

Roadmap to a sustainable market supply of feedstock for

RESfuels up to 2030 and beyond

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Workshop Session What is a Technology Roadmap?



A Technology Roadmap is a graphic presentation of innovations and their links over time (Möhrle & Isenmann, 2017)







Q1:

Q2:

What is the vision for RESfuel feedstock regarding its quantity, quality, socioeconomic and environmental impacts?

What innovations in politics/society/economy/technology/ R&D are needed to reach this vision?

Q3:

• What is the time frame of those innovations?







- > End-product: Hybrid poplar wood chips (D3.5)
- From cradle to gate
- The underlying conversion processes are methanol and dimethyl-ether (DME) production from syngas (D3.5.)



Workshop Session Short Rotation Poplar

In 2017 (AEBIOM, 2017) :

- > 12,675 ha of poplar was cultivated in EU28.
- Germany: 5,000 ha (biggest producer)
- Poland: 3,175 ha



→ Woody biomass is likely to be the largest source of energy in the long term run. However, Europe's potential for forest and recycled wood is already utilised.







	Unit	Today	2040 and beyond
Economic impact			-
Biomass price	€/tDM	70	
Biomass quantity			
Biomass yield	tDM/ha	10 ²	15 ¹
Feedstock quality			
Moisture	w-% dry	30-40 ²	≥ 8 until ≤ 25 ¹
Lignin	w-% dry	22.9 ³	<10 ³
Carbohydrates (cellulose +	w-% dry	69.7 ³	>65 ³
hemicellulose)			
Chlorine content	w-% dry		< 0.023
Ash deformation	(DT) °C	1320 ²	>1200 ³
temperature			
Ash content	w-% dry	2 ³	≤ 1.5 ²
Nitrogen content	w-% dry	0.4 ³	< 0.33
Feed size	mm		120 ¹
Coarse Fraction	%		≤ 6 % in P31S (>45mm) ¹
Fine particles	%		\leq 5 % in P31S (<3.15mm) ¹
Bulk density	kg/m³	150 ²	≥ 150 ³

¹ ENplus http://www.enplus-

hackschnitzel.de/media/filebase/files/Downloads/DEPI_ENplus_Flyer_Hackschnitzel_web.pdf

² Pecenka, 2019, personal communication

³ S2Biom D4.5



- Ecological impact
 - Zero emissions
 - Zero nitrogen leakage
 - Neutral/positive effect on water quality
 - Neutral/positive effect on biodiversity
 - Neutral/positive effect on SOC content
- Socioeconomic Impact

Neutral/positive effect on job creation Neutral/ positive effect on consumer prices Neutral/ positive effect on local capacity development

Workshop Session Barriers related to feedstock supply D1.1



- Difficulty mobilising biomass from remote regions
- Lack of quality, consistancy and homogeinity of the feedstock
- Uncertainty regarding inputs required to turn marginal into productive land

Economic

Technical

- Competing uses results in higher feedstock prices
- High pre-treatment storage and transportation costs
- Unavailability of investments necessary for feedstock harvesting
- Lack of profitability



Workshop Session Barriers related to feedstock supply D1.1



- Lack of knowledge among farmers and forest owners
- Lack of information from farm and agricultural organizations about new crops such as perennial grasses
- > Cultural barriers to introducing new crops into a monoculture landscape

Environmental

> Lack of clarity about land availability and environmental constraints for non-food energy crops

Regulatory

Social

Lack of harmonised regulations



Zeitverlauf (z. B. 2020 - 2050)



Zeitverlauf (z. B. 2020 - 2050)









Key findings

Politics

- Long-term incentive programmes for initial investments which regard the entire bioeconomy
- SRC should be allowed to harvested next to water bodies
- Provision of consulting vouchers for dedicated energy crop cultivation









Key findings

Social

- Establish a strong network of best practice business models.
- Establish a competence centre for agricultural wood.
- Agroforestry should be *implemented as an integral part of vocational and university* education

Economy & Business Models

- Collectively grow poplar among farmers
- Cultivate multi-purpose crops e.g. woody biomass for water purification services
- Identify marginal land where poplar generates an added value due to e.g. erosion control, water protection







Key findings

Technology

- Medium sized wood chips (P45) have the best results after storing them for seven months in terms of moisture content (26%), dry matter loss (17%), and fines fraction (< 5w-%)
- Cold drying as a more energy efficient method

R&D

- · Develop poplar varieties with higher biomass density and resistance
- Development of machinery that can harvest trees which are thicker than 10 cm



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Thank you for your attention

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