FORBIO
Fostering sustainable feedstock production for advanced biofuels on underutilised land in Europe

ADVANCEFUEL – SEEMLA workshop

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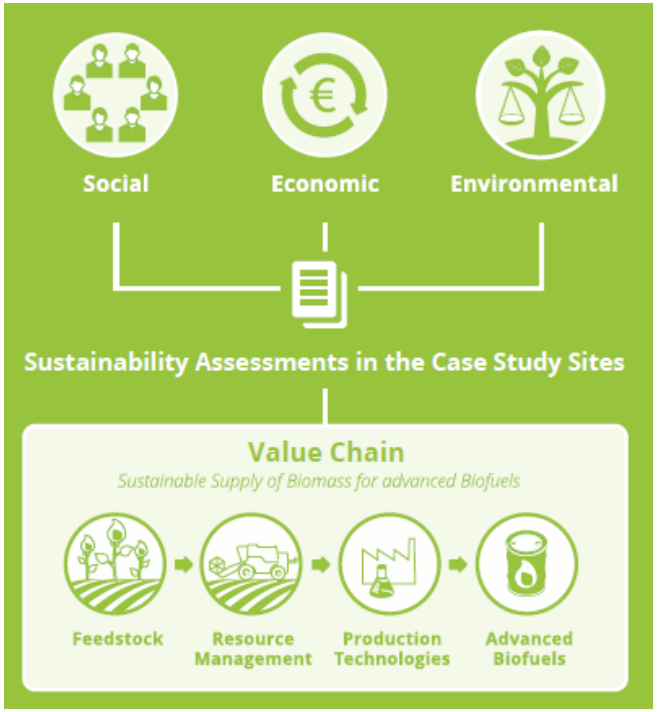
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No691846.

FORBIO objectives

- ✓ Identify social, economic, environmental and governance-related **opportunities and challenges**
- ✓ Evaluate **agronomic and techno-economic potential** of the selected bioenergy value chains
- ✓ Assess environmental, social and economic **sustainability**
- ✓ Analyse economic and non-economic **barriers to the market uptake**
- ✓ **Encourage** European **farmers** to produce sustainable biomass feedstock
- ✓ **Build capacity** of stakeholders for setting up sustainable bioenergy supply chains



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Main results

CASE 1

ITALY
Sulcis, Portoscuso

Contaminated land from industrial activities

22,000 ha

CASE 2

UKRAINE
Kyiv oblast, Ivankiv region

Underutilised marginal agricultural land

Over 20,000 ha

CASE 3

GERMANY
Metropolis region
Berlin & Brandenburg

Sewage irrigation fields & lignite mining

1,140-3,917 ha and 7,295-11,795 ha

- **Agronomic and technoeconomic feasibility studies of the case studies**
- **Potential value chains of bioenergy production on underutilised land**
- **Sustainability assessment of the most promising value chains**

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Agronomic and techno-economic feasibility studies

Country	Available land	Species	Biomass yield (ton DM / ha yr)	Assumptions for calculation of costs	Production cost
Italy	51,000 ha (70 km of biorefinery)	*Arundo donax* (Giant reed)	up to 25	Bioethanol Plant Capacity: 40,000 t/yr Production: 25 t DM/ha yr Area needed: 8,000 ha Collection radius: 40 km	71 €/ton DM yr (10 years)
Germany sewage fields	1,140 ha - 3,917 ha	Grass	3	Option 1: biogas (silage) Option 2: Amino acids and biogas	1.7 M€ /20 years 2.3 M€ /20 years
	1,140 ha - 3,917 ha	*Miscanthus x giganteus*	5-25	Chips for heat/electricity Production: 15 t DM/ha yr Area needed: 1,140 ha Collection radius: 3-14 km	13.1 - 17.7 M€ /20 years
Germany reclamation sites	7,295 ha - 10,095 ha	*Sorghum bicolor/ sudanense & Medicago sativa (Luzerne)*	3-17 1-11	Biomethane Prod: 10 & 5 t DM/ha yr Area needed: 2,431;3,648 ha Collection radius: 8-48 km	85.1 M€ / 20 years

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Sustainability assessment

	Indicators
Environmental 	• Air quality (GHG) • Soil quality (erosion, soil organic carbon SOC) • Water use and efficiency • Water quality • Biodiversity • Land cover and LUC
Social 	• Land tenure • Jobs in the bioenergy sector • Changes in income • Energy access
Economic 	• Productivity • Gross Value Added • Infrastructure • Capacity of use of bioenergy

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Sustainability assessment

Italy	
	• Air quality (GHG): ↘ 64 % GHG LCA on rainfed and ↘ 69 % GHG on irrigated (enzymes production off-site is responsible for a considerable share) • Soil quality (erosion, soil organic carbon SOC): Favorable impact ↘ SOC losses • Water use and efficiency: rainfed biomass production requires no irrigation water but is 13% less efficient than irrigated biomass production in terms of amount of water required per unit of energy generated (↘64% sediment loading, ↘51% N losses, ↗5% surface runoff),) • Land cover: ↘ loadings of pollutants in the bodies of water • Biodiversity: Positive impact
	• Land tenure is not an issue • Jobs in the bioenergy sector: 800 – 1,350 direct jobs depending on the irrigation management choice, permanent and skilled • Changes in income: Positive compared to the current conditions • Energy access: + 17% access to renewable liquid fuels, 28,000 household benefitting by district heating
	• Productivity: Great productivity performances • Gross Value Added: not feasible at current ethanol market prices. International ethanol prices strongly affect economic feasibility of the advanced biofuel value chain (e.g. 06/'17's = feasible; 06/'18's = not feasible) • Infrastructure: adequate and functional • Capacity of use of bioenergy: adequate margin for absorption of the produced sustainable renewable fuel

Sustainability assessment

Germany	Sewage irrigation: Grass => CH4 and chemicals	Reclamation: Lucerne & Sorghum => CH4
	• Air quality (GHG): ↘ 84%/unit of energy if no CH4 leakage • Soil quality: SOC slightly decreases • Water use and efficiency:Water performances of the biomethane value chains are positive • Land tenure: Strong limitations exist for the landscape planning and deployment of large scale biomass production in the target area	• ↘80% /unit of energy if no CH4 leakage • SOC highly increases due to highly organic fertilisation regime • Water performances of the biomethane value chains are positive • Strong limitations exist for the landscape planning and deployment of large scale biomass production in the target area
	• Jobs in the bioenergy sector: Minimal impact on jobs • Changes in income: Income is limited to the small number of stakeholders directly involved in the value chain • Energy access: Biomethane increase access to this form of renewable energy to about 1.5% of the national population	
	• Feasible only if produced chemicals are taken into account • Capacity of use of bioenergy: return at least 5.4 units of energy produced per each unit of energy employed	• Feasible with incentives • Capacity of use of bioenergy: return at least 5.4 units of energy produced per each unit of energy employed

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Knowledge transfer & Capacity building

Country		Info days		Capacity building	
		In target region	In another region	First event	Second event
Target countries	Italy	13-14 October 2016, Carbonia, Sardinia	20 June 2018, Rome	7 June 2018, Cagliari, Sardinia	19 September 2018, Ferrara
	Ukraine	12 December 2017, Kiev	16 May 2018, Cherkasy	21 February 2018, Kiev	17 May 2018, Cherkasy
	Germany	6 September 2017, Finterwalde	27 June 2018, Potsdam	7 April 2018, Goßmar	12 June 2018, Neuperhain
Outreach countries	Belgium			22 May 2018, Westmalle	28 July 2018, Libramont
	Poland			24 May 2018, Warsaw	04 September 2018, Płońsk
	Romania			18 July 2018, Bacau	31 August 2018, Targoviste
	Hungary			6-7 June 2018, Gödöllő	
	United Kingdom			6-7 June 2018, Lincoln	

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Barriers

- ✓ Lack of **better policy, market support and financial frameworks**, notably at national, regional and local level
- ✓ **Financial security of farmers business** (long term vs. short term contracts with farmers)
- ✓ **Access to credit** (loans, microloans, equity, other forms of financing for innovative value chains)
- ✓ **Incentives** (tax breaks, tariffs, etc.)
- ✓ **Capacity development** of local actors
- ✓ **Profitability** (market conditions for biomass production, costs & revenue analyses, etc.) on marginal lands

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Announcements

BIOPLAT-EU introduction: Promoting Sustainable Use of Underutilised Lands for Bioenergy Production through a Web-Based Platform for Europe

FORBIO Final workshop – 27 November 2018, Rome, Italy

More information: www.forbio-project.eu

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Thank you for your attention!

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