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Policy Brief: Market analysis for biobased products

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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 EU28, western Balkans, Turkey and Ukraine. Further information about the project and the partners involved are available under www.s2biom.eu.

Project coordinator



Scientific coordinator



Project partners



About this document

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Table of contents

About S2Biom policy briefs	4
Market analysis for lignocellulosic biomass as feedstock for bioenergy, biobased chemicals & materials in Europe; A quantitative estimate of biomass demand in 2020 and 2030.....	4
Summary of the outcomes	5
Conclusions and recommendations	7

About S2Biom policy briefs

S2Biom (www.s2biom.eu) is a European funded project aiming to improve evidence on the availability, cost supply, technologies and framework conditions (sustainability, policy, financing) for lignocellulosic non-food biomass in Europe¹ by 2030.

The work planned includes also a series of dedicated policy briefs to ensure effective dissemination of the project results to policy and decision makers at European, national and regional level. These are regarded as important since the project intends to provide support for the development and implementation of future policies on sustainable supply of non-food biomass.

The information presented in this policy brief is based on the market analysis performed for lignocellulosic biomass to supply bioenergy, biobased chemicals and materials in Europe.

Market analysis for lignocellulosic biomass as feedstock for bioenergy, biobased chemicals & materials in Europe; A quantitative estimate of biomass demand in 2020 and 2030

The S2Biom project provides support to the delivery of sustainable non-food biomass for energy, fuels and chemicals/materials. One of the activities in S2Biom Work Package 7 is a market review: “How much biomass demand can be foreseen up to 2030 when production of biobased chemicals and materials develops further?” The focus is on biomass demand for European production facilities (EU28, Western Balkans, Moldova, Turkey and Ukraine) and on lignocellulosic biomass feedstocks and their applications. The market review is important in two respects:

- So far, only few projections for future demand for biobased chemicals and materials are available, and none of them contains a translation back to a corresponding demand for lignocellulosic biomass.
- The key question in S2Biom WP7 is to what extent the additional demand for biomass from chemicals and materials could be sufficiently significant to influence lignocellulosic biomass prices and induce scarcity and competition issues with energy applications.

For this review, the focus is directed towards sectors that can create significant biomass demand, i.e. relatively bulky chemicals markets. Specialties and fine chemicals can have high added value and can therefore be most relevant for a biorefinery business case, but their production will not induce bulky amounts of biomass demand.

For the market analysis 10 product-market combinations (PMCs) were identified as possible significant consumers of biomass resources in the Pan-European area (**Error!**

¹ EU28, Western Balkans, Moldova, Ukraine, Turkey

reference source not found.)². The focus was to quantify the demand for biomass feedstock for these PMCs in 2020 and 2030.

Table 1 Product-market combinations (PMCs) considered within this market analysis

	Product	Market
1	Heat	District heating
2	Electricity	Power market
3	Advanced Biofuels	Transport fuel
4	C6 sugars	C6 chemistry: polymers & plastics, others
5	C5 sugars	C5 chemistry: polymers & plastics, others
6	Bio-methane	Grid, transport
7	BTX	Petrochemical industry
8	Methanol	Transport, chemical industry
9	Hydrogen	Transport, (petro)chemical industry
10	Ethylene	(petro)chemical industry

Summary of the outcomes

The projected total lignocellulosic biomass demand (PJ) for the PMCs 4-10 exclusive biomethane³ PMC in 2020 and 2030 are summarized in Figure 1.

Table 2 gives impressions of the projected amount⁴ of the lignocellulosic-based chemicals and materials in Europe. So are, for example, the projected lingo-based biopolymers & plastics in 2030 about 60% of the EU biobased polymers & plastics production in 2012. In order to produce the projected amount of bio-methanol in 2030, about 5 wood gasification plants with a thermal input of 100 MW would be required. Finally, the expected production

² Originally, three more PMCs were identified: lignin, bioethanol and mixed alcohols. Current bioplastic routes only use the cellulose and hemicellulose parts of the lignocellulosic feedstock. Lignin is a more complex resource for which less biochemical pathways are available today. It is expected, that lignin up to 2030 would mainly be used as a source of bioenergy. Bioethanol has been considered as a biofuel within the third PMC, and as a biochemical in the dehydration reaction for the production of bio-ethylene (PMC 10). The process of mixed alcohol production is still at the early stage of development. No data is found for the conversion efficiency of this process. The process is mostly developed in the USA (NREL), where the major focus lies on renewable alternatives for fossil-based gasoline. An alternative to this process in Europe is ethanol production via biochemical conversion of lignocellulosic biomass.

³ It is assumed, that biomethane would mainly be used in the bioenergy sector either as a biofuel, or for the generation of heat and/or electricity (PMCs 1-3).

⁴ Medium Scenario

of bio-hydrogen in 2020 would be enough to fuel more than 75,000 hydrogen vehicles, with average annual mileages of 11,000 km and an average hydrogen consumption of 1 kg/100 km.

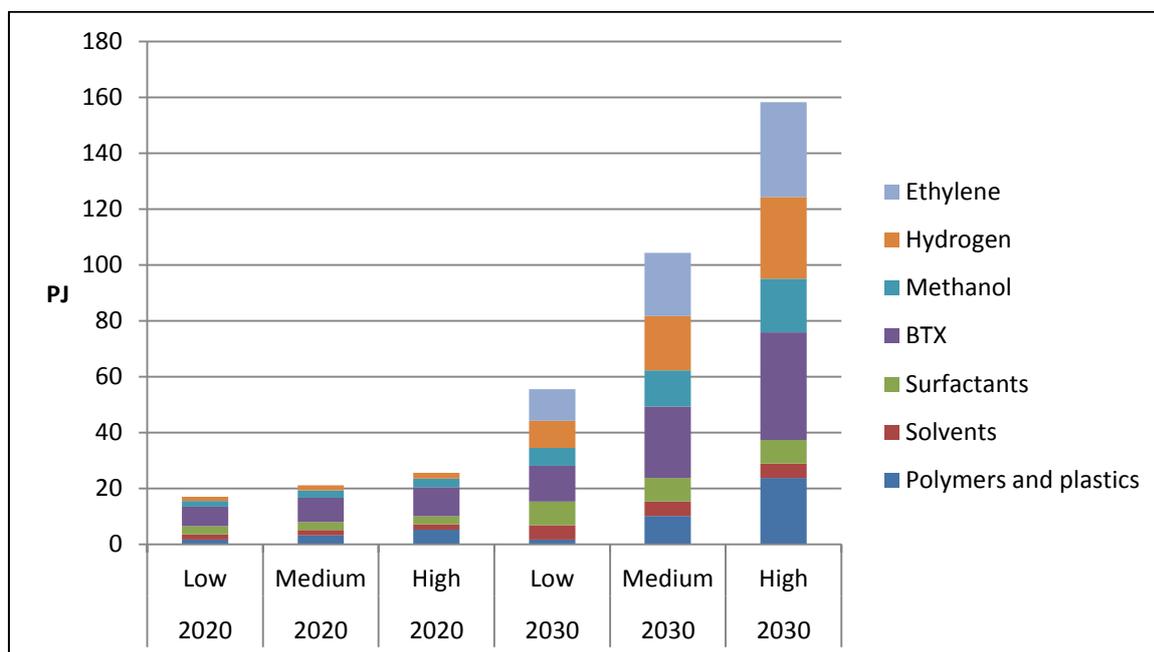


Figure 1: Projected total lignocellulosic biomass demand for PMCs 4-10 exclusive biomethane PMC

In **Error! Reference source not found.** an indicative consumption of domestic lignocellulosic biomass for the PMCs 1-3 in EU28+ is compared to the expected consumption of domestic lignocellulosic biomass for the PMCs 4-10 exclusive biomethane PMC.

Table 2: Projected lignocellulosic-based chemicals & materials in Europe

	Unit	2020	Impression	2030	Impression
Biopolymers & bioplastics	kt	77	≈20% of EU biobased polymers & plastics production in 2012	233	≈60% of EU biobased polymers & plastics production in 2012
Solvents	kt	44	7% of EU biobased solvent production in 2008	141	22% of EU biobased solvent production in 2008
Surfactants	kt	69	5% of EU biobased surfactant production in 2008	195	13% of EU biobased surfactant production in 2008
BTX	kt	150	Requires 10 wood gasification plants of 150 MW _{th} (input)	450	Requires 28 wood gasification plants of 150 MW _{th} (input)
Methanol	kt	77	Requires ≈ 1 wood gasification plant of 100 MW _{th} (input)	387	Requires ≈ 5 wood gasification plants of 100 MW _{th} (input)
Hydrogen	Bm3	0.1	Enough to fuel > 75,000 hydrogen vehicles	1.1	Enough to fuel ≈ 1,000,000 hydrogen vehicles
Ethylene	kt	0	-	185	44% of current global bio-ethylene production

Table 3 Comparison demand (PJ) lignocellulosic biomass EU28+

	2020	2030
PMCs 1-3		
Consumption of domestic lignocellulosic biomass in EU28+	5,173	7,238
Consumption of domestic lignocellulosic biomass for PMCs 4-10 exclusive biomethane PMC	21.1	104.3
	0.41%	1.44%

Conclusions and recommendations

Preliminary results indicate that demand for lignocellulosic biomass for chemicals and materials at pan European level in 2020 would be around one million tonne, increasing to less than 10 million tonnes in 2030. Based on the energy content, the demand would be around 0.4% of the corresponding demand for bioenergy and biofuels (PMCs 1-3), increasing to 1.4% in 2030. Key factors affecting this picture are the rate of technology development (both for advanced chemicals/material and for biofuels and bioenergy), the exact shaping of the supporting policy framework, and the future of the (petro)chemical industry in Europe. Besides, the oil price is a strong factor affecting the prospects for biobased chemicals and materials.