parallel Session 2: Market Review**

In this parallel session **Marc Londo**, ECN presented the S2Biom work package on “Integrated Assessment”. This activity provides the overall analysis, addressing the question to what extent EU biomass potential will be sufficient to meet the renewable energy targets for 2020 and beyond, and in parallel provides a basis to start a bio-based chemistry sector. Draft scenarios were developed and shared within the consortium. As key uncertainties and therefore scenario determining factors, the policy framework on sustainable biomass (and related uncertainty in biomass availability) and the nature of bio-based markets and industries (European/centralized vs local/decentralized) were identified.

Furthermore, **Marc Londo**, ECN, **Hamid Mozaffarian**, ECN and **Marco Pantaleo**, Imperial College presented information on current market size and estimates of future bio-based markets. 13 product-market combinations have been identified and are currently under review. Results so far indicate that many bio-based chemistry markets are still under development, which means that several assumptions will need to be made to estimate long-term biomass demand for these markets.

Finally, concerning the S2Biom integrated assessment of biomass-to-energy and biomass-to-chemistry routes, expansion and preparation of the analytical tool RESolve is on-going.

# Annex I – Workshop Programme

| | | |
|---|---|---|
| *9:00* | **Registration** | *Chair: Luc Pelkmans, VITO, Belgium* |
| *9:30* | **Welcome - The S2Biom project - Introduction**<br>LUDGER WENZELIDES, FNR, GERMANY<br>CALLIOPE PANOUTSOU, IMPERIAL COLLEGE, UNITED KINGDOM | |
| *10.00* | **Modelling and databases**<br>BERIEN ELBERSEN, DLO, THE NETHERLANDS | |
| *10.30* | **Panel discussion on methodological approaches**<br>MATTHIAS DEES, ALU-FR UNIVERSITY OF FREIBURG, GERMANY<br>DOUWE VAN DEN BERG, BTG, THE NETHERLANDS<br>BERT ANNEVELINK, DLO, THE NETHERLANDS<br>BERIEN ELBERSEN, DLO, THE NETHERLANDS | |
| *11.30* | *Coffee break* | |
| *12.00* | **Strategies, R&D roadmaps**<br>CALLIOPE PANOUTSOU, IMPERIAL COLLEGE, UNITED KINGDOM | *Chair: Rainer Janssen, WIP-Renewable Energies, Germany* |
| *12:30* | **Panel discussion on strategies, R&D roadmaps**<br>LEIRE IRIARTE, IINAS, GERMANY<br>LUC PELKMANS, VITO, BELGIUM<br>MARC LONDO, ECN, THE NETHERLANDS<br>CALLIOPE PANOUTSOU, IMPERIAL COLLEGE, UNITED KINGDOM | |
| *13.00* | *Lunch* | |
| *14.00* | ***Parallel Sessions*** | |
| | **Session 1: Validation and interactive testing**<br>PETER CANCIANI, CEI, ITALY,<br>LUDGER WENZELIDES, FNR, GERMANY | |
| | **Session 2: Market review**<br>MARC LONDO, ECN, THE NETHERLANDS | |
| *16:30* | **Summary and conclusions**<br>LUDGER WENZELIDES, FNR, GERMANY | |

# Annex II – List of Workshop Participants

S2Biom Workshop

Sustainable supply of ligno-cellulosic biomass in Europe

Brussels, 16 June 2015

| First Name | Last Name | Organisation | Country | Signature | Mail if not registered |
|---|---|---|---|---|---|
| Bert | ANNEVELINK | WUR-FBR (DLO) | Netherlands | | |
| Carlos | ARSUAGA | CIRCE | Spain | | |
| Melvyn | ASKEW | Census-Bio | UK | | |
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| Dirk | CARREZ | Clever Consult | Belgium | | |
| George | CHARALAMPOUS | University of Macedonia | Greece | | |
| Angelos | CHARLAFTIS | EPAPHOS ADVISORS TEAMWORK | Belgium | | |
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| Boris | COSIC | SDEWES Centre | Croatia | | |
| Matthias | DEES | University of Freiburg | Germany | | |
| Dominique | DEJONCKHEERE | Copa-Cogeca | Belgium | | |
| Nicola | DI VIRGILIO | CNR IBIMET | Italy | | |
| Sammy | EL TAKRITI | ICCT | UK | | |
| Berien | ELBERSEN | Alterra | Netherlands | | |
| Nelo | EMERENCIA | Biobased Industries Consortium | Belgium | | |
| Marc | FLEURECK | DG AGRI | Belgium | | |

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| Luca | IBELLI | Federchimica | Belgium | | |
| Leire | IRIARTE | IINAS | Spain | | |
| Rainer | JANSSEN | WIP Renewable Energies | Germany | | |
| Manolis | KARAMPINIS | CERTH | Greece | | |
| Kees | KWANT | RVO | Netherlands | | |
| Tijs | LAMMENS | BTG | Netherlands | | |
| Klaus | LENZ | SYNCOM GmbH | Germany | | |
| Marc | LONDO | ECN | Netherlands | | |
| Chris | MALINS | ICCT | UK | | |
| Hamid | MOZAFFARIAN | ECN | Netherlands | | |
| Calliope | PANOUTSOU | Imperial College London | UK | | |
| Luc | PELKMANS | VITO | Belgium | | |
| Pekka T. | RAJALA | Stora Enso Wood Supply | Finland | | |
| Virginie | RIMBERT | EC, DG AGRI | Brussels | | |
| Fabienne | SANS | Delegation of Government of Navarre | Belgium | | |
| Thomas | SCHLEKER | EC, DG Research and Innovation | Belgium | | |
| Jori | SIHVONEN | AEBIOM | Belgium | | |
| Laurent | SOMER | ValBiom asbl | Belgium | | |
| Douwe | VAN DEN BERG | BTG | Netherlands | | |

| First Name | Last Name | Organisation | Country | Signature | Mail if not registered |
|---|---|---|---|---|---|
| Francies | VAN GIJZEGHEM | ODE Bio-E | Belgium | [signature] | |
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| Ludger | WENZELIDES | FNR | Germany | G. Wenzelides | |
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