MUSIC
Market Uptake Support for Intermediate Bioenergy Carriers

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: https://www.music-h2020.eu/

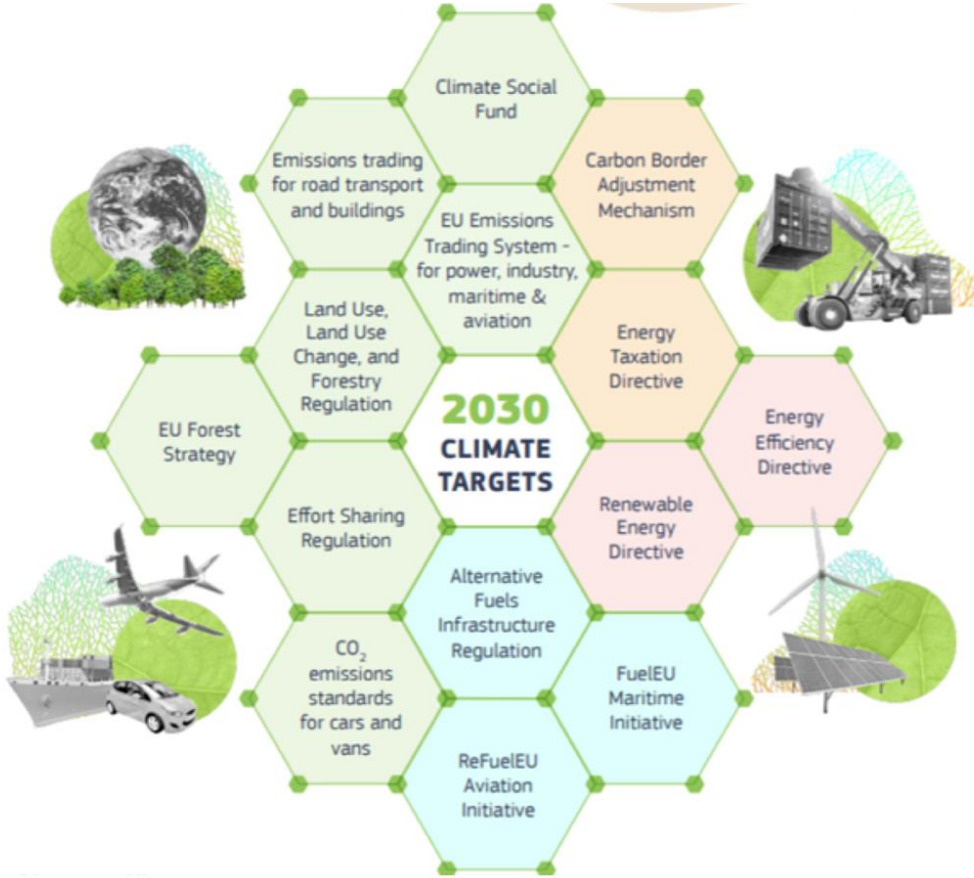
Torrefied biomass

Pyrolysis oil

Microbial oil

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

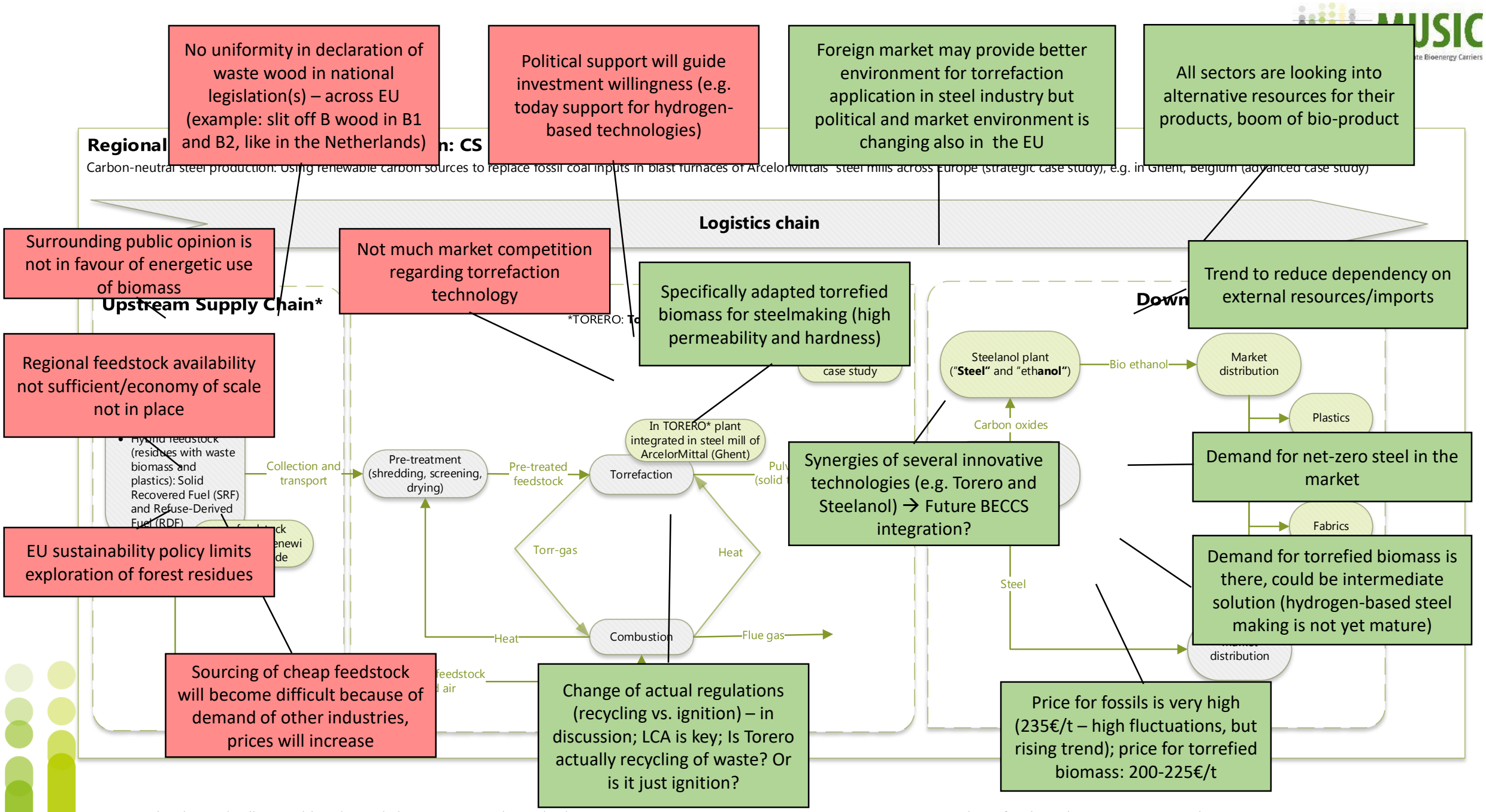


STRATEGY DEVELOPMENT, LINKED TO CASE STUDIES

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 can be allocated to SWOT/TOWS tables

Next slide: Sample result (supply chain scheme)



Factors hindering (red) & enabling (green) the International supply chain.

Source: Konrad Siegfried, Linda König, DBFZ gGmbH

STAKEHOLDER ENGAGEMENT EVENTS

Regional Stakeholder Engagement

- Series of Regional Stakeholder Engagement workshops, linked to case studies
- Forthcoming: free in person networking event **Bio-economy in a net-zero European industry** @ Deutsches Biomasseforschungszentrum (DBFZ) in Leipzig, 30-31 May

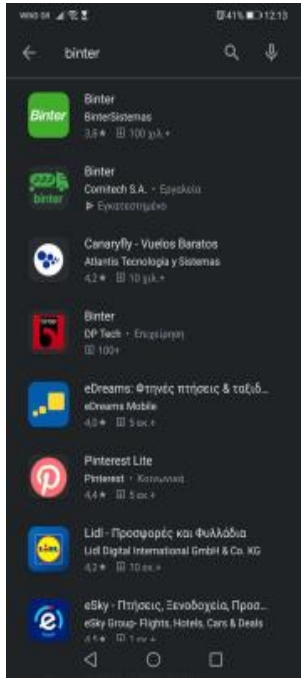
Industrial Working Groups (IWG)

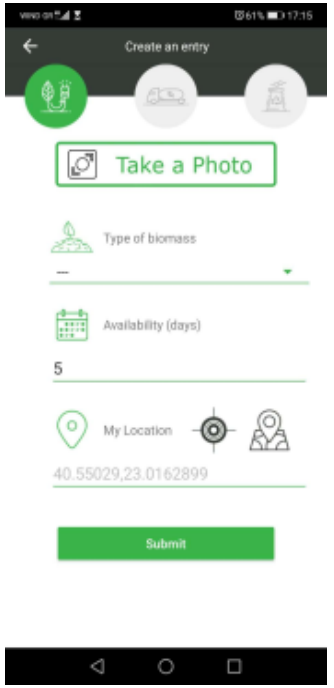
- Focusing on Energy intensive industries, Maritime transport and Aviation transport
- Forthcoming: free online workshop on "**Use of advanced biofuels to decarbonise maritime transport**" @ EUBCE conference, Thursday 12 May 2022 (15.00 – 17.00) - https://www.eubce.com/hostedevents/music-workshop-use-of-pyrolysis-oil-and-other-advanced-biofuels-to-decarbonize-maritime-transport/

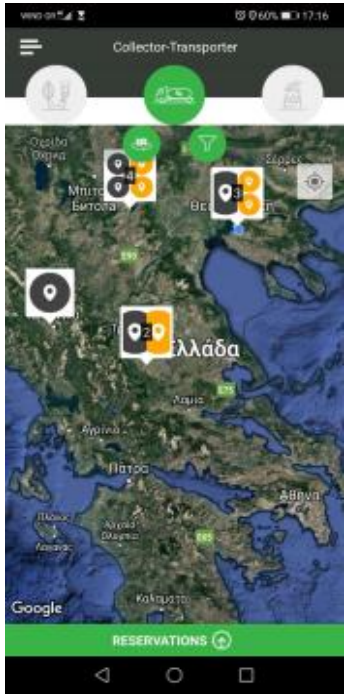
LOGISTICAL MODELS

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







‘BINTER’ APP (BIOMASS INTERMEDIATES)

Binter is available in **Google Play Store** for free

A smart phone app tool

Platform for mobilising biomass resources

Easy and simple for the average use

Beta testing/pilot stage

W.Macedonia/ Any region with high biomass potential

Android app/ Available through Google Play Store

Farmers: gain an alternative disposal option for their residual biomass

Collector/ transporter: identifies new opportunities by transporting biomass from farmers to end users (IBC plants)

End users:

Gain access to significant quantities of biomass from nearby areas

The coordination of users is done through is done through the binter app with the possibility of direct phone call after “matching” completion

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

MUSIC impacts - quantitative indications

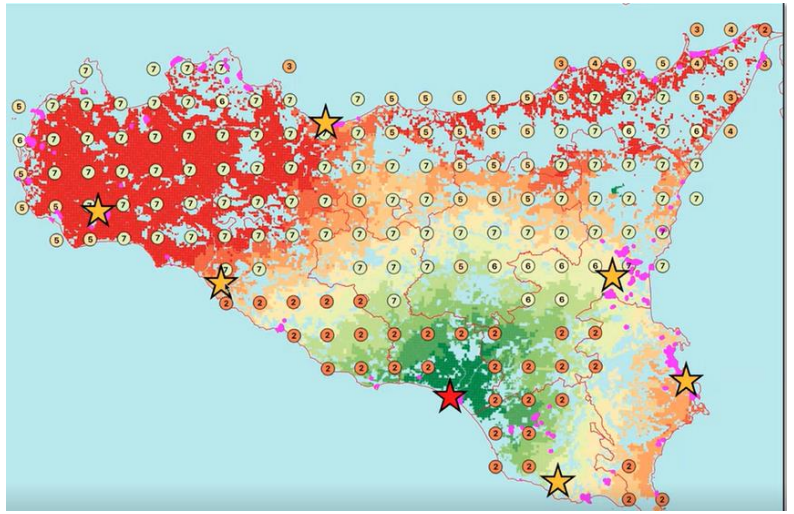
CASE STUDY: SWEDEN/FINLAND

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

- Results:
  - 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)
  - Substantial amounts of hydrogen are needed. Costs per tonne of avoided CO_2 are lower for 'greener' hydrogen

CASE STUDY: ITALY

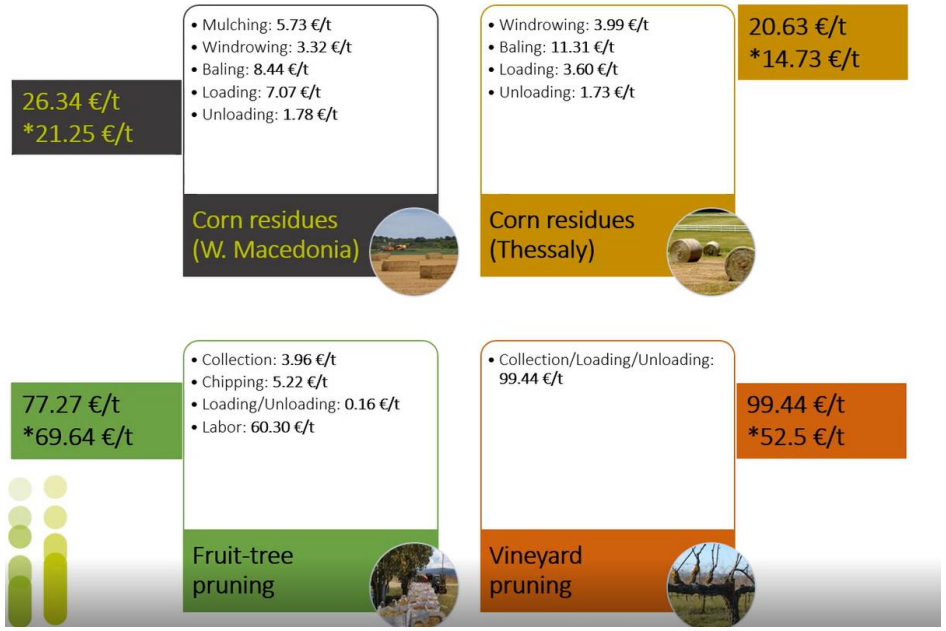
- Concept: Conversion of agricultural residues in Microbial Oil for transport fuel production in ENI refineries in Gela and Porto Marghera
- Target production of 100 kt/year MO, roughly equivalent to 700 kt/year dry biomass



- 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%
  - 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

THE MUSIC PROJECT – WHAT'S STILL IN STORE?

Selected MUSIC activities

- **Case studies:** synthesis, lessons learned and impact analysis
- Series of **White Papers** (one per IBC)
- **Prospects/perspectives of IBC use** in targeted sectors: power and heat sector; maritime shipping sector; steel industry; large-scale pellet production sector
- **Guidance document** for IBC project development
- **Engagement activities**: (a) regional stakeholder workshops in Italy, Greece, Sweden; (b) Industry Working Groups meetings; (c) final dissemination workshop linked to European Bioenergy Future (Oct/Nov 2022, Brussels), etc.
- **Business mission/s**
- **Policy recommendations**
  - at national and EU level
  - on IBCs and advocacy work

THANK YOU FOR YOUR ATTENTION!

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