

THE MUSIC PROJECT

MARKET UPTAKE SUPPORT FOR INTERMEDIATE BIOENERGY CARRIERS -THE MUSIC PROJECT (HORIZON 2020)

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THE MUSIC PROJECT – INTERMEDIATE BIOENERGY CARRIERS

Intermediate Bioenergy Carriers (IBCs) are densified biomass 'energy' – similar to coal and oil. IBCs are easier to store, transport and use than regular biomass.

In the **MUSIC project**, the market uptake of IBCs is facilitated, by developing feedstock mobilisation strategies, improved cost-effective logistics and trade centres.

- Duration: September 2019 February 2023
- Budget: ca. 3M €
- Website: <u>https://www.music-h2020.eu/</u>





THE MUSIC PROJECT – CONSORTIUM

WIP RENEWABLE ENERGIES

Renewable energy advisory SME's



btg 🧨

biomass technology group





Member organisations



Case study partners (economic actors)







FRAMEWORK ASSESSMENT

- Industrial surveys (one each on TB, PO & MO) to establish key drivers and barriers to IBC market uptake
- Forward and backward casting to assess IBC market potential
- Summary paper for policy makers, synthesising the knowledge and insights gained from desk research, case study development, expert interviews and online workshops
- *Fit for 55* suites of proposals (published July 2021 & Dec 2021) were assessed for their relevance for MUSIC's IBCs
- Policy framework subject to changes





STRATEGY DEVELOPMENT, LINKED TO CASE STUDIES

Strategy development, linked to case studies

- IBC supply chain descriptions
- Analysis of hindrances and enablers of IBC supply chains
- Direct interviews with regional stakeholders and more determined discussions at workshops, fairs and round tables to assess
- Factors defined through PESTEL+ (Political, Economic, Social, Technological, Environmental, Legal) analysis are sorted into enablers and hindrances
- Enablers and hindrances were allocated to SWOT/TOWS tables
- Strategies were defined by combining these. e.g
 - Opportunity: Pyrolysis oil industry can create new value chains for local forest companies and regional companies
 - Strength: Fast Pyrolysis increases energy density and reduces transport costs
 - Forestry industry/refineries should invest in FPBO plants because it enables using their own resources in own plants, thus establishing regional value chains, and reducing dependence on imports.



LOGISTICAL MODELS

Development of **biomass mobilisation and chain optimisation software tools** to assess regional biomass flows and facilitate regional biomass trade towards IBCs in case study regions

- Various GIS-models to determine e.g. potential biomass availability, optimise biomass (residues) supply, assess costs of biomass logistics, and/or siting of IBC facility
- For Greece: Smartphone app 'binter', connecting farmers, collectors/transporters & final users





VALUE CHAIN ASSESSMENT CASE STUDIES

Elaboration of value chain assessment in four case study regions (Sweden/Finland, Italy, Greece, and International)

- Case studies investigating: cost-effective logistics, feedstock mobilisation strategies and trade centres)
- Aspects covered: Technology, Markets, Biomass availability and pricing, Value chain description and location of plants, Logistics, GHG emission reductions, Economic Feasibility.
- Strong industrial participation

Case type	Biomass	RE generated	IBCs
	mobilised	(TJ/year)	(t/year)
	(t/year)		
Advanced	802.778	4.660	164.000
Strategic	2.514.815	17.328	913.333

MUSIC impacts - quantitative indications



CASE STUDY: SWEDEN/FINLAND

• Concept: Production of pyrolysis oil (192 kton/year) in eight plants, followed by transport to the Netherlands and upgrading to marine biofuels.





- Logistic aspect:
 - Costs for PO transport are substantial (ca 60 Euro/tonne, ca 15% - 20% of total cost price PO).
 - 'Port-to-port' bulk transport is preferable above alternatives (e.g. via a hub, containerized)
 - Hydrogen supply is important both economically and for the sustainability of the value chain. Using sustainable hydrogen reduces the costs per tonne of CO2 abatement.



CASE STUDY: ITALY

- Concept: Conversion of agricultural residues in Microbial Oil for transport fuel production in ENI refineries in Gela and Porto Marghera
- Target production of 100 kt/year MO, roughly equivalent to 700 kt/year dry biomass
- Target Italian regions: Sicily and Veneto
- GIS modeling to determine plant siting/costs
- Results:
 - Biomass availability is sufficient for target capacity
 - Central MO-production sites preferable to decentral ones
 - Overall costs are in line with costs for other biofuel production technologies from lignocellulosic materials







CASE STUDY: GREECE

- Overall concept
 - Overall goal is developing a value chain for torrefaction of biomass and supplying it to various district heating plants/other industrial end users to replace lignite coal
- Results
 - Analysis of agricultural practices
 - Analysis overall supply
 - Simulate torrefaction process
 - Aspen+ model, adjusted for types of biomass, etc.
 - Optimize supply chains and production
 - Logistic GIS model, supply optimization model, sensitivity analysis
 - Costs for supplying torrefied material to the factory gate have been determined at 38 Euro/MWh





CASE STUDY: INTERNATIONAL

- Concept: Use of torrefied biomass in ArcelorMittal sites across Europe.
- Results
 - Investigating feasibility of non-wood feedstocks due to stiff competition for renewable biomass streams (waste wood).
 SRF and RDF identified as alternative
 - Direct replacement of coal is feasible up to 2%-4% of coal input
 - 30.000 tonne/year Torero plant reactor installation is on-going
 - Feedstock requirements for 60% replacement of coal at AM sites in EU has been determined at ca. 1.6 million tonne/year



WHITE PAPERS

- Three White Papers were published at <u>https://www.music-h2020.eu</u>
- Concise and accessible overview of the technologies, status, applications, benefits and market prospects
- Also available as hardcopy (limited edition)



THANK YOU FOR YOUR ATTENTION!

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Market Uptake Support for Intermediate Bioenergy Carriers



MUSIC Workshop: The Role of Intermediate Bioenergy Carriers

23 November 2022 | 11:15 - 15:00 | European Bioenergy Future Conference





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