BIOMASS FROM MARGINAL LAND AND BIOENERGY VILLAGES: FORBIO AND BIOVILL

FINAL WORKSHOP OF THE SECURECHAIN PROJECT

7 June 2018, Brussels, Belgium

presented by Dominik Rutz

FORBIO

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

Duration: 01/2016-12/2018

www.forbio-project.eu

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WIP RENEWABLE ENERGIES

PROJECT CONSORTIUM

WIP Renewable Energies

Contact: Rainer Janssen, Cosette Khawaja, Dominik Rutz

Food and Agriculture Organisation of the United Nations

Contact: Marco Colangeli, Lorenzo Taverno

Geonardo Environmental Technologies Ltd.

Contact: Ömer Ceylan, Peter Gyuris, Attila Udersky

Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria

Contact: Guido Bonati

Biochemtex Spa

Contact: Stefania Pescarolo

Blacksmith Initiative - UK

Contact: Valeriia Kovach

Scientific Engineering Centre "Biomass" Ltd

Contact: Oleksandra Triyboi

Center for Promotion of Clean and Efficient Energy

Contact: Nicoleta Ion

Forschungsinstitut für Bergbaufolgelandschaften e.V.

Contact: Dirk Knoche, Raul Köhler

Polish Biomass Association

Contact: Maria Smietanka, Magdalena Rogulska

European Landowners' Organization

Contact: Marie-Alice Budniok

University of Limerick

Contact: JJ Lehay

FOR BIO

MAIN OBJECTIVES

- Demonstrate the viability of using land in Europe for **sustainable bioenergy feedstock production** that does not affect the supply of food and feed
- Develop a methodology to assess the sustainable bioenergy production potential on available **“underutilized lands” in Europe** (contaminated, abandoned, marginal, fallow land etc.) at local, site-specific level.
- Produce multiple **feasibility studies** in selected case study locations in three countries.

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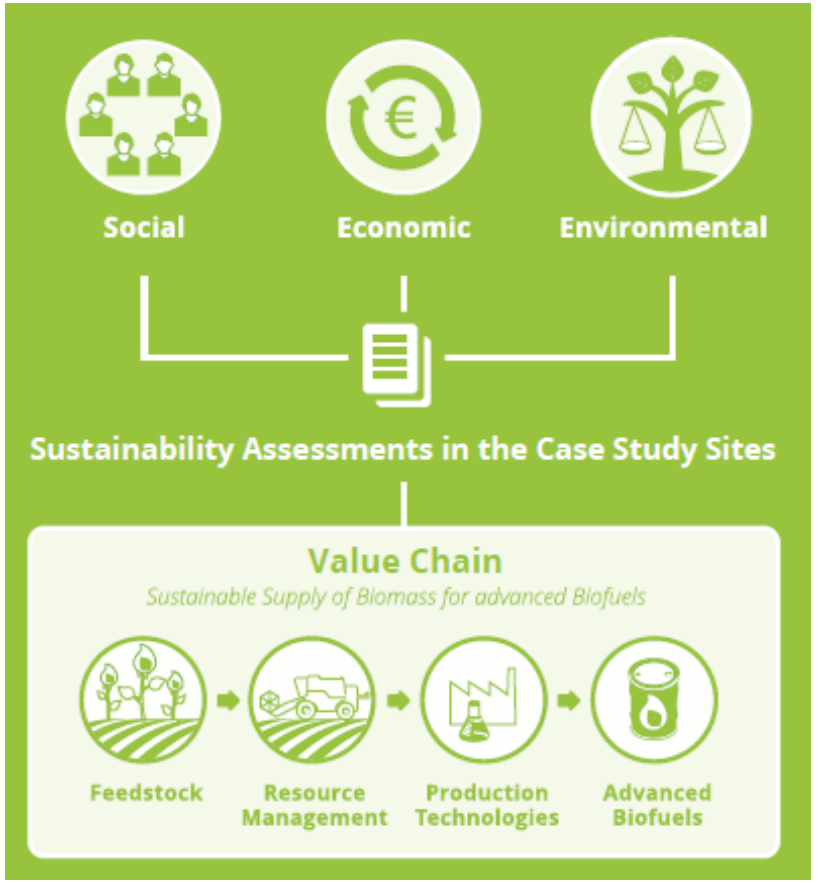
OBJECTIVES

- ✓ 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



CASE STUDIES

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, technoeconomic feasibility studies and s 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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Italian Case Study

Contaminated land from industrial activities in Sulcis district, south-west Sardinia

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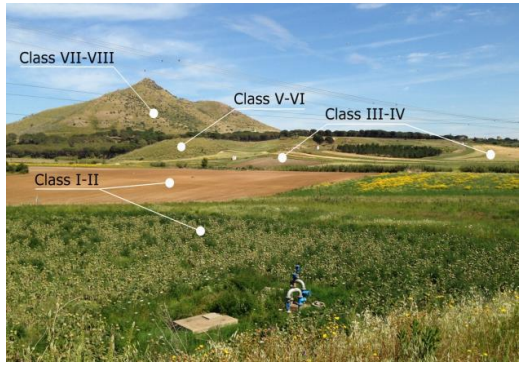
LAND AVAILABLE FOR ENERGY CROPS BASED ON GIS EVALUATION RESULTS

- **51.000 ha** could be available hypothesizing a supply radius of 70 km to the biorefinery
- In the most contaminated area approximately **1.000 ha** are available. The area is unequipped for irrigation, thus most suitable for rainfed crops such as those identified in this study
- GIS-based evaluation suggest a potential to increase the production of **2G** biomass crops without impacting significantly on food crop production



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PROMISING ENERGY CROPS (SELECTION)

Species	Biomass yield (Mg DM $ha^{-1} yr^{-1}$)	Comments on usage, experience and cultivation
Arundo donax *(Giant reed)*	up to 25	Low nutrient input, water use efficiency, carbon storage potential. Potential disadvantages are related to invasiveness
Piptatherummiliaceum L. (Smilo grass)	26-45	Low nutrient input, but need further investigation
Dactylis glomerata L. (Cocksfoot)	16-20	Low nutrient input, but need further investigation
Silybummarianum L. Gaertn. *(Milk thistle)*	9-20	Shows high adaptability for Mediterranean environments (rainfed), good yield even under non-irrigated conditions on alcaline soils

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VALUE CHAIN:
ARUNDO DONAX FOR BIOETHANOL PRODUCTION (10 YEARS)

Input data	
Plant Capacity	40,000 tons/year
Mean biomass productivity	25 Mg DM ha^{-1} yr^{-1}
Area needed for biomass production	8,000 ha
Collection radius from the plant	40 km

Costs	€/ha year	€/Mg DM year
Landowner fee	600	24
Irrigation fee	210	8.4
Fertilisation costs	100	4
Annual maintenance	80	3.2
Harvesting	332.5	13.3
Pro-anno installation + eradication costs	15	0.6
Pro-anno drip irrigation investments	132.5	5.3
Capital remuneration (2.5%)	2.5	0.1
Supply chain management	50	2
Transport (40 km)	250	10
TOTAL COSTS	**1,772.5**	**71**
	11.23 €/Gj year	**40.4 €/MWh year**

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

BioVill

Increasing the Market Uptake of Sustainable Bioenergy

Bioenergy Villages (BioVill) - Increasing the Market Uptake of Sustainable Energy	
Objective	Support the development of regional bioenergy concepts and the establishment of bioenergy villages in Croatia, Macedonia, Romania, Serbia and Slovenia by transferring existing experiences from Austria, Germany and other European countries to the partners in South-East Europe
Duration	03/2016 – 02/2019
Target Countries	Austria, Croatia, Germany, Macedonia, Romania, Serbia, Slovenia

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PROJECT CONSORTIUM

- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Germany
- WIP Renewable Energies, Germany
- Klimaschutz und Energieagentur Baden-Württemberg GmbH, Germany
- Austrian Energy Agency, Austria
- Regional Energy Agency of North-West Croatia, Croatia
- International Centre for Sustainable Development of Energy, Water and Environment Systems Zagreb - Office Skopje, Macedonia
- Green Energy Association, Romania
- Slovenian Forestry Institute, Slovenia
- Standing Conference of Towns and Municipalities, Serbia

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THE CHALLENGE

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HOW TO ADDRESS THIS CHALLENGE?

Transferring existing experiences from Austria, Germany…

…to South-Eastern Europe

Developing regional bioenergy concepts and **bioenergy villages** in Croatia, Macedonia, Romania, Serbia and Slovenia

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WHAT IS A BIOENERGY VILLAGE?

…a village, municipality, settlement or community or a part of it, which supplies most of its energy for electricity and heating from local biomass, e.g. From agriculture, forestry and waste, and from other renewable energy sources.

It usually combines several energy technologies, such as woodchip boilers, pellet stoves, logwood boilers, biogas plants, combined heat and power plants, and sometimes also solar, thermal and wind energy. Often, a local district heating grid distributes the heat to the consumers.


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KEY CHARACTERISTICS OF A BIOENERGY VILLAGE

Sustainability:	The biomass feedstock is produced locally and in a sustainable way.
Energy Self Sufficiency:	A large share of the electricity and heat demand is covered by locally produced biomass and other renewable energies.
Local Ownership:	The business model allows consumers, farmers and forest owners to become shared owners of the installations.
Regional Development:	The added value remains within the village and supports the local and regional economic development.
Public Participation:	The creation and management of the bioenergy village is based on a high level of public participation.
Resource Efficiency:	The energy concept of a bioenergy village includes also energy efficiency and energy saving measures.

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PROJECT OBJECTIVES

Specific Objectives

1. **5 villages** have developed the institutional set-up and energy management concept for **becoming a bioenergy village.**
2. **Mobilization of at least 62 GWh/year heat and power** based on solid biomass in at least 5 target villages based on the exchange of European best practices.
3. **Increase public acceptance** of sustainable bioenergy and **raise public awareness** on commercial opportunities.
4. **Capacity Building** of users and key actors in business and legislation

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CORE ACTIVITIES

1. National and local **framework analyses** (policies, legislation, stakeholder landscape)
2. **Technological and economic assessments** of local bioenergy value chains
3. Development of the **institutional set-up** and business models including ownership and operation models for the potential bioenergy villages
4. **Capacity building** on financing schemes and business models
5. Implementation of a **multi-stakeholder approach** to foster the **active participation of citizens** and **stakeholders** in the planning and implementation process.


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SITUATION IN THE TARGET VILLAGES:
DOLE PRI LITIJI, SLOVENIJA

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TECHNICAL CONCEPT
DOLE PRI LITIJI, SLOVENIJA

Heat production	
Network length:	890 m
Connected consumers:	18
Annual energy sale:	493 MWh/a
Fuel type:	Wood chips
Main boiler capacity:	0,45 MW
Backup boiler capacity:	Not considered
Peak load :	0,45 MW
Biofuel demand:	752 MWh/a
Operating hours:	1.390 h/a
Expected Service Life	25

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ECONOMIC RESULTS
DOLE PRI LITIJI, SLOVENIJA

Heat production	
Initial investment:	415.000 EUR
Subsidies:	214.700EUR
Reinvestment (year 2039):	120.000 EUR
Expected heat price:	85 EUR
Revenue energy sale:	44.400 EUR/a
Net Present Value:	18.900 EUR
Internal Rate of Return:	7,3 %
Biofuel price:	17,9 EUR/MWh
Revenue biofuel sale:	13.400 EUR/a

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SOCIO-ECONOMIC & ENVIRONMENTAL IMPACT
DOLE PRI LITIJI, SLOVENIJA

Heat production	
Amount of bioenergy:	752 MWh/a
Local share of bioenergy:	64 %
Plus of bioenergy:	+ 189 MWh/a
Plus of bioenergy share:	+ 6 %
New full-time jobs:	1
Cost savings Consumer:	35-56 EUR/MWh
GHG emission reduction:	47 t CO_{2eq}/a

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CHALLENGES

Current major challenges or the of the implementation of the bioenergy villages in the target countries are, e.g.

- Low world oil/gas prices, thus often low prices for heat (per kWh)
- Often, subsidies for fossil fuels and electricity in the target countries
- Wood is sometimes not seen as a marketable resource which has a value (citizens heat with their own wood “free of charge”)
- Lack of political interest & support programmes in some of the target countries
- Sometimes low credit security of municipalities in target countries
- Lacking willingness of municipalities to take out loans
- Sometimes lacking trust of citizens in district heating due to negative experiences
- Lack of cooperation experiences (between citizens, between municipalities and businesses)
- Usually, low awareness, still too less information and knowledge on bioenergy topics
- Lack of available technologies for reasonable prices

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THANK YOU FOR YOUR ATTENTION

Dominik Rutz: dominik.rutz@wip-munich.de
Cosette Khawaja: cosette.Khawaja@wip-munich.de
Rainer Janssen: rainer.Janssen@wip-munich.de

WIP – Renewable Energies
Sylvensteinstrasse 2
81369 Munich, Germany

www.wip-munich.de