Energy Intensive Industry:
Using Biomass to Reach Carbon Neutrality by 2050

26 October 2021 | 14:00 - 16:00 CEST

Webinar

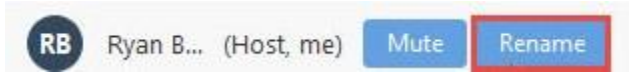
Bioenergy EUROPE

MUSIC
Market Uptake Support for Intermediate Bioenergy Carriers

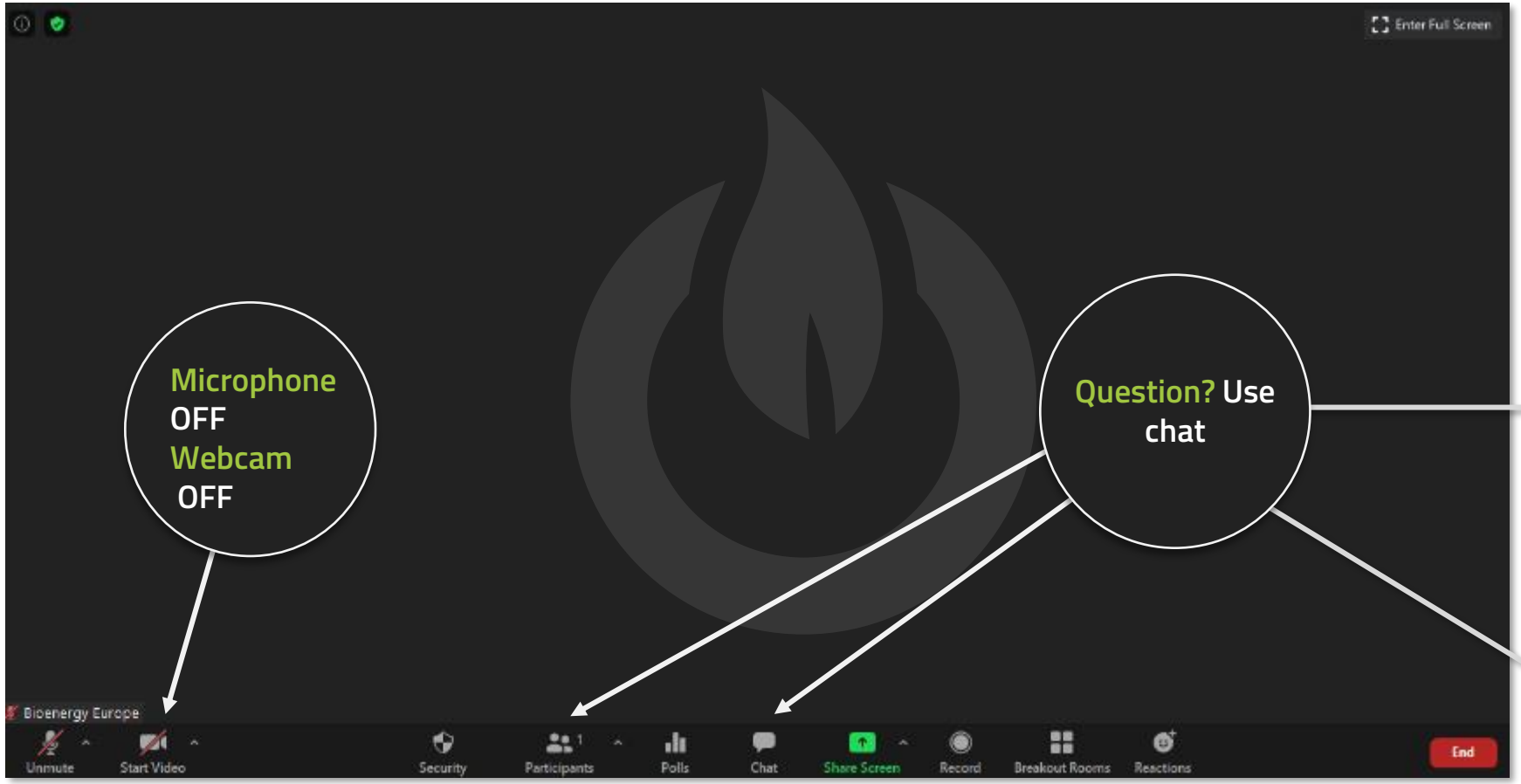
RE4INDUSTRY

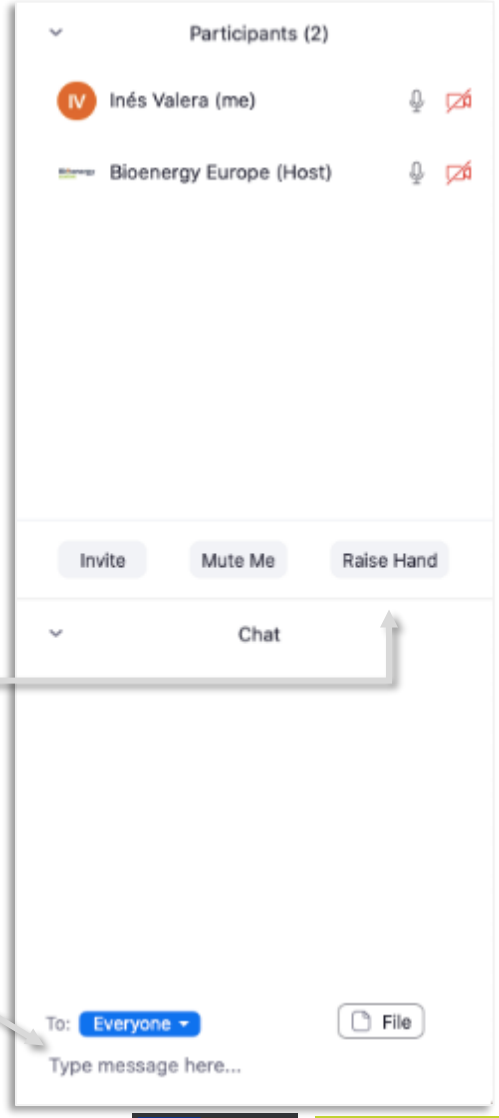
Before we start....

Participant tag: add your first name & last name



Technical issue? use the chat or email Francisco Matias (lourencomatias@bioenergyeurope.org)





This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N.952936.
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Agenda of the Day

Energy Intensive Industry: Using Biomass to Reach Carbon Neutrality by 2050

26 October 2021 | 2:00 – 4:00 PM

Webinar

2:00 PM Welcome – Jean-Marc Jossart, Bioenergy Europe

2:15 PM Introduction to biomass usage in Energy Intensive Industry

POLICY FRAMEWORK

EU policies supporting the decarbonization of EII industries
Heiko Kunst, Deputy Head of Unit, EC DG Climate Action

BIOMASS SUPPLY AND USE

Biomass use for industrial processes – an overview
Olle Olsson, Team leader, IEA task 40

ROADMAPS ENERGY INTENSIVE INDUSTRIES

Cement industry – 2050 carbon neutrality roadmap
Nikos Nikolakakos, Environment and Resources Manager, CEMBUREAU

Steel industry - CO_2 reductions initiatives through biomass use
Andrew Purvis, Director Safety Environment and Technology, World Steel Association

EXPERTS INTRODUCTION & GROUPS CREATION

Rachael Levinson, Senior Research Manager, Hawkins Wright
John Robert McFarlane, Biomass broker, AlbionDesign
Krister Rosenqvist, CEO, Cleantek Trade
Evaldas Margis, Director of Commerce, AXIS Tech
Jonas Kugelevičius, Head of Engineering Group, AXIS Tech

3:00 PM Group discussions on key issues with experts

POLICY FRAMEWORK
BIOMASS SUPPLY (INCL. TORREFACTION)
BIOMASS USE

3:45 PM Wrap-up and closing – Gilles Gauthier, Bioenergy Europe

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Supported by RE4Industry and MUSIC

RE4INDUSTRY
Renewable energies for industries

RE4INDUSTRY

Consortium

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Bioenergy EUROPE · ENERGY EFFICIENCY in Industrial Processes · eseia european sustainable energy innovation alliance

ENERGY INTENSIVE INDUSTRIES

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https://re4industry.eu/

MUSIC
Market Uptake Support for Intermediate Bioenergy Carriers

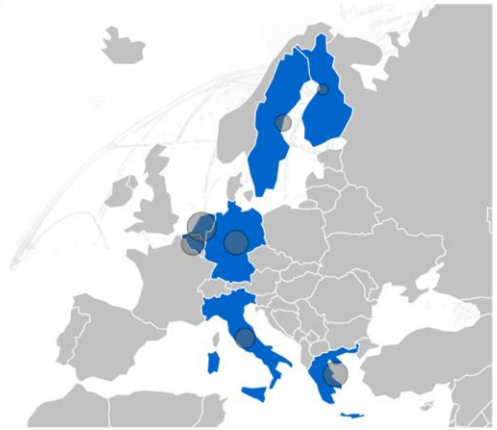
THE MUSIC TEAM

Renewable energy advisory SME's

WIP RENEWABLE ENERGIES · btg biomass technology group

(Bio)energy RTD institutes

KAПE CRES · RE-CORD · DBFZ · CERTH CENTRE FOR RESEARCH & TECHNOLOGY HELLAS



Member organisations

BioFuel Region · CluBE · INTERNATIONAL BIOMASS TORREFACTION COUNCIL

Case study partners (economic actors)

ArcelorMittal · TORRCOAL · btg bioliquids · GREEN FUEL Nordic Oy · GoodFuels · renewi · Eni

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

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About Us

Common voice of European bioenergy since 1990

Unites **40+ national associations** and **140+ companies/research**

EUROPEAN PELLET COUNCIL
A NETWORK OF BIOENERGY EUROPE

INTERNATIONAL BIOMASS TORREFACTION COUNCIL
A NETWORK OF BIOENERGY EUROPE

Hosting 2 **networks**

Bioenergy EUROPE

Our Activities & Services

- **EU Policy Monitoring & Influence**
- **Market Data**
- **Visibility**
- **Networking**
- **Free & Discounted event**
- **Quality & sustainability certifications**

Our Members

*as of October 2021

BioEnergy EUROPE

Companies

Associations

Academia

Our Working Groups

Members Only

Domestic Heating

Next Date: TBC

Promotes biomass in the domestic heating sector and discusses building regulations, air emissions and stove & boilers certifications.

Pellets

Next Date: 24.11.2021

Discusses common issues and opportunities regarding the development of the European pellet market (residential, commercial, industrial) and proposes actions to overcome current barriers.

Agrobiomass

Next Date: TBC

Promotes underutilized biomass feedstocks (e.g. residues from agriculture, dedicated perennial lignocellulosic crops) through ad 'hoc policies.

Competitiveness

Next Date: 25.11.2021

Provides updates on key existing and emerging policy topics determining the competitiveness of bioenergy sector within the EU (e.g. carbon tax, state aid)

Sustainability

Next Date: TBC

Monitors climate and energy legislation impacting the European bioenergy sector and advocates for an efficient EU sustainability policy for biomass for heating and electricity production.

Wood Supply

Next Date: TBC

Provides with active exchanges of data, market trends and news in legislation.

Task Force Carbon Removals

Next Date: TBC

Influence EU legislation in order to create markets for carbon removals.

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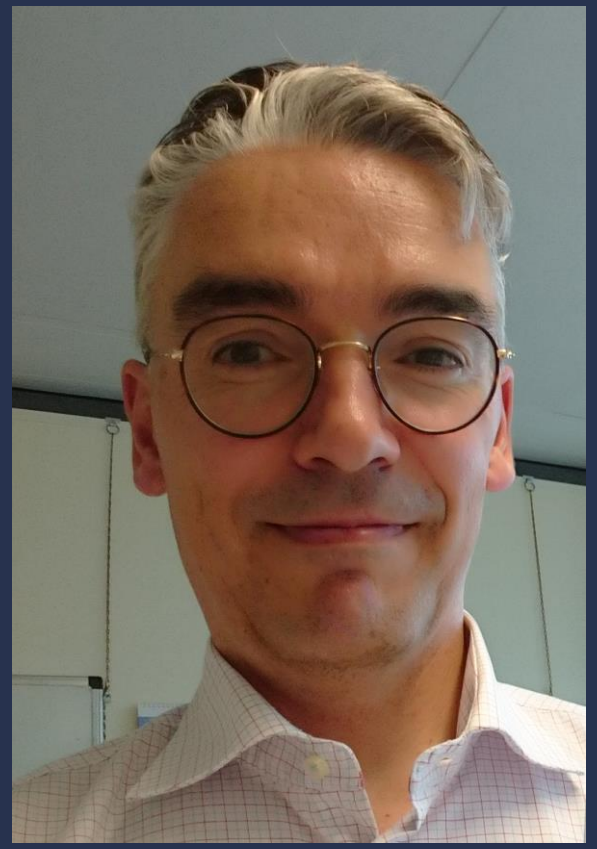


BIOenergy EUROPE

EU Policies supporting the de-carbonisation of energy-intensive industries

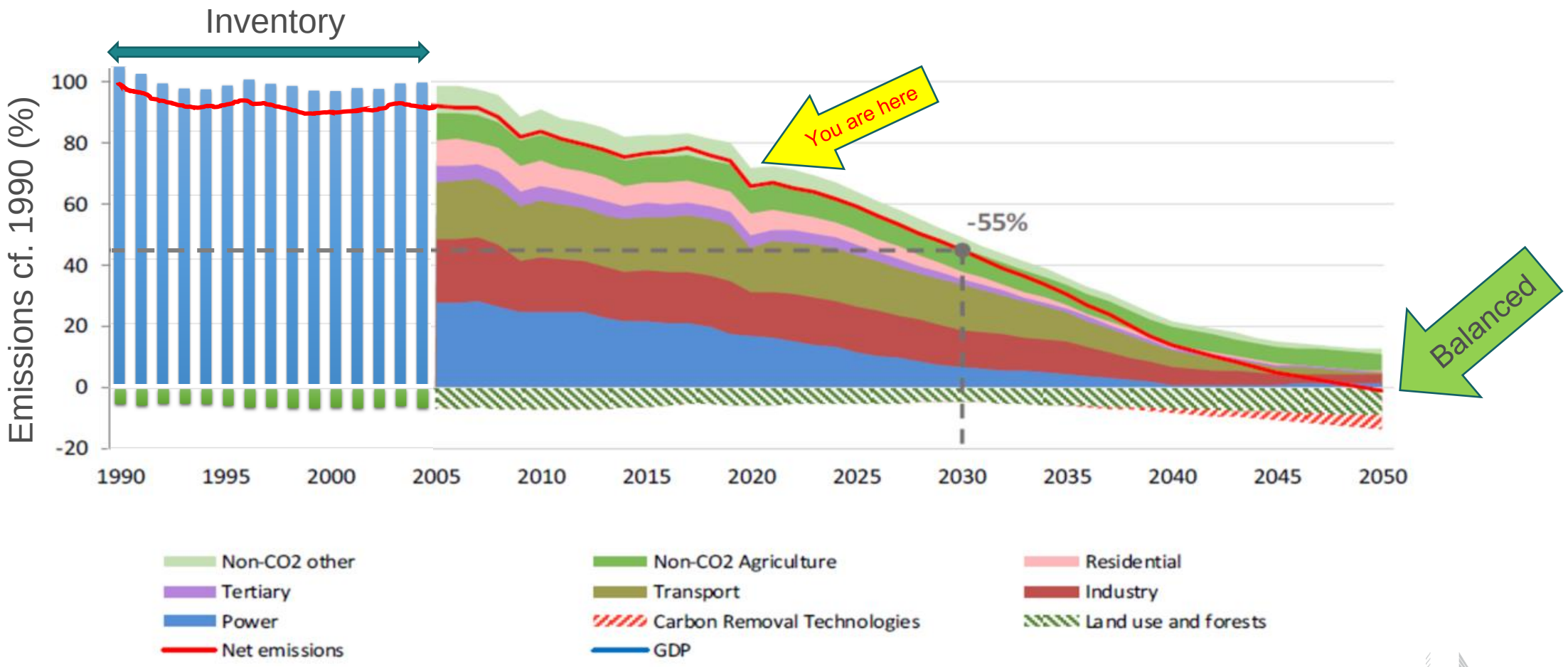
Heiko Kunst

Deputy Head of Unit

ETS Implementation and IT, DG CLIMA

26 October 2021

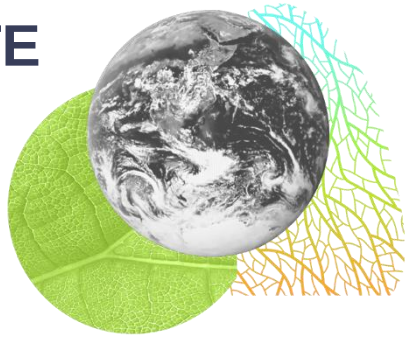
Pathway to climate neutrality



European Commission

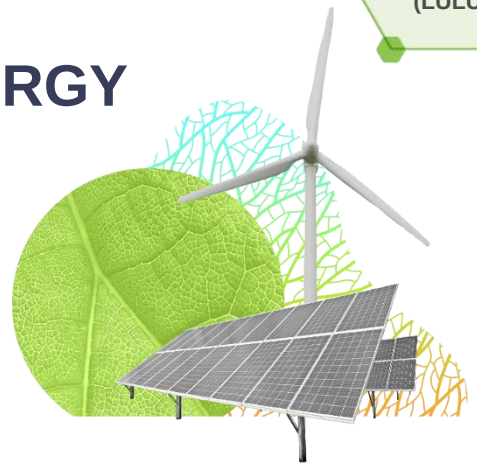
Delivering on the “Fit for 55” commitment

CLIMATE



TRANSPORT

ENERGY



TAXATION AND TRADE

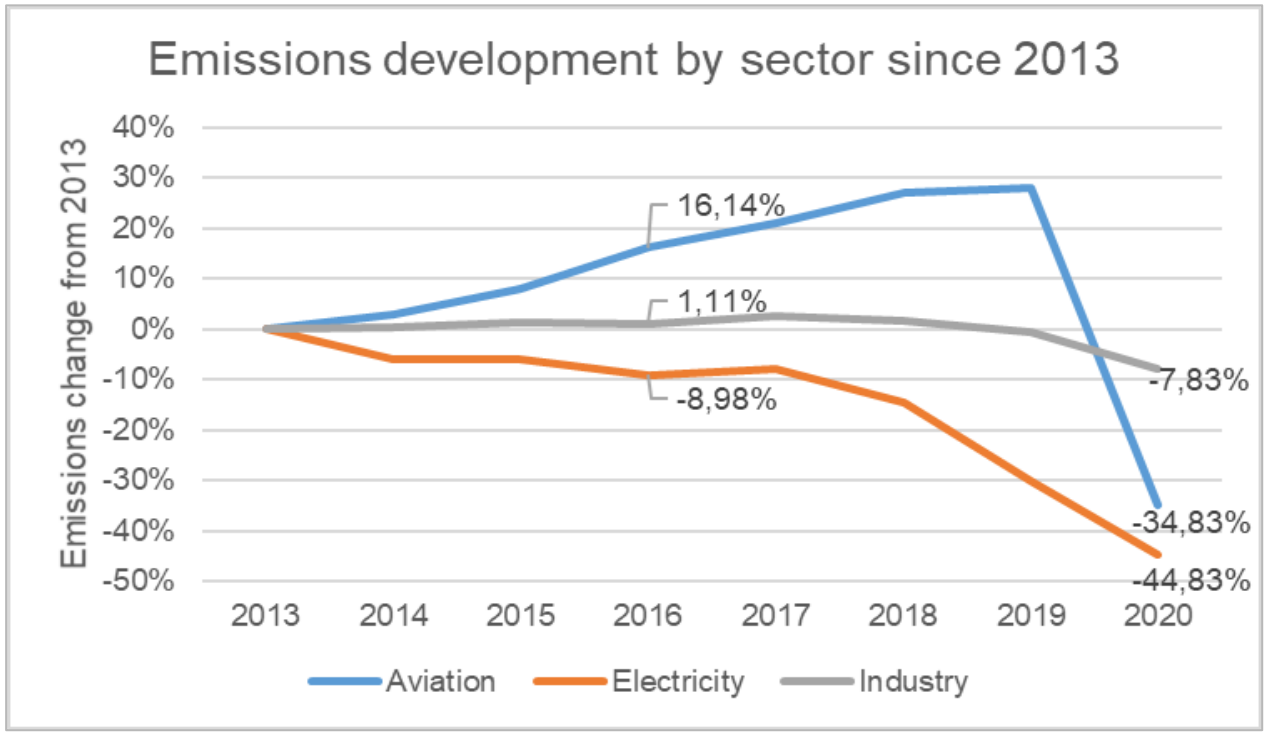
- Revision of the EU Emissions Trading System (EU ETS)
- Revision of the EU ETS in alignment with the CORSIA system for reducing international aviation emissions
- Revision of the Alternative Fuels Infrastructure Directive
- Revision of the Effort Sharing Regulation
- NEW ReFuelEU Aviation Initiative
- Revision of the Regulation on Land use, Land use change and Forestry (LULUCF)
- **Fit for 55**
- NEW FuelEU Maritime Initiative
- Revision of CO2 emissions standards for cars and vans
- Revision of the Energy Taxation Directive
- Revision of the Renewable Energy Directive
- Revision of the Energy Efficiency Directive
- New Carbon Border Adjustment Mechanism

European Commission

Revision of the EU ETS

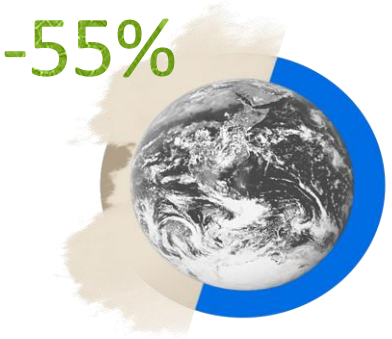
EU ETS is performing well: emissions decrease

- In 2020, emissions reduced by **13%** compared to 2019
- In 2019 emissions reduced by **9%** compared to 2018
- Since the start of the ETS in 2005, total emissions from stationary installations reduced by **43%**



European Commission

Revision of the EU ETS



Strengthening the existing ETS: cap

- Need to **update the cap in line with -55%**: increase linear reduction factor (currently 2.2%) combined with an one-off cap reduction
- Cap and linear reduction factor need to take into account ETS extension to maritime
- Cost-effective contribution of ETS sectors to -55%, including extension to maritime, lead to a **new 2030 reduction objective of -61%** compared to 2005 (currently -43% without maritime)

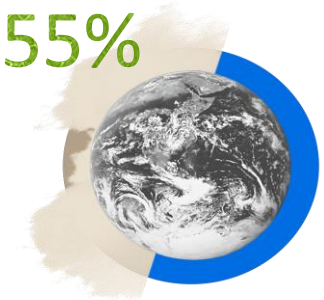
➢ Increased EU ETS **linear reduction factor** from 2024: **4.2%**

- **One-off reduction of the cap** in the year of entry into force to align the cap with emissions (if 2024: 117 Mt), while at the same time cap increase through the maritime transport extension

European Commission

Revision of the EU ETS

Strengthening the existing ETS: free allocation



- **Free allocation** continues to be based on benchmarks. No changes to the free allocation (FA) share (43% + 3% buffer)
- **Better targeted FA**: Maximum annual reduction rate of the benchmarks increased to 2.5% (currently 1.6%). Shifts more free allocation to sectors that are harder to decarbonise
- More targeted free allocation and inclusion of maritime sector **limit the risk / size of the** factor reducing free allocation for all sectors. Delays application of CSCF by around 1 year and reduces its value by around 6% as average for the period 2026 – 2030.
- **Scope of benchmarks broadened**: Remove barriers for the deployment of new technologies such as green hydrogen or hydrogen based steel to guarantee a level playing field among technologies.
- **Conditionality to decarbonisation efforts:** 25% reduction of FA for installations not implementing cost-efficient measures identified in energy efficiency audits or equivalent measures

European Commission

Revision of the EU ETS

Strengthening the existing ETS: Protection against the risk of carbon leakage

- **Free allocation under the ETS and the proposed Carbon Border Adjustment Mechanism (CBAM) are interlinked**: To ensure compatibility with the EU's international obligations, and maintain incentives to decarbonize, free allocation will be phased out as CBAM is phased in for selected sectors
  - **Free allocation** will be **reduced by 10 percentage points each year** for CBAM sectors, starting at 90% in 2026 and reaching zero in 2035
  - **Industrial CBAM sectors** are iron & steel, cement, fertilisers and aluminium; they represent around 50% of the total free allocation in the period 2021–2025
  - Free allocation no longer provided to **these sectors**, **allowances** must be **auctioned** and the revenues accrue to the Innovation Fund

European Commission

Revision of the EU ETS

Strengthening the existing ETS: accelerating investment in low-carbon innovation & improved auction revenue use

- **Increased Innovation Fund from 450 to 650 million allowances:** 150 of the additional 200 million allowances from the new emissions trading system for road transport and buildings
- Also allowances which would otherwise be allocated for free to industry sectors covered by the Carbon Border Adjustment Mechanism **added to the Innovation Fund** from 2026 to 2030
- **Supporting contracts for difference under the Innovation Fund**: a tool to provide support to the early deployment of innovative technologies and to complement the existing funding mechanisms in the Innovation Fund.
- **Improving the use of auction revenues:** a commitment for Member States to use the entirety of their revenues on climate and energy (including social) purposes

Thank you

European Commission

BIOMASS SUPPLY AND USE

Biomass use for industrial processes – an overview

Olle Olsson, Team leader, IEA task 40

BioEnergy EUROPE

IEA Bioenergy
Technology Collaboration Programme

Decarbonizing process heat for industry: the role of biomass

Olle Olsson
Stockholm Environment Institute (SEI) & IEA Bioenergy Task 40

26 Oct 2021

Background on IEA Bioenergy

- Technology Collaboration Programme (TCP) organized under the auspices of the IEA
- Work carried out in 11 thematic expert groups (”Tasks”)
- *Bioenergy for High Temperature Heat in Industry* – an IEA Bioenergy Inter-Task project
  - Task 32 (*Biomass combustion*)
  - Task 33 (*Thermal gasification of biomass*)
  - Task 34 (*Direct Thermal Liquefaction*)
  - Task 36 (*Material and energy valorisation of waste in a circular economy*)
  - Task 40 (*Deployment of biobased value chains)*

Industrial heat - characteristics

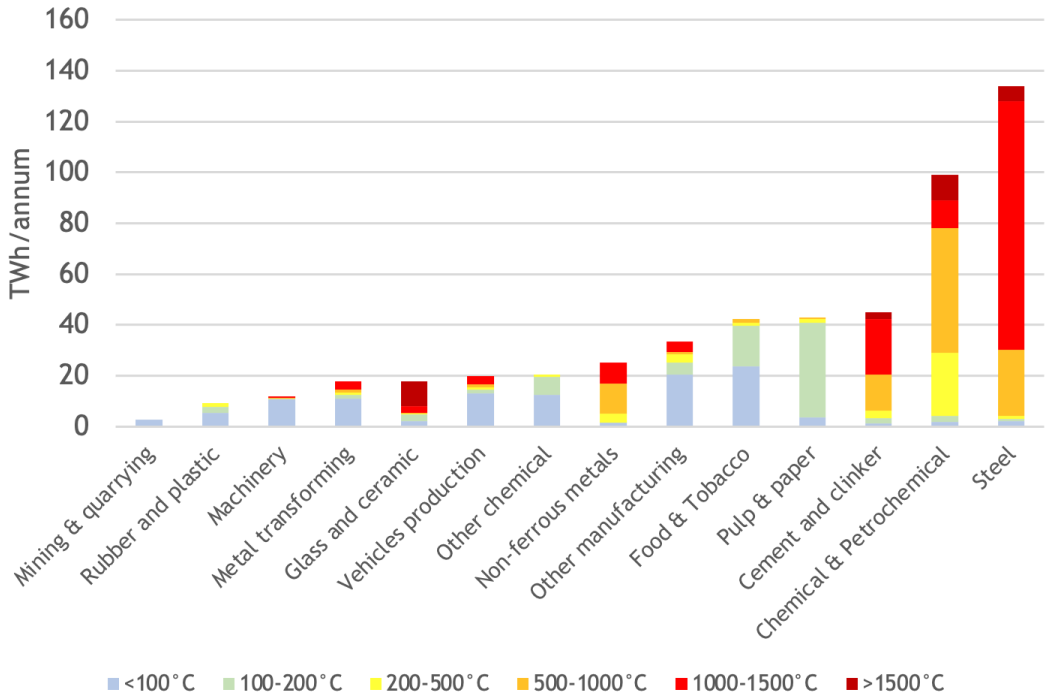
- Industry ~30% of global GHG emissions – though not all of it from heat
- Industrial heat is very diverse – many different applications that vary in
  - Temperature
  - Direct/indirect heat
  - Control & flexibility
  - …
- Heterogeneity -> difficult to generalize (and difficult to analyze!)

Example: which temperature intervals should be used?

Naegler et al (2015)	100°C	100-500°C	500-1000°C	>1000°C		
Philibert (2017)	<150°C	150-400°C	>400°C			
Bataille et al (2018)	<250°C	250-1000°C	>1000°C			
McKinsey & Co (2018)	<100 °C	100-500°C	500-1600°C	>1600 °C		
Malico et al (2019)	<100 °C	100-200°C	200-500°C	>500°C		
ARENA (2019)	< 150°C	150-250°C	250-800°C	>800°C		
Madeddu et al (2020)	<100 °C	100-400°C	400°C-1000°C	>1000°C		
Lenz et al (2020)	<100 °C	100-200°C	200-500°C	500-1000°C	1000-1500°C	>1500°C

But if we still try to generalize…

- High temperatures (>500°C) especially in metals and minerals processing – direct heating
- Lower temperatures (~50-500°C) in wide variety of sectors, indirectly (incl via steam)

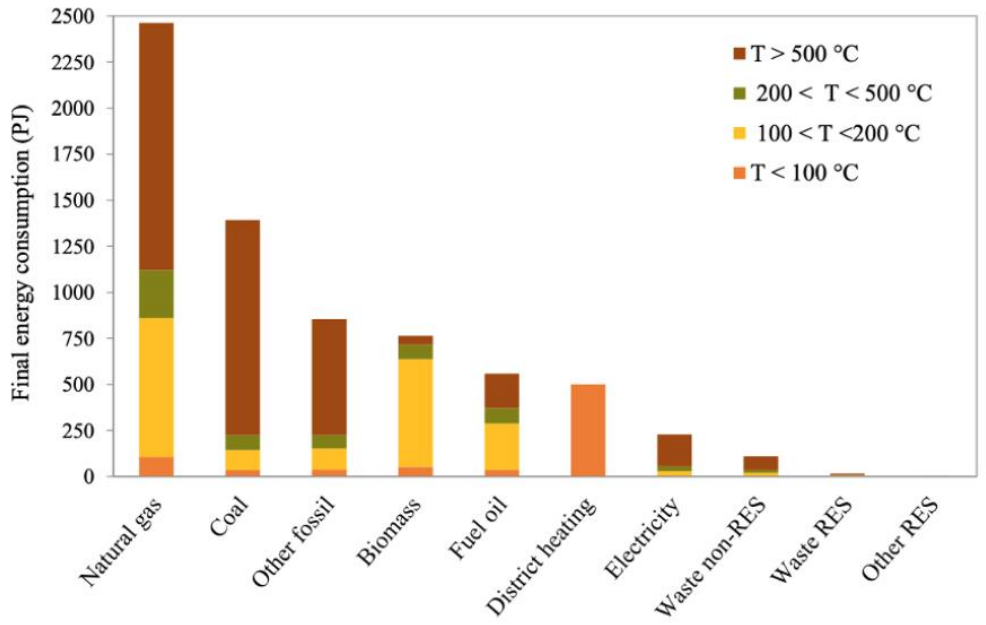


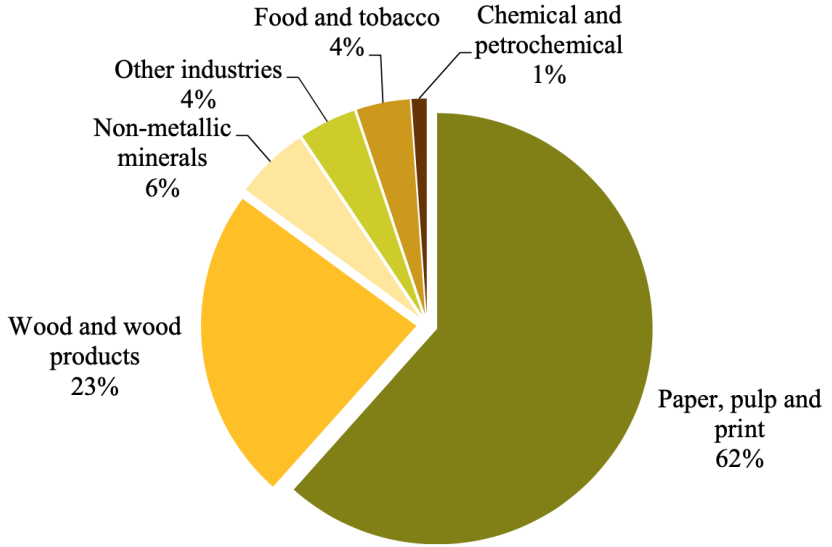
2013 industrial heat use in Germany
(Data from Lenz et al, 2020)

Industrial heat decarbonization options – hot takes

- CCS: avoids stranding of assets, but costly & infrastructure challenging
- Electrification: feasible at lower temps, less mature at higher temps
- Hydrogen: allows retrofitting of natural gas heating, but costs challenging
- Biomass?

Use of biomass in industrial heat (EU)



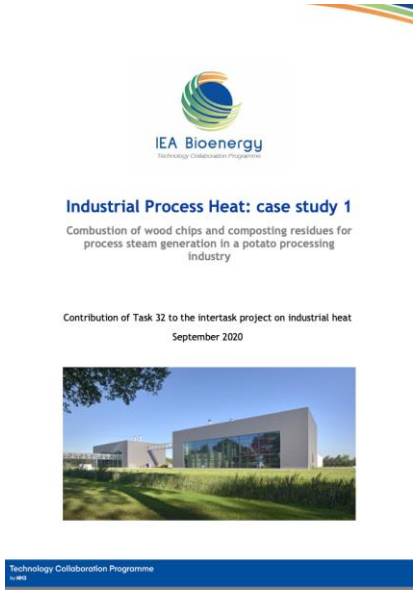


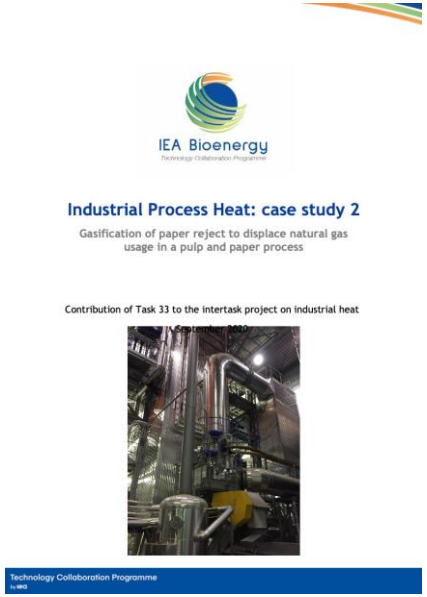
Figures from Malico, I., Pereira, R. N., Gonçalves, A. C. and Sousa, A. M. (2019). Current status and future perspectives for energy production from solid biomass in the European industry. *Renewable and Sustainable Energy Reviews*, 112. 960–77.

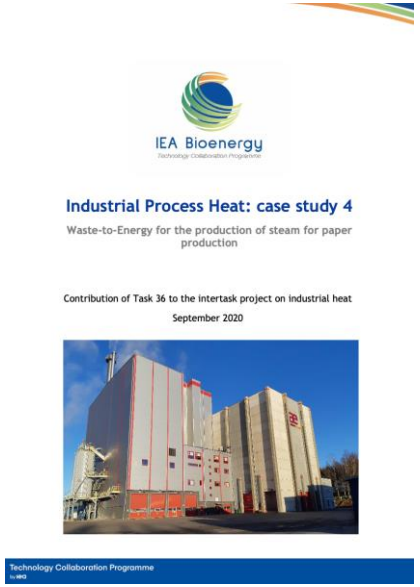
Potential for bioenergy in industrial heat

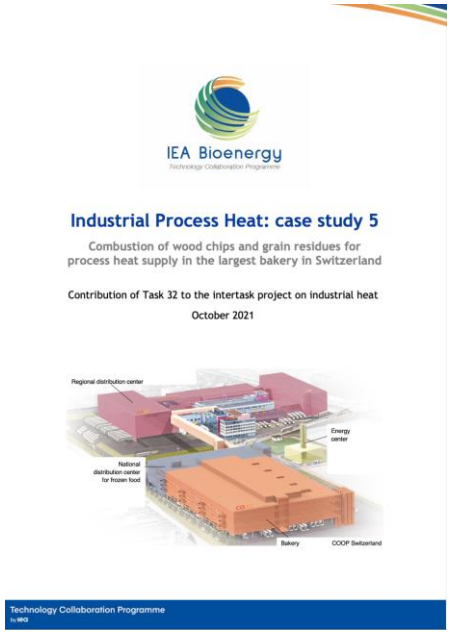
- Pros
  - Comes in many different forms, so can cover most needs currently met by fossil fuels
  - Retrofits could therefore be relatively small
  - Can enable negative emissions when combined with CCS
- Cons
  - Technological maturity varies
  - Difficult to generalize because local availability key for price
  - Larger volumes may be expensive and complicated to source

Again, difficult to generalize, - let's draw on examples









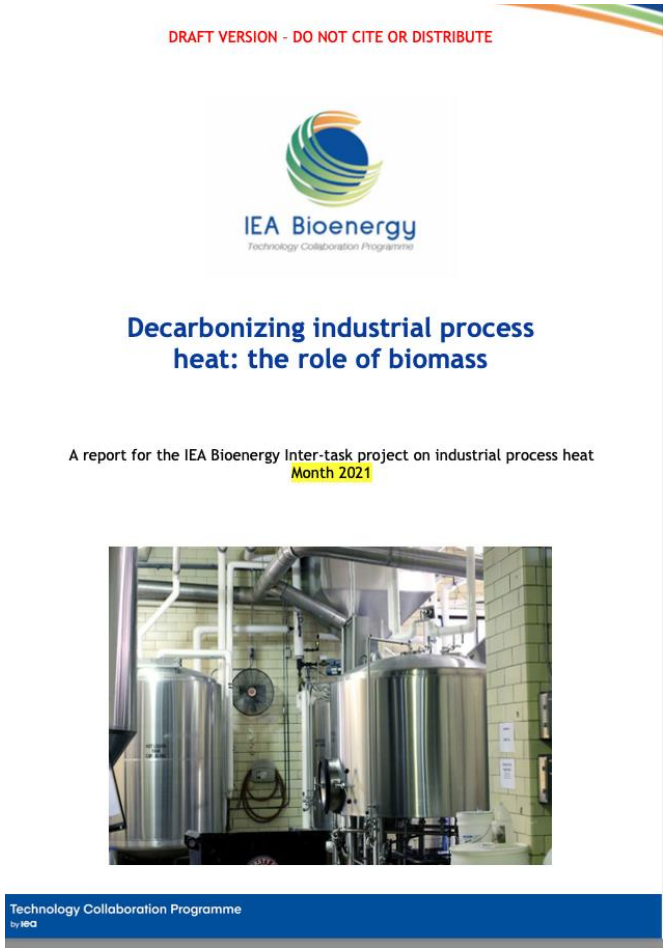
https://itp-hightemperatureheat.ieabioenergy.com/iea-publications/

Lessons from the cases

- Choice of solution depends on existing technology, biomass availability and site-specifics related to logistics
- Cost reductions key driver
- Low/high opex vs low/high capex?
- Strong relationships in value chain important

Moving forward & policy aspects

- EU ETS (+CBAM?)
- Public procurement
- Value chain collaborations:
  - Cost increases in processes may be miniscule if carried to sticker price
  - Brand owners, OEMs etc push towards lower life cycle emission products?
- Opportunities for biomass **by adding value**, e.g., through bio-CCS & CDR



(Coming soon!)

Thank you!

Olle.Olsson@sei.org

https://itp-hightemperatureheat.ieabioenergy.com/iea-publications/

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CEMBUREAU

BIOenergy EUROPE

CEMBUREAU
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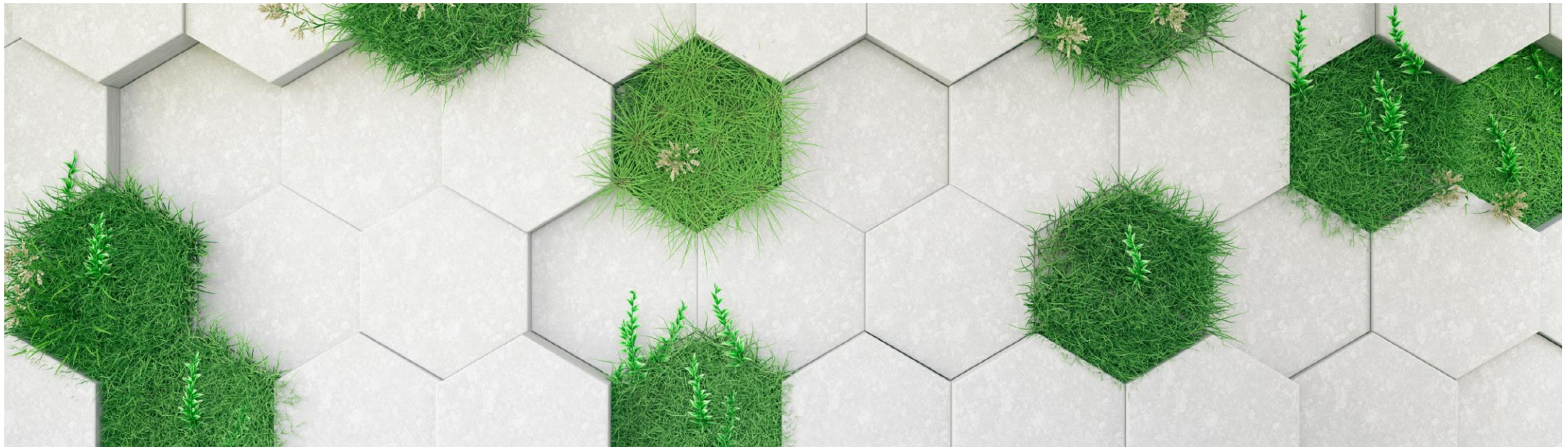
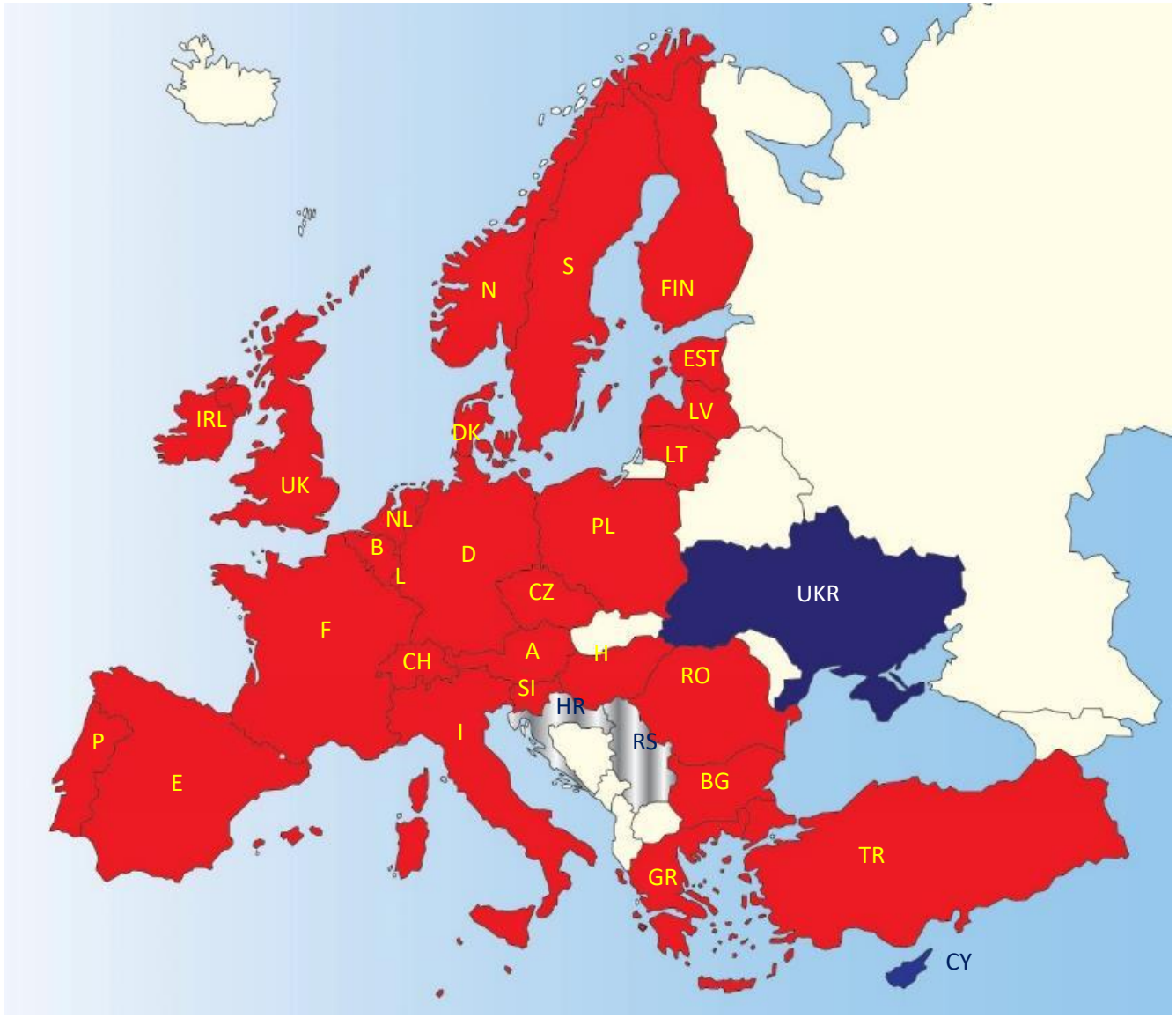
CEMENT INDUSTRY
2050 CARBON NEUTRALITY ROADMAP

Nikos Nikolakakos
Environment & Resources Manager, CEMBUREAU



CEMBUREAU, The European Cement Association



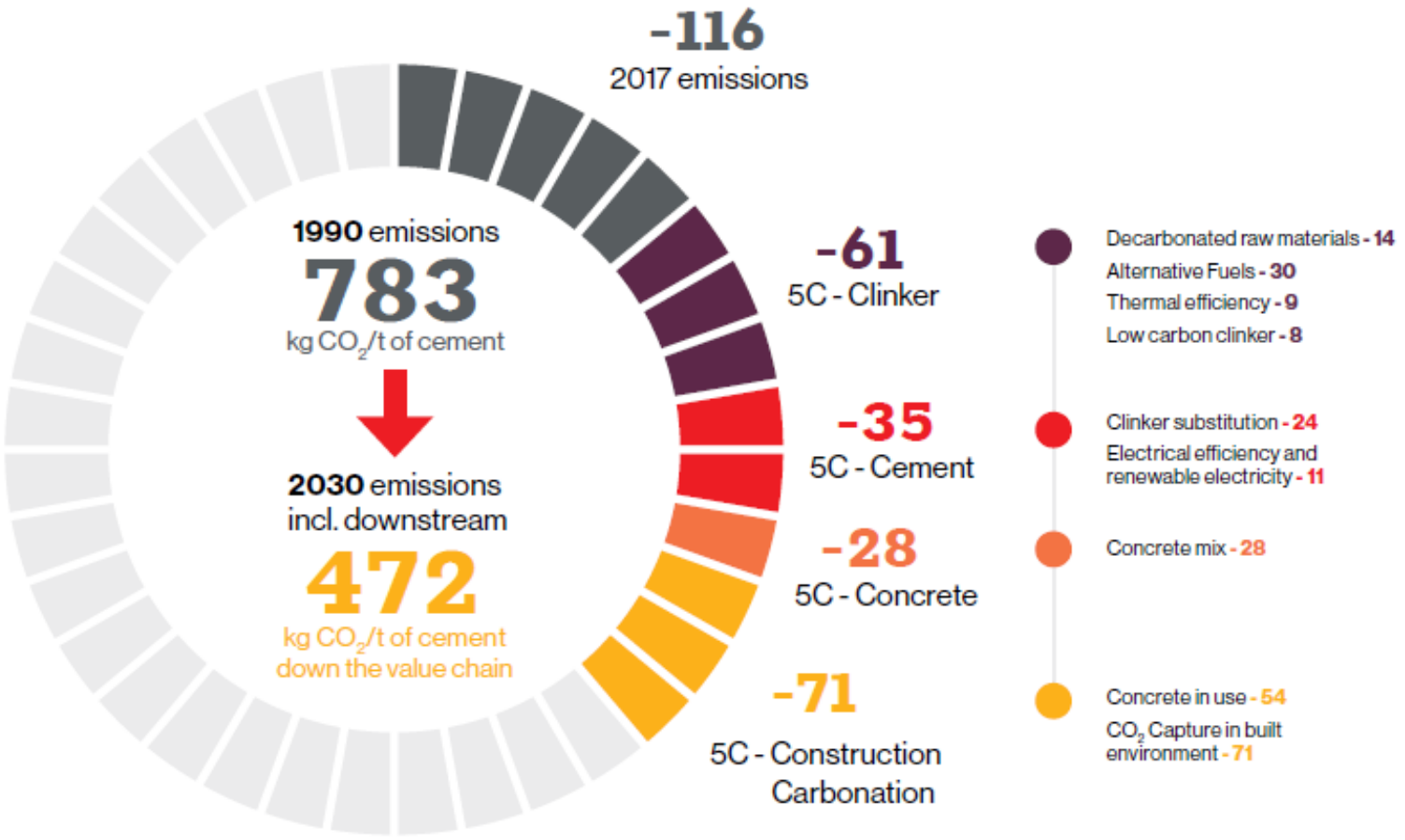
CEMBUREAU is the European Cement Association and is based in Brussels

The Association acts as spokesperson for the cement industry before the EU institutions and other public authorities.

- Full Members
- Associate Members
- Cooperation agreement

CEMBUREAU 2030 roadmap

CO_2 reduction along the cement value chain (5Cs: clinker, cement, concrete, construction, re-carbonation)



https://cembureau.eu/library/reports/2050-carbon-neutrality-roadmap/

CEMBUREAU 2050 roadmap

CO_2 reduction along the cement value chain (5Cs: clinker, cement, concrete, construction, re-carbonation)

Fuel Substitution and Zero Fuel Emissions Research

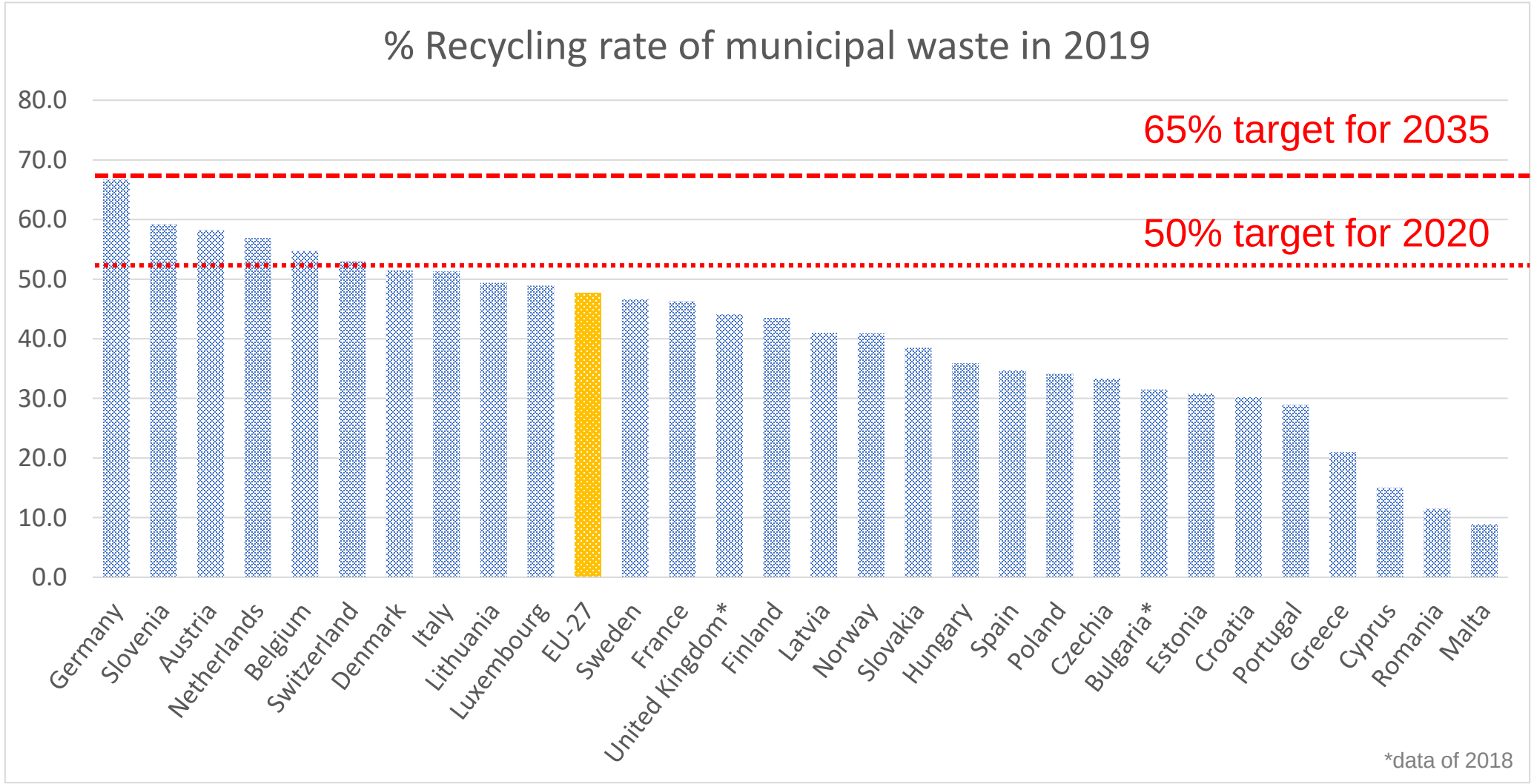
CEMBUREAU targets to reach **60% alternative fuels** containing **30% biomass in 2030**, and **90% alternative fuels** with **50% biomass by 2050.**

Policy asks

- **Access to non-recyclable waste and biomass waste**
- **Facilitate waste shipment**
- **Ban on landfill**

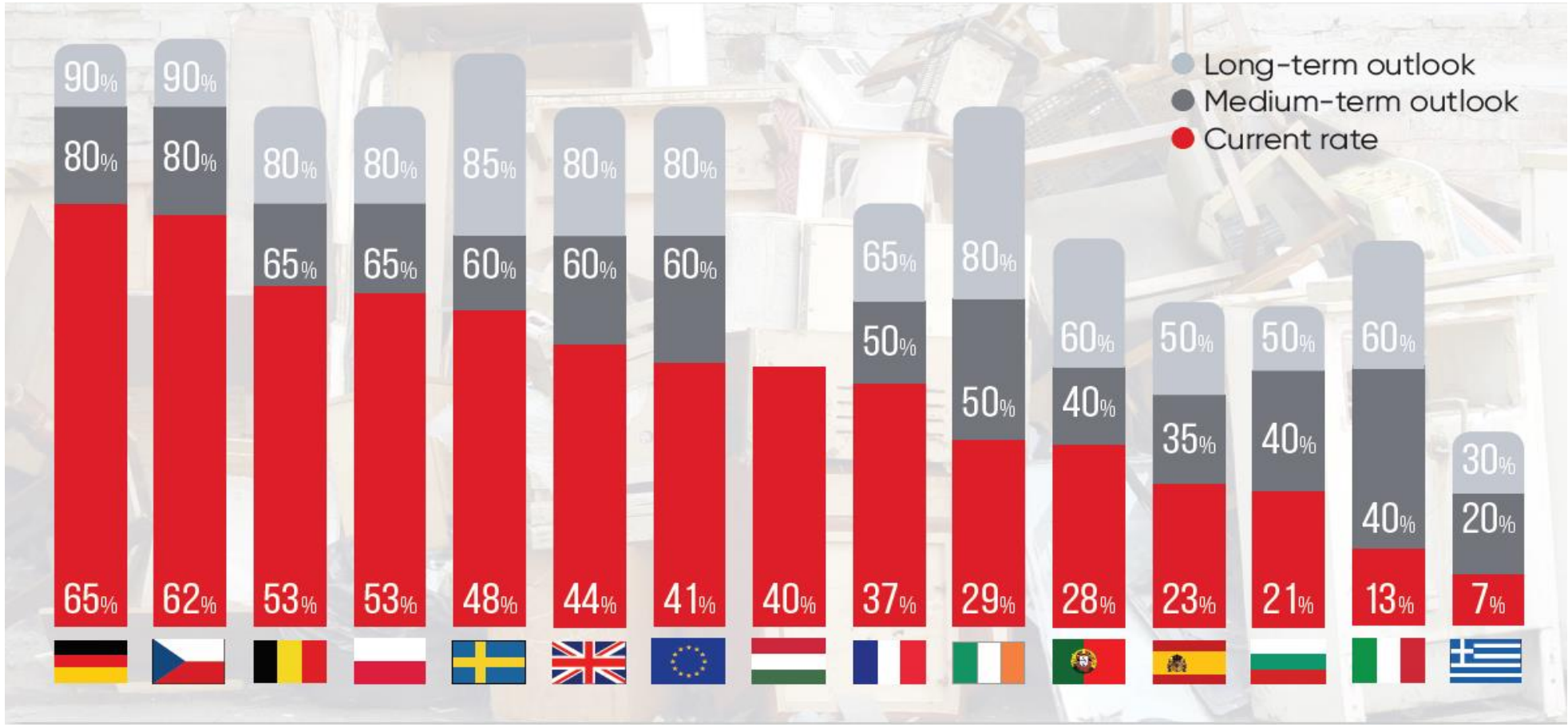
EU – Municipal waste generation

Municipal waste generation in EU ≈ 250 million tonnes per year



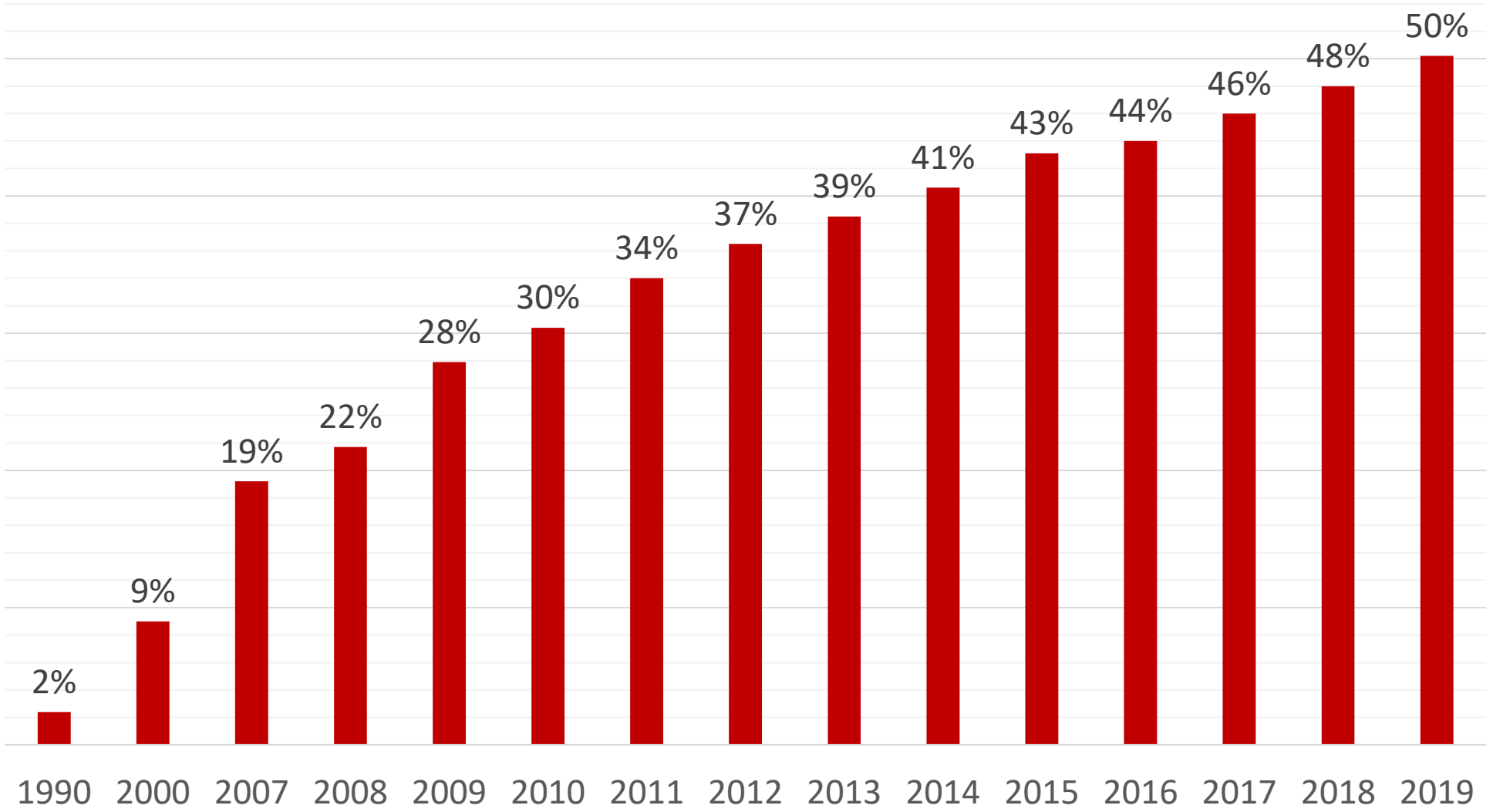
Alternative Fuels prospects

Ecofys studies “Status and prospects of co-processing of waste in EU cement plants”, summary report April 2017 and case studies May 2017



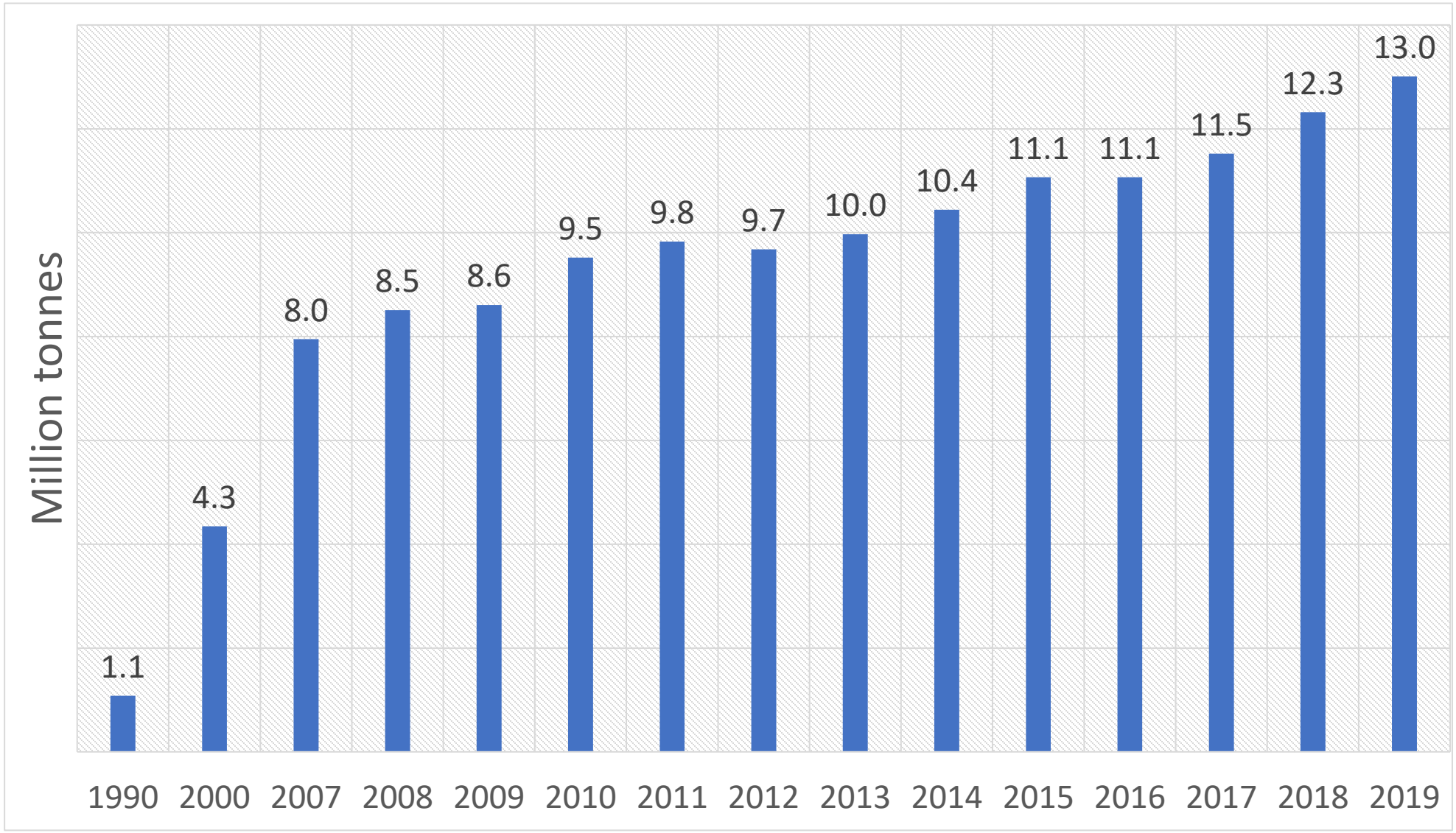
All data are for 2014, with the exception of Portugal and Bulgaria where data are from 2013.

% of Thermal energy from Alternative Fuels in the Cement sector in the EU



Source: Global Cement & Concrete Association (GCCA)

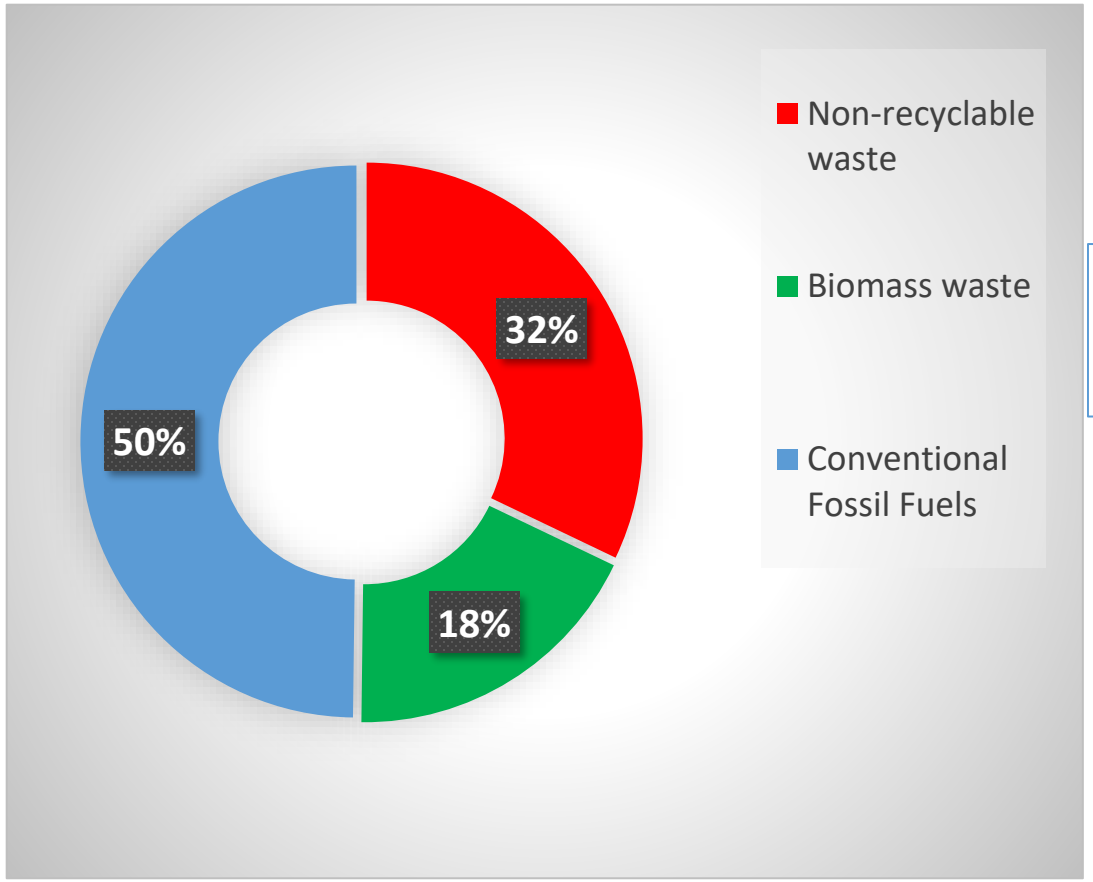
Alternative fuels used in the cement sector in the EU



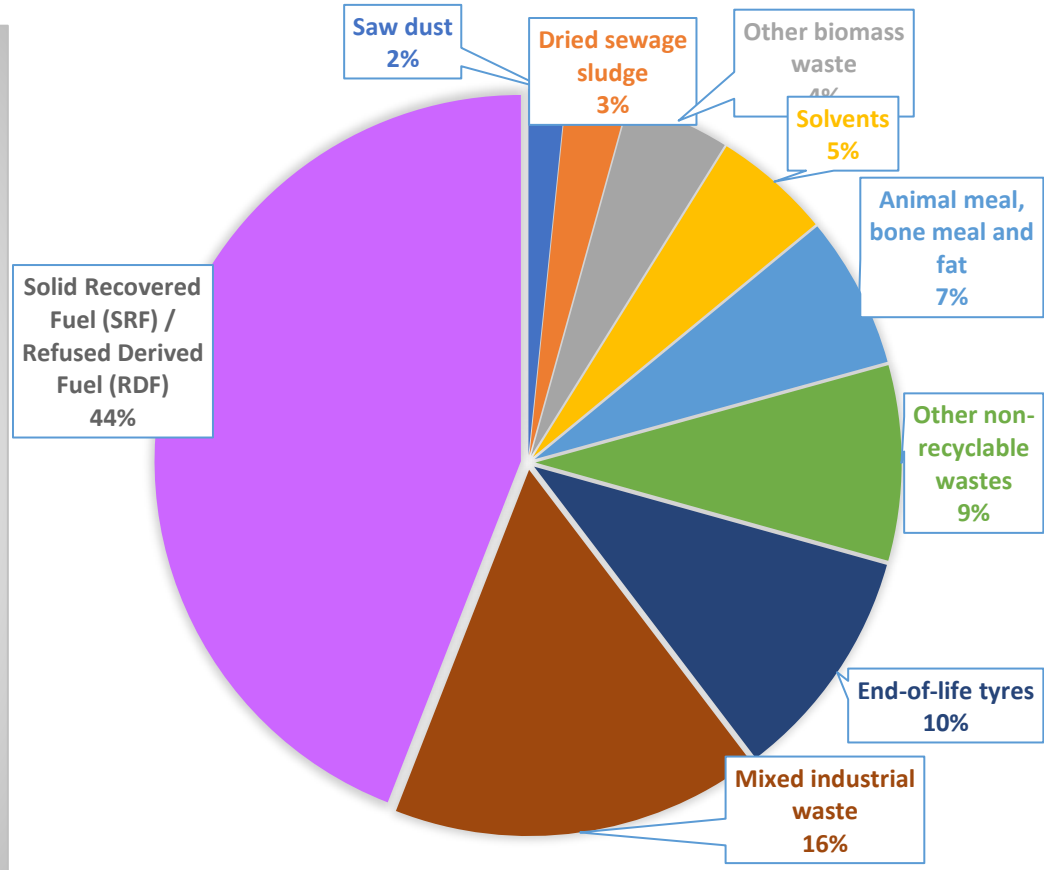
Source: Global Cement & Concrete Association (GCCA)

Update 2019 data: Alternative Fuels use in the EU

THERMAL ENERGY CONSUMPTION BY FUEL TYPE for the year 2019



BREAKDOWN OF ALTERNATIVE FUELS 2019

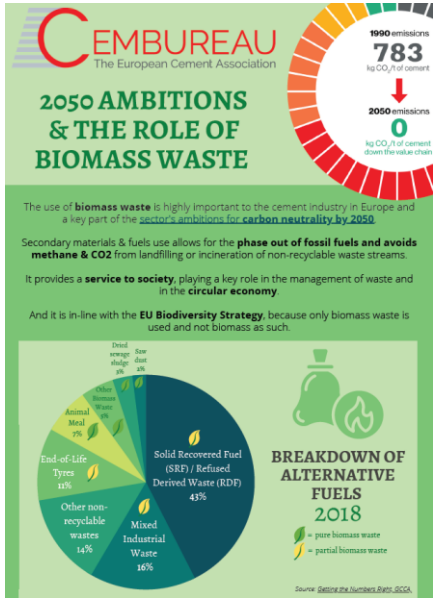


Source: Global Cement & Concrete Association (GCCA)

CEMBUREAU publications

Description of the waste streams used

https://cembureau.eu/media/nqpnsbkh/biomass-waste-leaflet.pdf

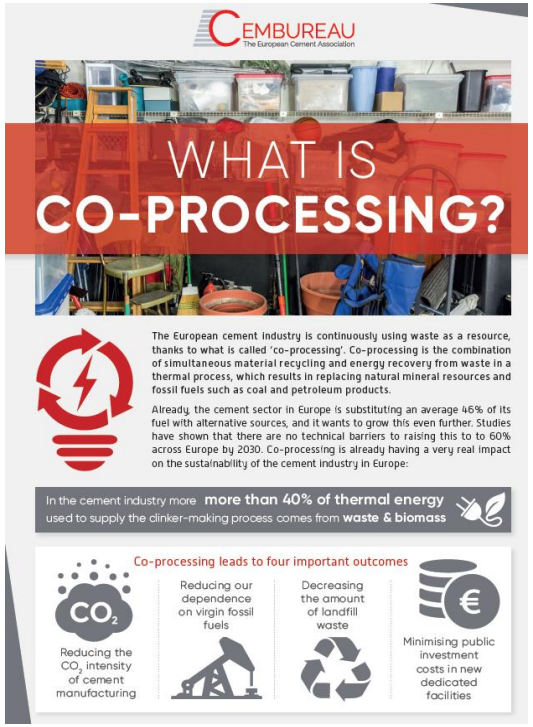


The co-processing journey

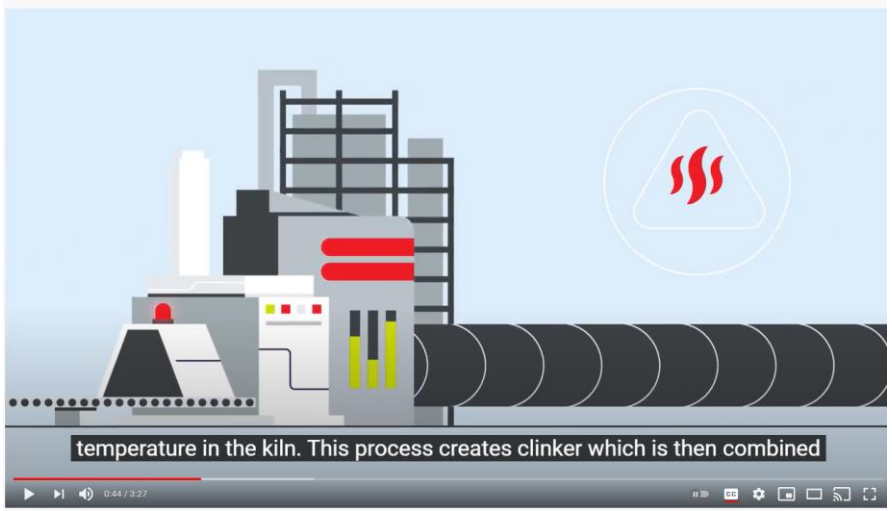
https://cembureau.eu/media/djtexpjb/16298-cembureau-the-co-processing-journey-2019-06-04.pdf

CEMBUREAU publications

What is co-processing?
https://cembureau.eu/media/hbdhpv0s/what-is-co-processing-brochure_pm-version.pdf



Animation video: "processing waste to create cement"
https://www.youtube.com/watch?v=iT-zMmZGVjA




CEMBUREAU
The European Cement Association

ROADMAPS ENERGY INTENSIVE INDUSTRIES

Steel industry - CO_2 reductions initiatives through biomass use

Andrew Purvis, Director Safety Environment and Technology

World Steel Association

BIOenergy EUROPE

The use of biomass in the steel industry

Andrew Purvis | Director, Safety Environment & Technology

World Steel Association (worldsteel)

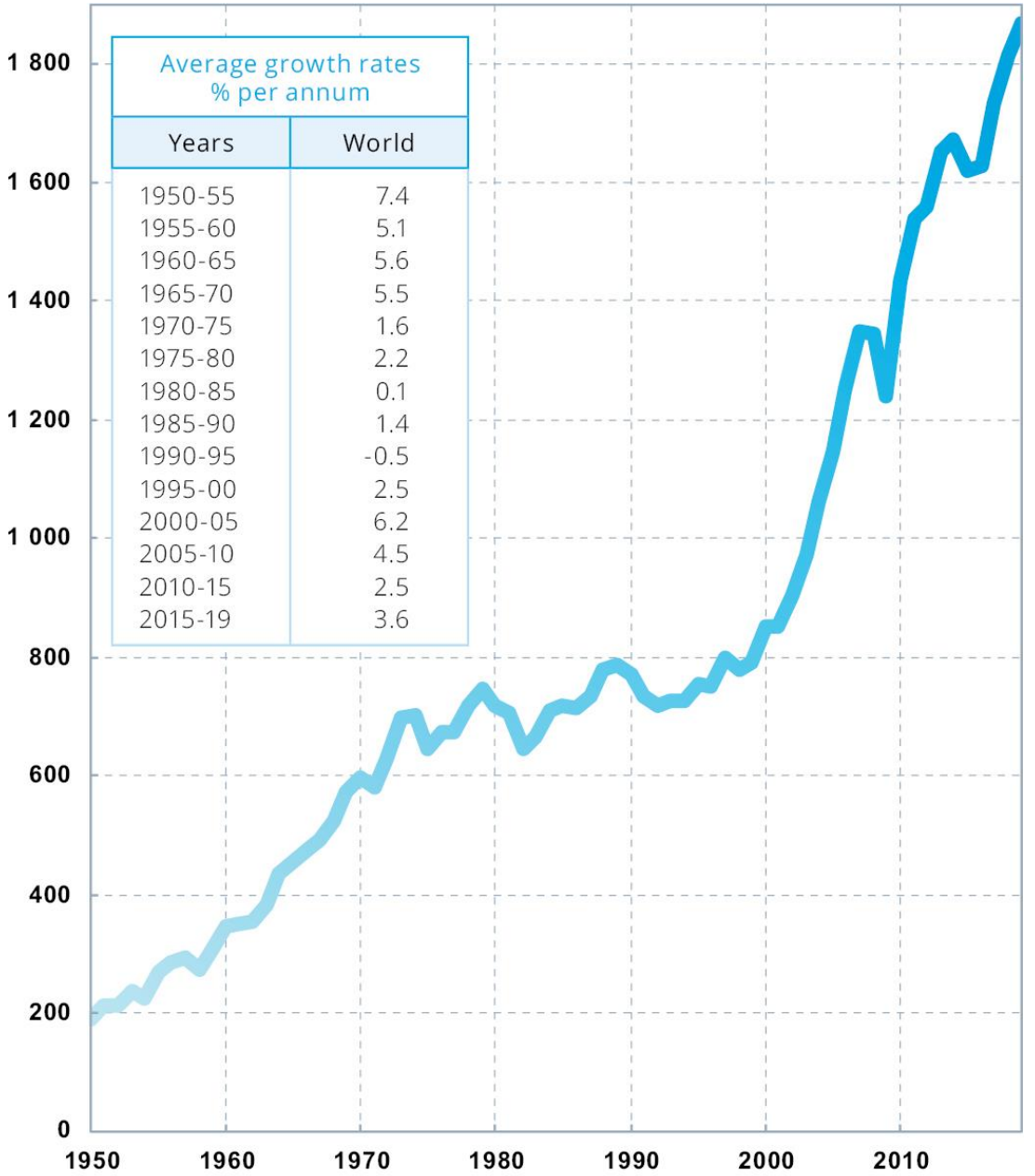
worldsteel ASSOCIATION

Disclaimer

The scale of the challenge

In 2020, on average, every tonne of steel produced led to the emission of 1.85 tonnes of CO_2.

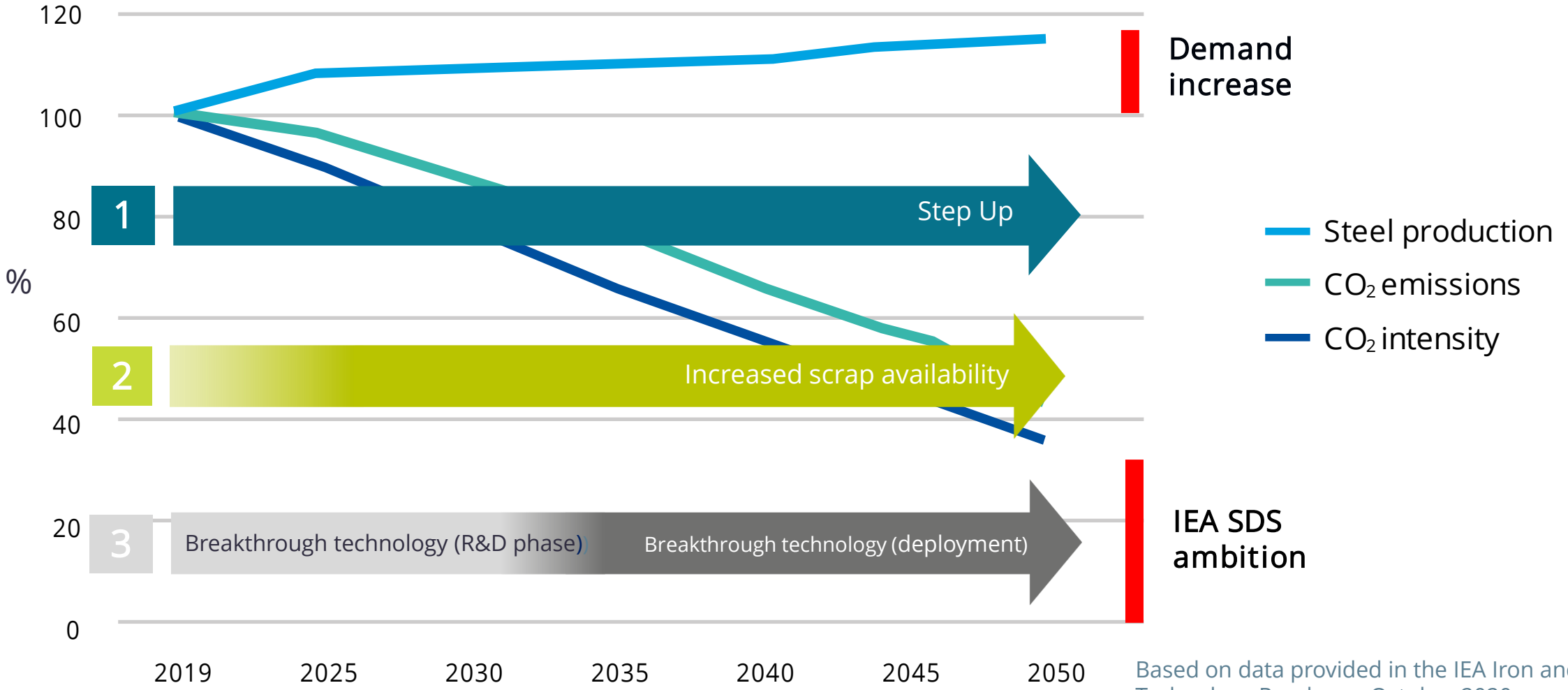
In 2020, the total direct emissions were of the order of 2.6 billion tonnes, representing between 7% and 9% of global anthropogenic CO_2 emissions.



worldsteel's 3-step approach

worldsteel ASSOCIATION

IEA scenario and our approach

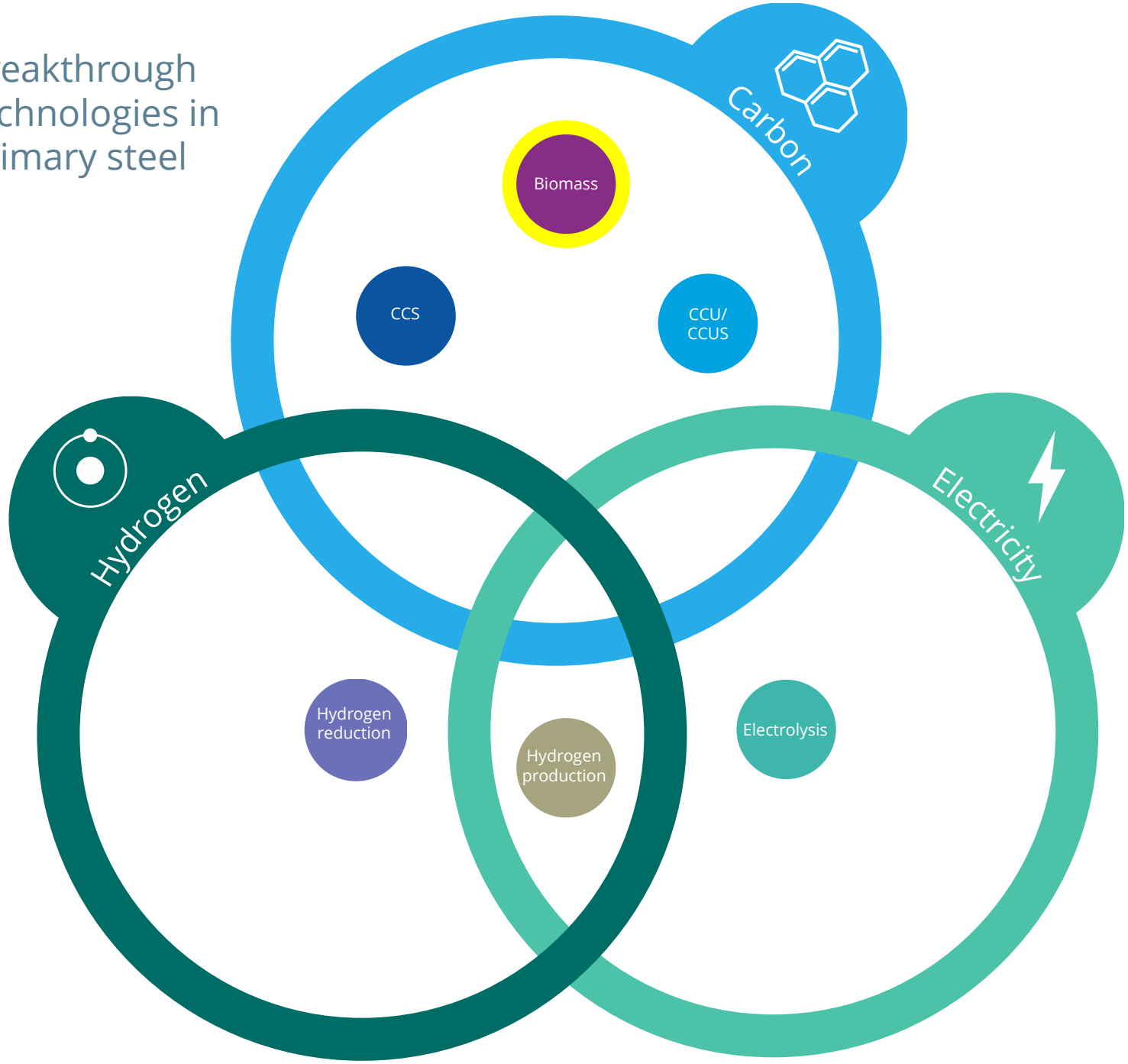


Based on data provided in the IEA Iron and Steel Technology Roadmap, October 2020

A portfolio of breakthrough technology options

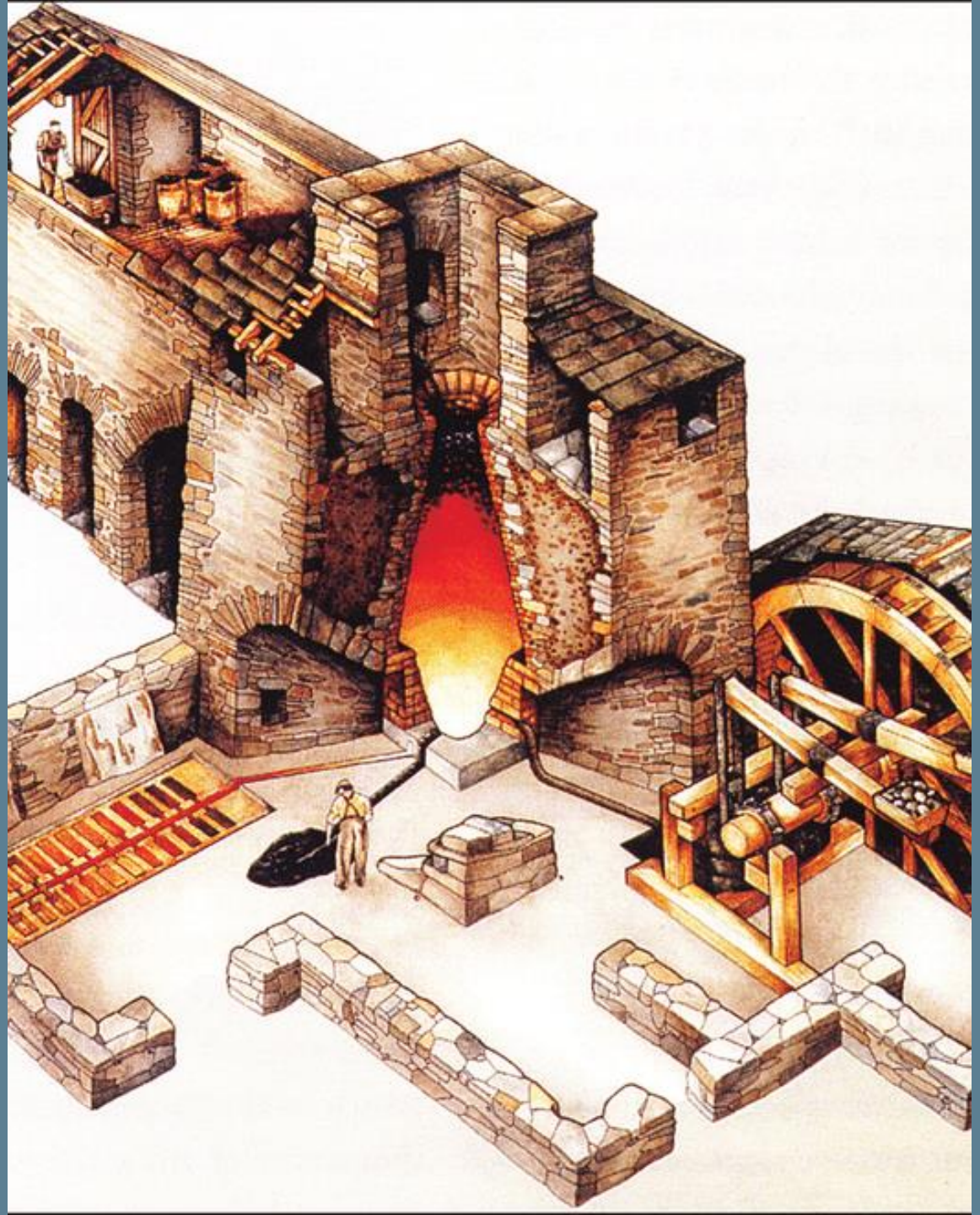
worldsteel ASSOCIATION

Breakthrough technologies in primary steel



Technology type:

- Biomass
- CCS
- CCU/ CCUS
- Hydrogen reduction
- Hydrogen production
- Electricity



Ironmaking began with biomass

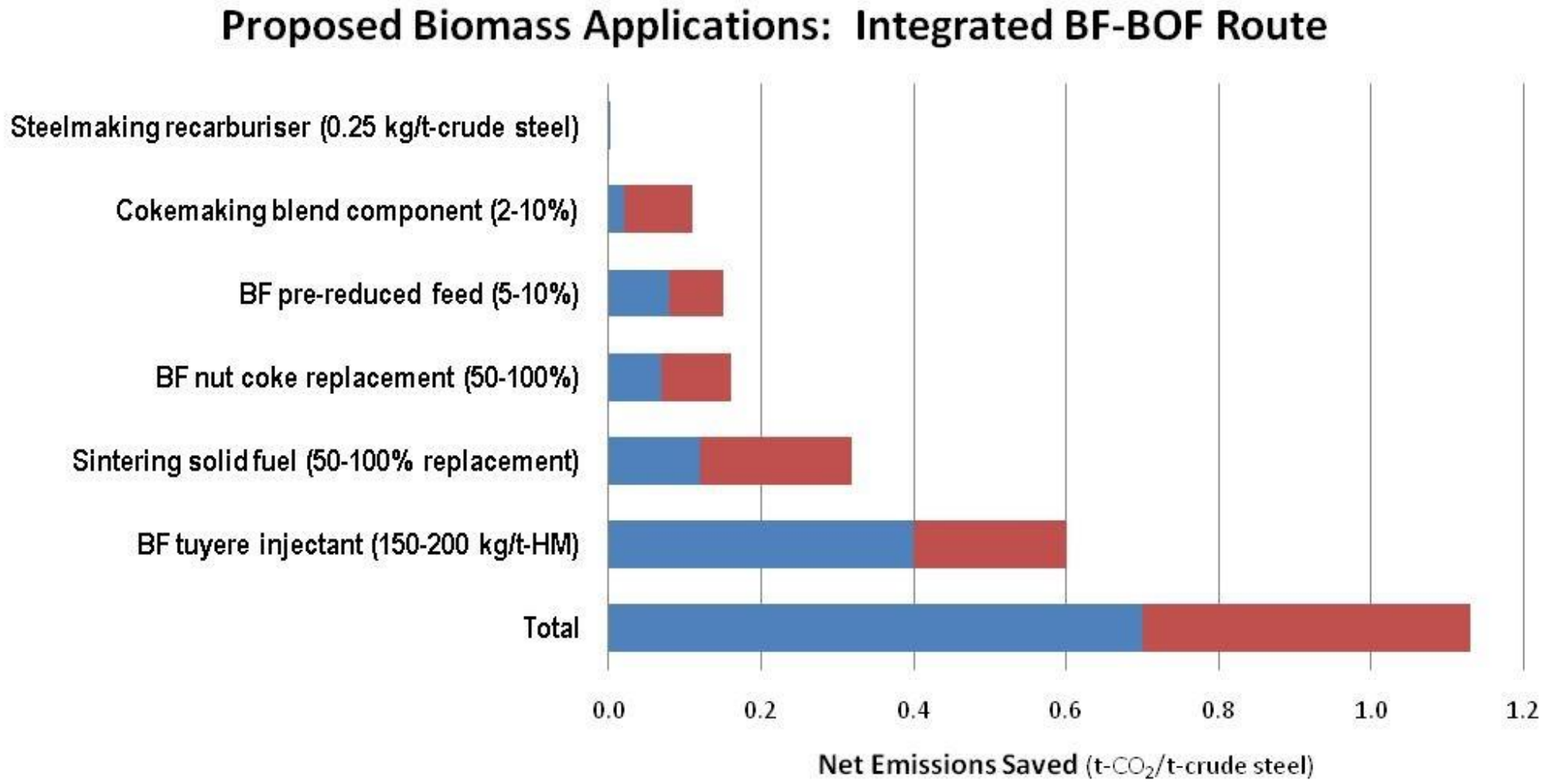
- In pre-historic and historic times biomass (charcoal) was used extensively in ironmaking
- Charcoal provided a source of carbon to reduce iron ore in the blast furnace.

worldsteel ASSOCIATION

21st century biomass

- Different regions will adopt different breakthrough technology solutions, biomass isn't a silver bullet.
- Biomass can potentially be used to replace a proportion of fossil carbon resources.
    - As a reductant
    - As a source of alloying carbon
    - As a replacement for fossil energy in other processes
- The potential for biomass-derived products to mitigate CO_2 emissions in the BF-BOF route is substantial (32 – 58%)
- Some biomass is in use now, other steel companies are undertaking research

Biomass can make a significant impact



Mathieson, John & Rogers, Harold & Somerville, Michael & Jahanshahi, Sharif & Ridgeway, Phillip. (2011). POTENTIAL FOR THE USE OF BIOMASS IN THE IRON AND STEEL INDUSTRY.

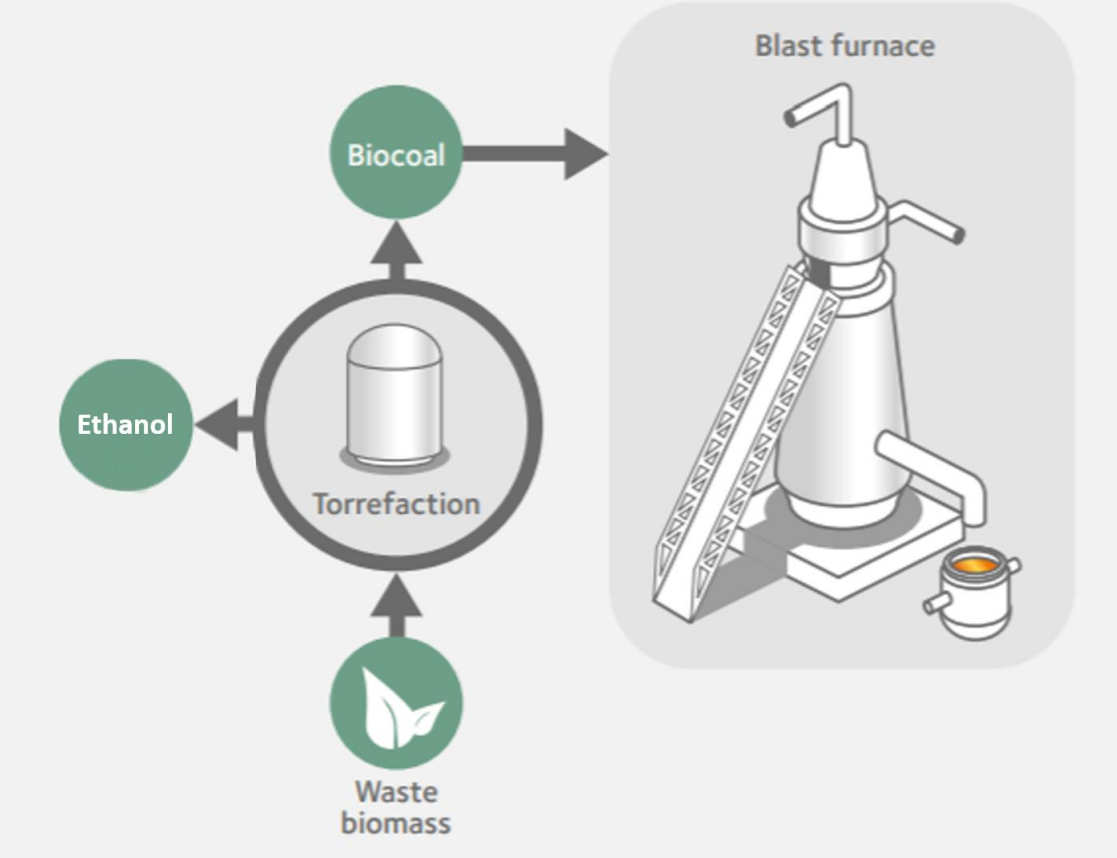
Where are we seeing interest in biomass now?

Aço Verde do Brasil , a charcoal based, carbon neutral steel plant

Gerdau uses as a renewable energy source known as a bioreducer - charcoal from planted forests - used to replace carbon in some of the company's units that use the blast furnace in its production process.

13 plants in South America use biomass.

Where are we seeing interest in biomass now?



ArcelorMittal is developing **Torero,** a torrefaction plant which will convert waste wood into a biocarbon suitable for the blast furnace.

Construction of the project started in 2018; production will begin in 2022.

Where are we seeing interest in biomass now?

ArcelorMittal's Sestao facility in Spain will be a full-scale zero-carbon emissions steel plant, using sustainable biomass or green hydrogen.

Tata Steel's HIsarna process can use coal, biomass or natural gas.

Where are we seeing interest in biomass now?

CSPA

Biomass and other wood residues as reducing agents to replace coal.

Biochar/coal mixture pneumatic transport laboratory testing and furnace biochar injection trials are planned.

Some biomass issues - technical

- We are used to using fossil fuels, moving to alternative reductants represents a big change
- Charcoal/Biochar cannot be swapped 100% like-to-like with coal using existing technology, but can play a role
- Biomass with CCS offers the possibility for negative emissions
- Biomass blends can be engineered and can be better than coal (no gangue) and the possibility to better engineer slags

Biomass challenges - others

- Robust supply chains exist to move the large amounts of raw materials (such as coal, iron ore, lime, scrap) required in modern steelmaking.
- Similar supply chains will need to be developed to collect biomass at volume, convert and process, and to deliver it reliably to steel manufacturing facilities
- Many sectors are looking to use biomass e.g. there will be competition, potential land use competition with food production
- Sustainable credentials of biomass used would need to be proved
  - The full supply chain must be considered, and all emissions associated with the production, processing, transport and use of bioenergy

worldsteel policy paper

Restructured and expanded public website content in the new Climate Action section includes the policy paper and:

- Fact sheets detailing the suite of low-carbon breakthrough technologies currently under development.
- Examples of member initiatives in related areas, including new business practices encouraging low-carbon market development
- Work being carried out by other international organisations including the IEA and ResponsibleSteel

worldsteel contact

Andrew Purvis

Director, Safety, Environment & Technology

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worldsteel
ASSOCIATION

worldsteel.org | constructsteel.org | steeluniversity.org | worldautosteel.org | issf.org

worldsteel
ASSOCIATION

GROUP DISCUSSIONs

POLICY FRAMEWORK

BIOMASS SUPPLY (INCL. TORREFACTION)

BIOMASS USE

BIOenergy EUROPE

Small group discussions

POLICY FRAMEWORK

Jean-Marc Jossart
Secretary General
Bioenergy Europe

Giulia Cancian
Policy Director
Bioenergy Europe

Nikos Nikolakakos
Environment and Resources Manager
CEMBUREAU

BIOenergy EUROPE

Small group discussions

BIOMASS SUPPLY (AND TORREFACTION)

Cristina Calderon
M. Intelligence Director
Bioenergy Europe

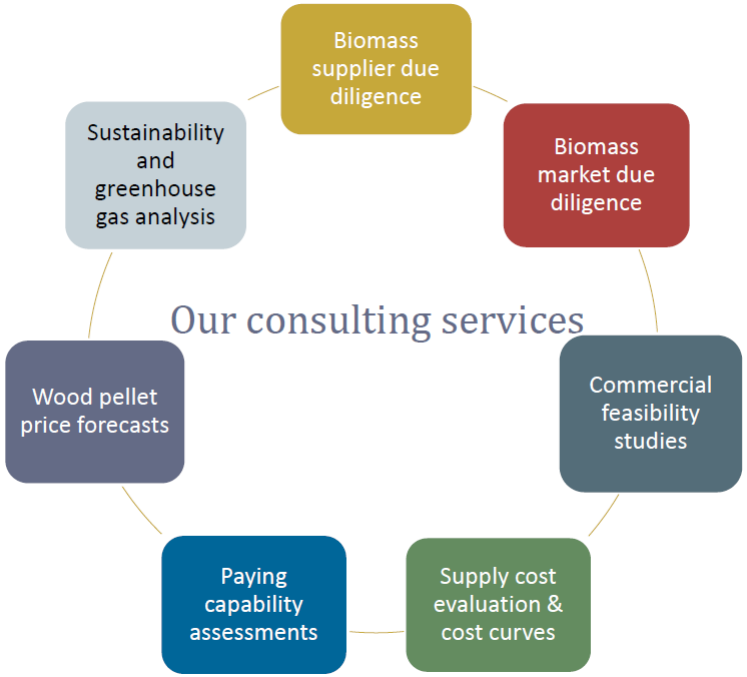
Rachael Levinson
Senior Research Manager
Hawkins Wright

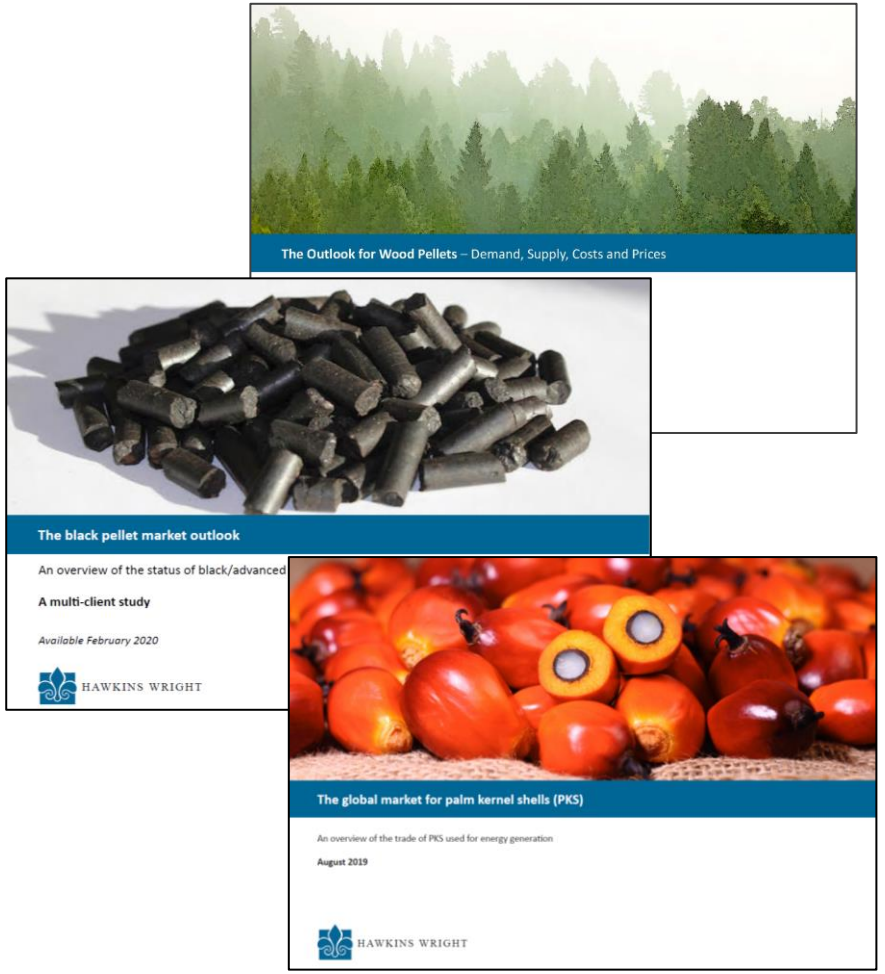
John Robert McFarlane
Founder
Albion Design

Krister Rosenqvist
CEO
Cleantek Trade

BiOenergy EUROPE

Hawkins Wright – consultants to the global biomass industry





Assessing biomass supply

Examples of related projects:

- Frequent wood pellet market due diligence studies
- Overview of the global wood chip market
- World's first palm kernel shell market multi-client report
- Black pellet market outlook
- Analysis of the factors that will drive US wood markets over the next twenty-five years
- Due diligence assessment of the feedstock supply strategy of a coal-to biomass conversion project

- Assessment of the cost competitiveness of different wood pellet suppliers
- Calculation of lifecycle GHG emissions for biomass supply chains

Small group discussions

BIOMASS SUPPLY (AND TORREFACTION)

Cristina Calderon
M. Intelligence Director
Bioenergy Europe

Rachael Levinson
Senior Research Manager
Hawkins Wright

John Robert McFarlane
Founder
Albion Design

Krister Rosenqvist
CEO
Cleantek Trade

BiOenergy EUROPE

Small group discussions

BIOMASS USE

Jonas Kugelevicius
Head of Engineering Group
AXIS Tech

Evaldas Margis
Director of Commerce
AXIS Tech

Simon Lavergne
Technical Officer
Bioenergy Europe

BIOENERGY EUROPE

AXIS Tech

Handling. Heavy. Heat.

Evaldas Margis

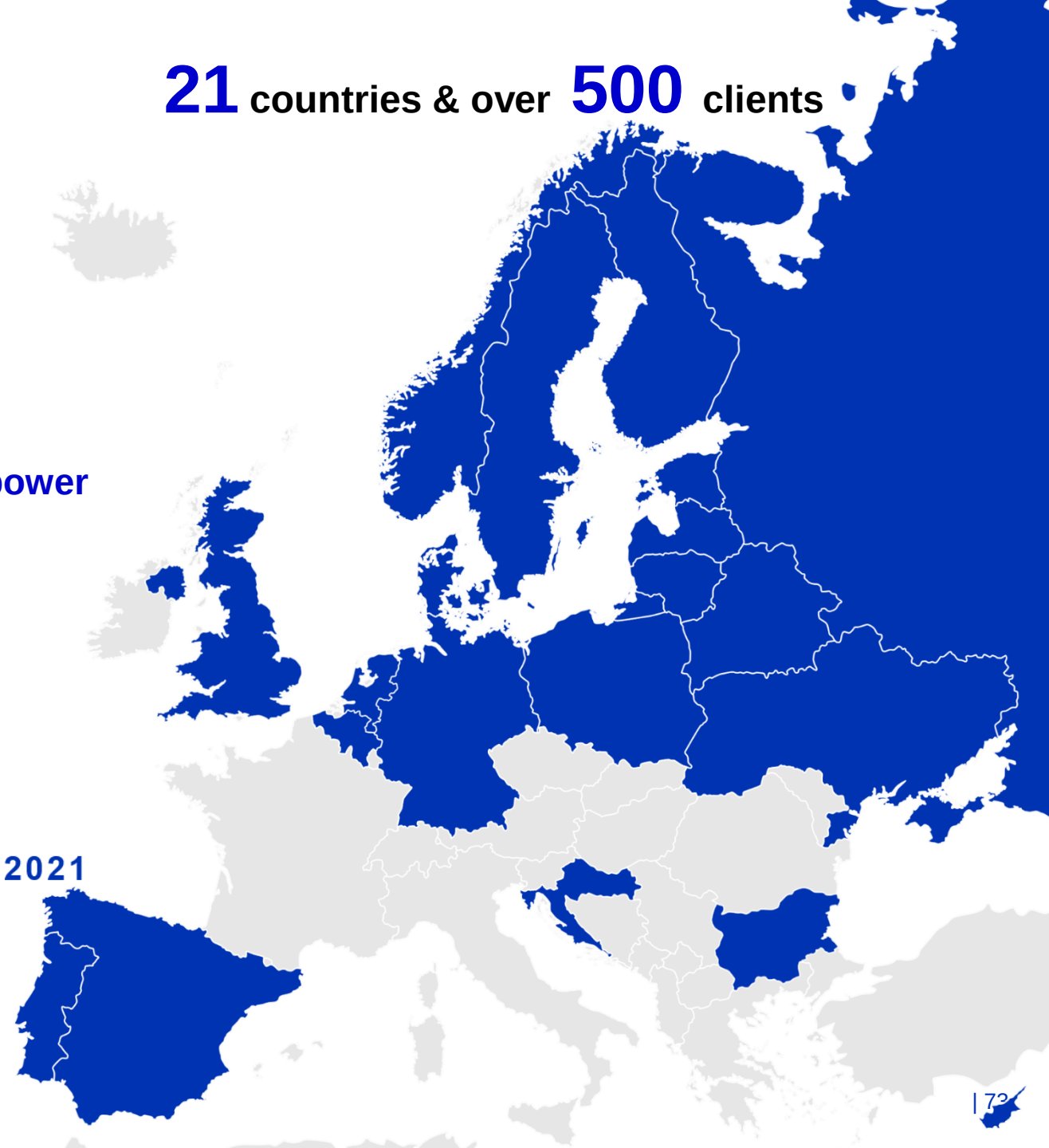
Director of Commerce

Business development and project management of biofuel technological solutions for domestic and international markets.

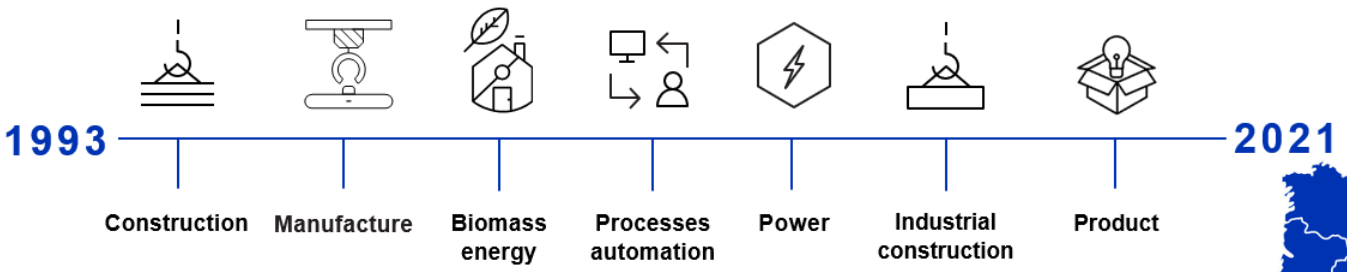
WE CARE

- **Carbon neutral** biomass energy solutions
- **Respect** for the environment
- Highest **environmental standards**
- Our produced equipment has more than **5500 MW of power**
- Our equipment utilizes **3000 t/h biomass**

21 countries & over **500** clients



OUR EXPERIENCE



FIELD OF ACTIVITIES

Industrial lifting equipment

Bulk material handling equipment

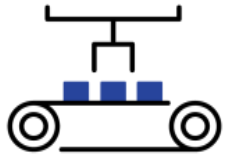
Steel processing

Biomass energy equipment

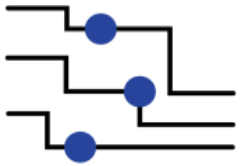
OUR SERVICES

ENGINEERING

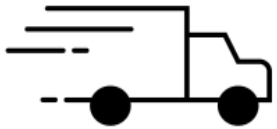
MECHANICAL DESIGN



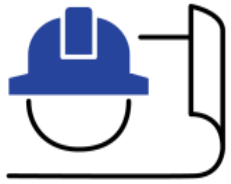
PRODUCTION



ELECTRICAL ASSEMBLY AND PROGRAMMING FOR THE MAIN EQUIPMENT



DELIVERY

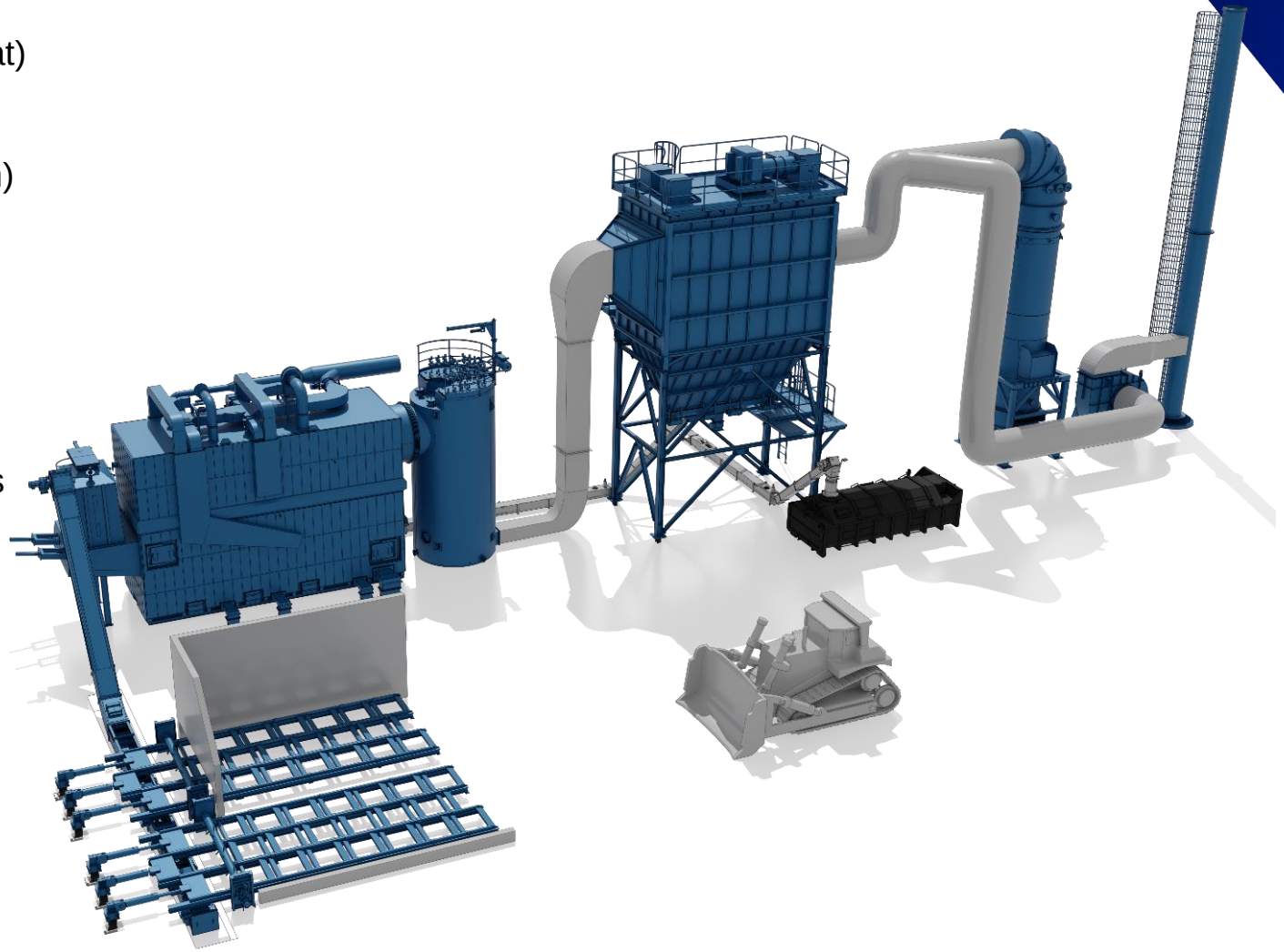


INSTALLATION ON SITE

WARRANTY AND POST-WARRANTY SERVICE

BIOMASS ENERGY EQUIPMENT

- Water heating boiler units (5 – 25 MW heat)
- Saturated steam boiler units (8 – 35 t/h)
- Superheated steam boiler units (8 – 30 t/h)
- CHP (2.5 – 20 MWe; 10 – 80 MW heat)
- Thermal oil boiler plants (5 – 25 MW)
- Fuel handling equipment and systems
- Ash removal equipment and systems
- Flue gas cleaning equipment and systems
- Heat recovery equipment and systems



REFERENCES

2x7 MW thermal oil boiler plant

Belarus

21 MWe biomass boiler plant
Total capacity – 73,8 MW

Estonia

10,6 MW biomass boiler plant

Sweden

REFERENCES

2x12 MW biomass boiler plant

Poland

5 MWe biomass boiler plant
Total capacity - 26,3 MW

Lithuania

Jonas Kugelevičius

Head of Engineering Group

Experience as a project engineer in CHP plants, hot water boiler plants, thermal oil supply, pelletizing systems, etc. in a field of important energy issues, energy combustion technologies based on biomass fuels, sustainable energy technologies, and its relations with energy economics and environment al policy.

AXIS Tech

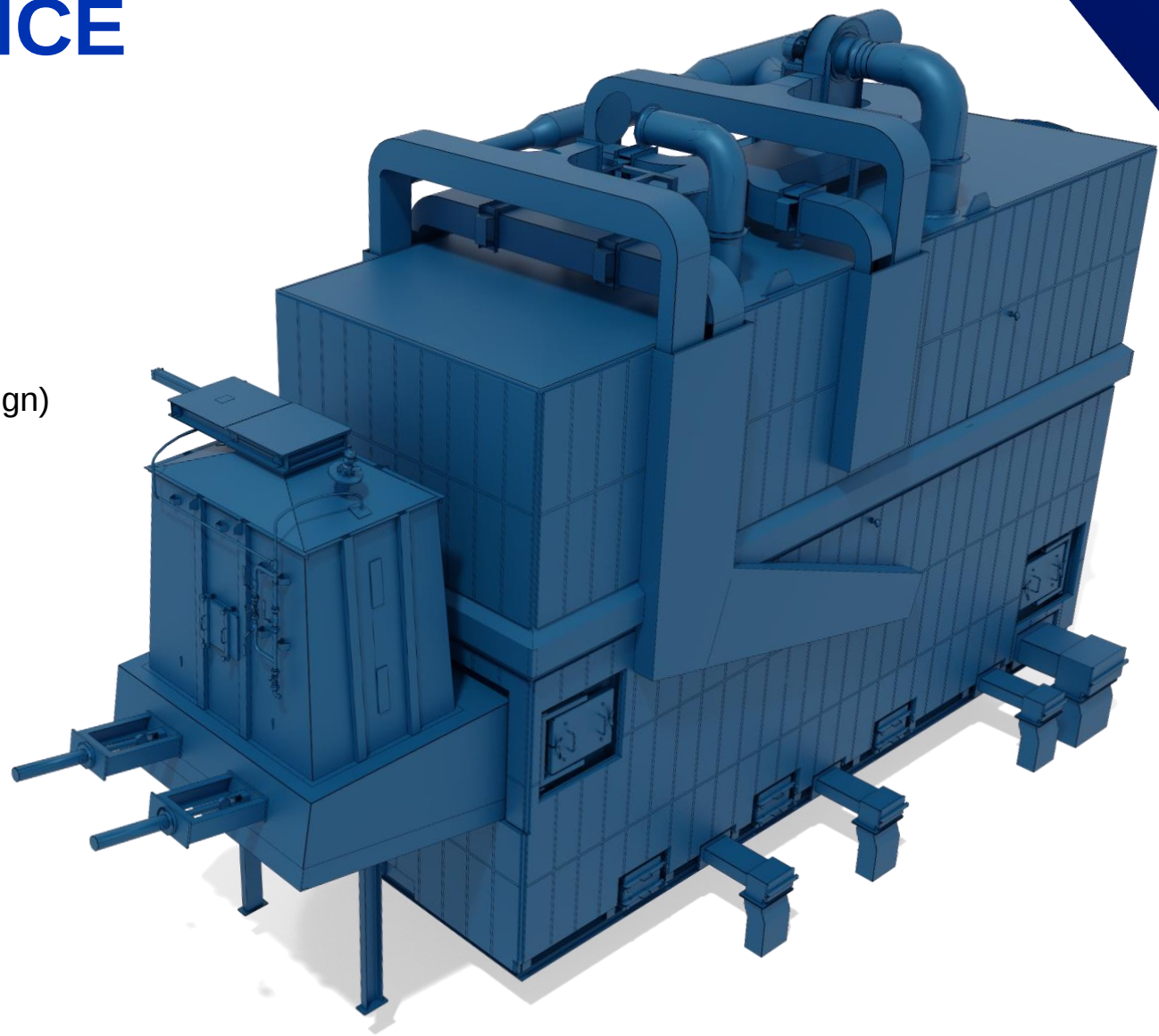
Handling. Heavy. Heat.

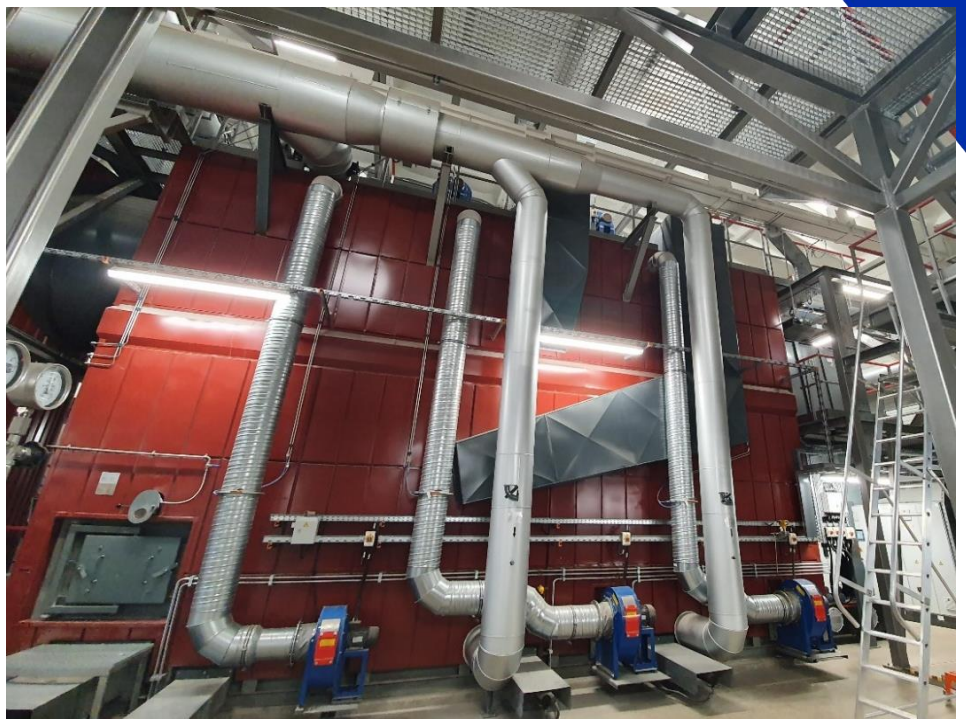
BIOFUEL FURNANCE

- Moving step grate furnace:

  PKS type 6 – 15 MW

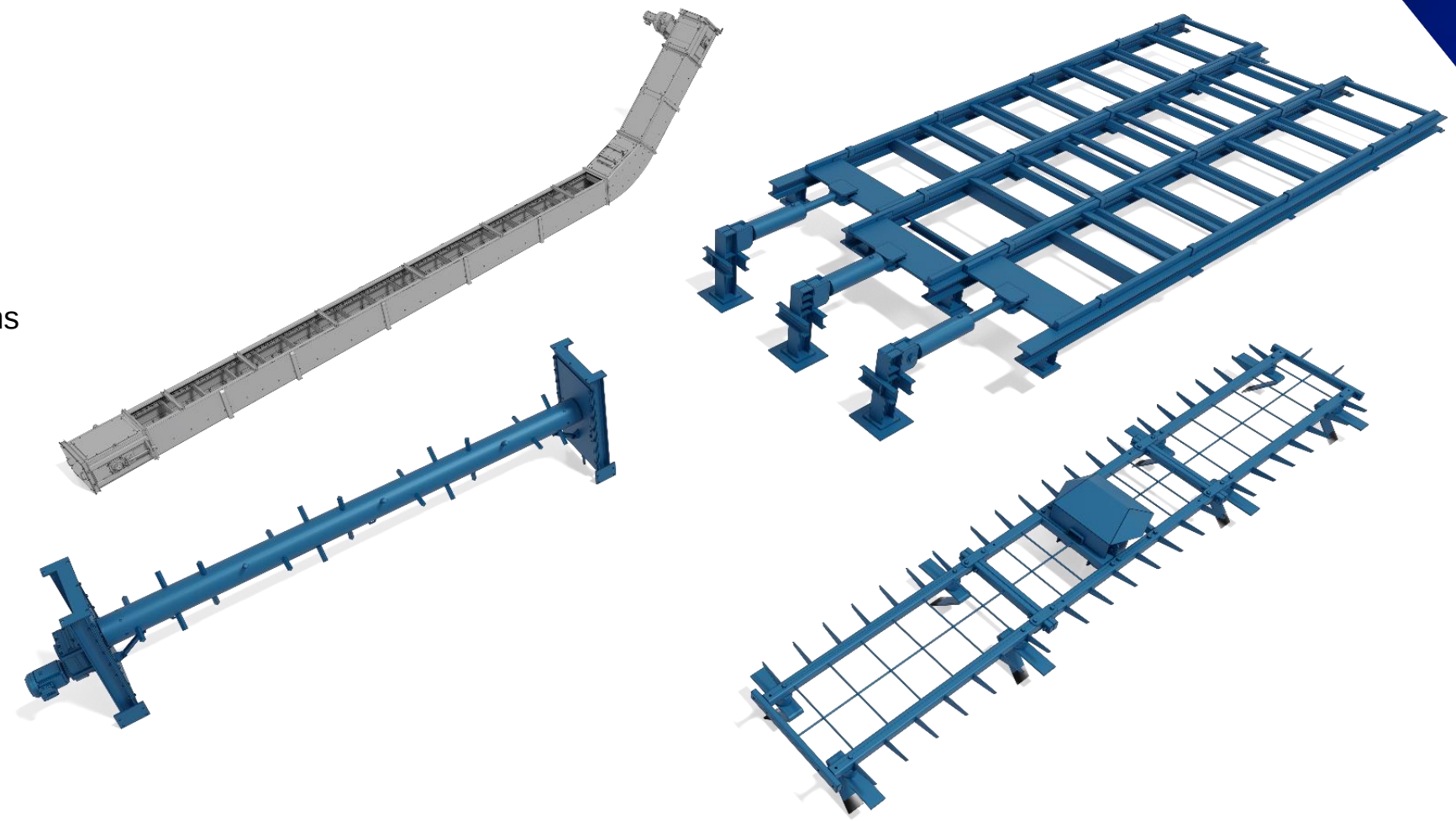
  SAX type 12 – 30 MW
- Furnace for pelletizing lines (6 – 30 MW)
- Furnace for dry fuel (6 – 15 MW, under design)





FUEL SUPPLY EQUIPMENT

- Moving floor platforms
- Fuel layer leveller
- Scrapper conveyors
- Vibro - sieves
- Screw conveyors
- Fuel distribution systems
- Fuel sorting systems
- Grab crane system

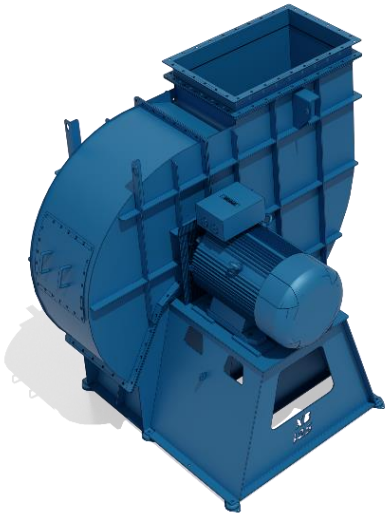


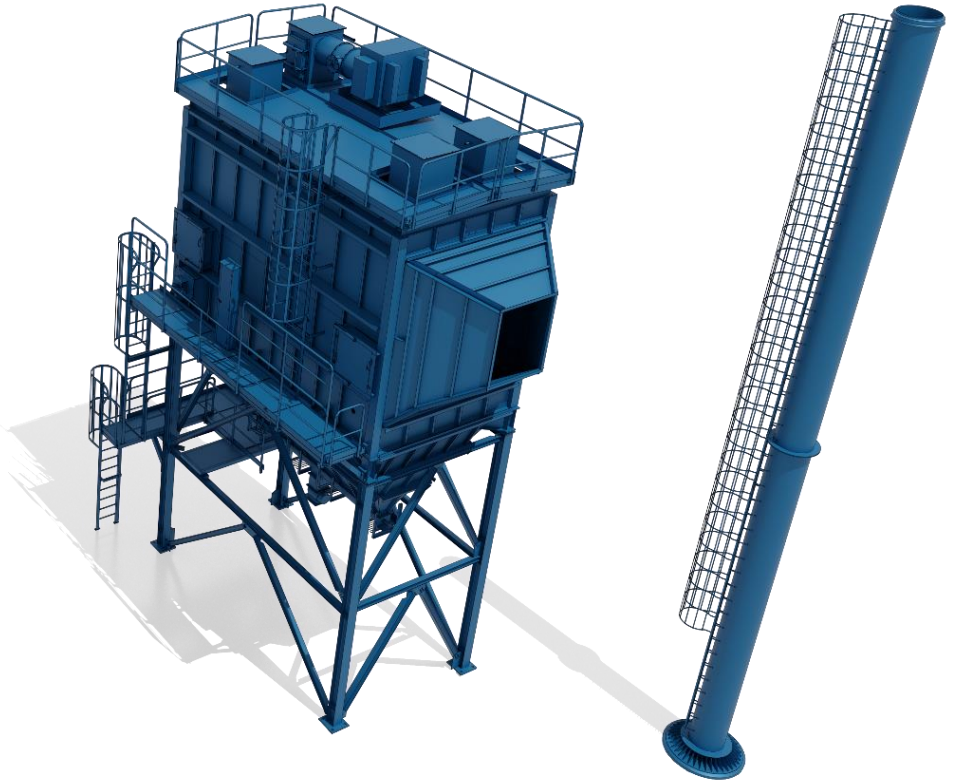
FLUE GAS TREATMENT AND EXHAUST SYSTEMS

- Multicyclone (up to 150 mg / Nm3)
- Electrostatic precipitator (ESP) (up to 10 mg / Nm3)
- Bag filter (up to 10 mg / Nm3)
- Wet-type electrostatic filtre (up to 1 mg / Nm3)
- Flue gas ducts and dampers
- Stack

SOLUTIONS FOR REDUCING NOX:

- SNCR systems

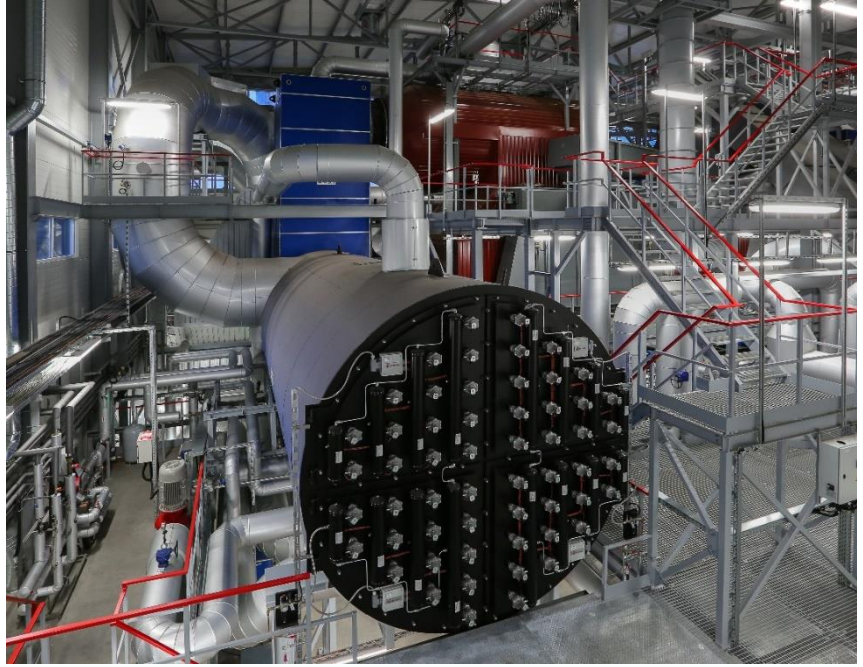


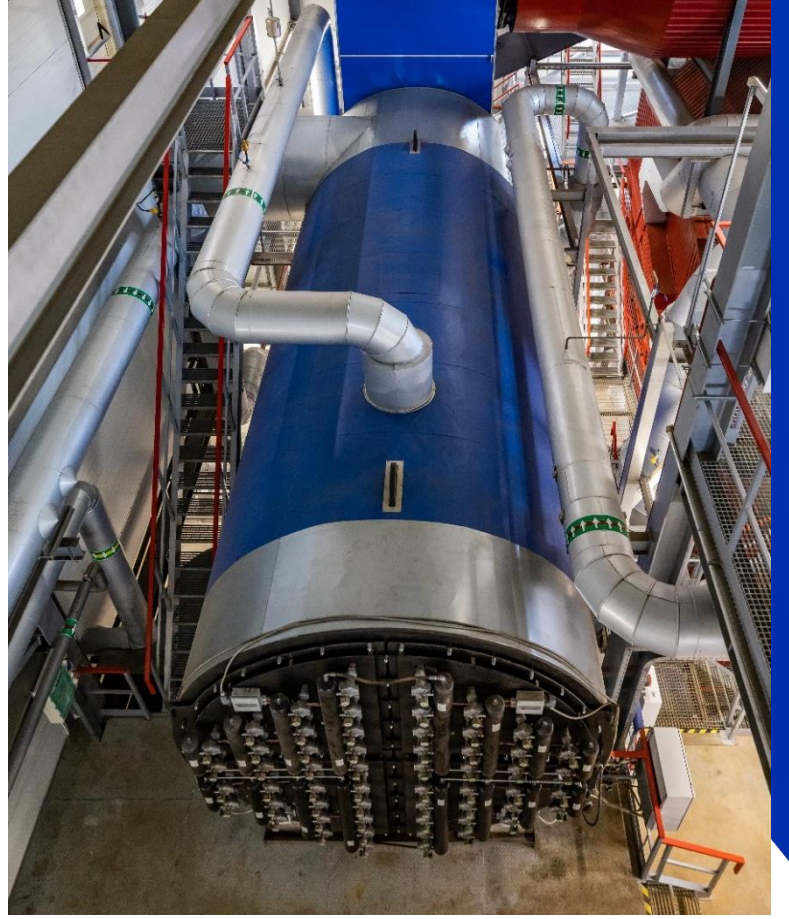



AXIS Tech

BOILERS

- Water heating boilers
- Steam boilers
- Thermal oil boilers

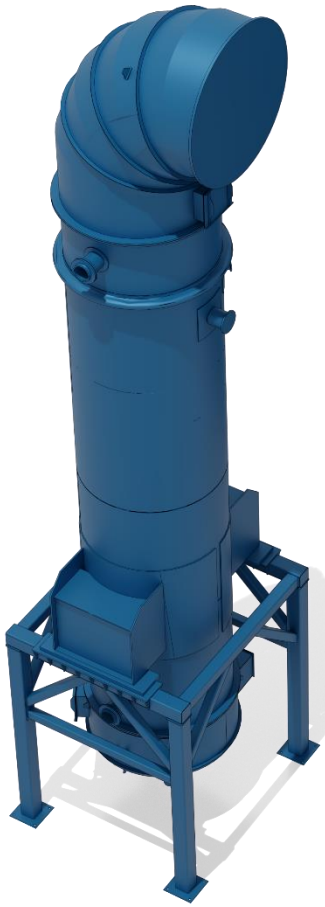


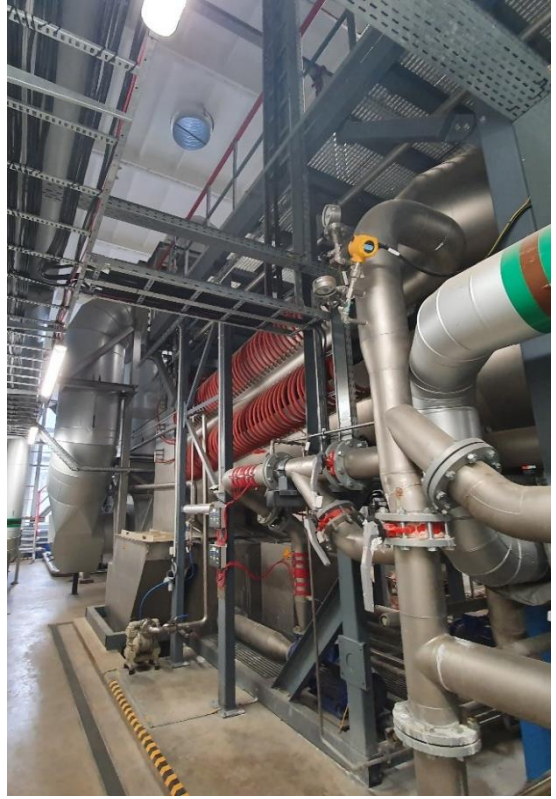



danstoker
CleanTech

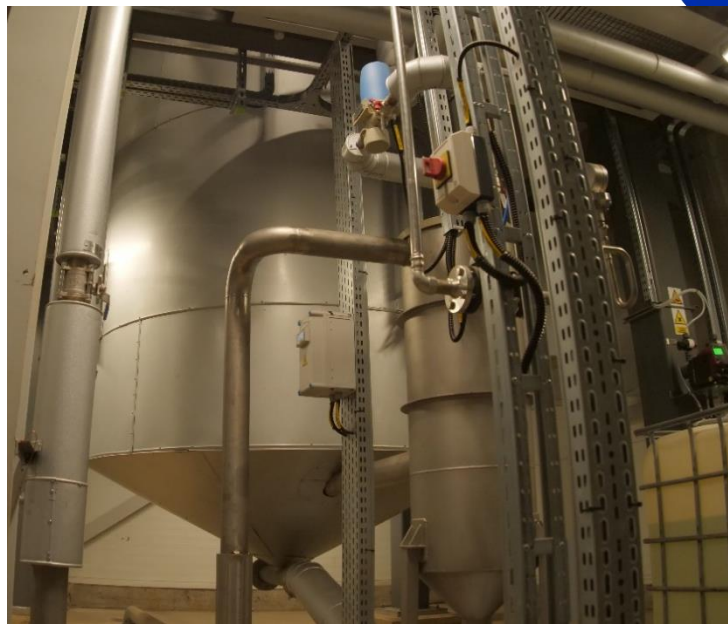
EQUIPMENT FOR IMPROVING EFFICIENCY

- Flue gas condensing economizer
- Dry-type economizer
- Heat pumps



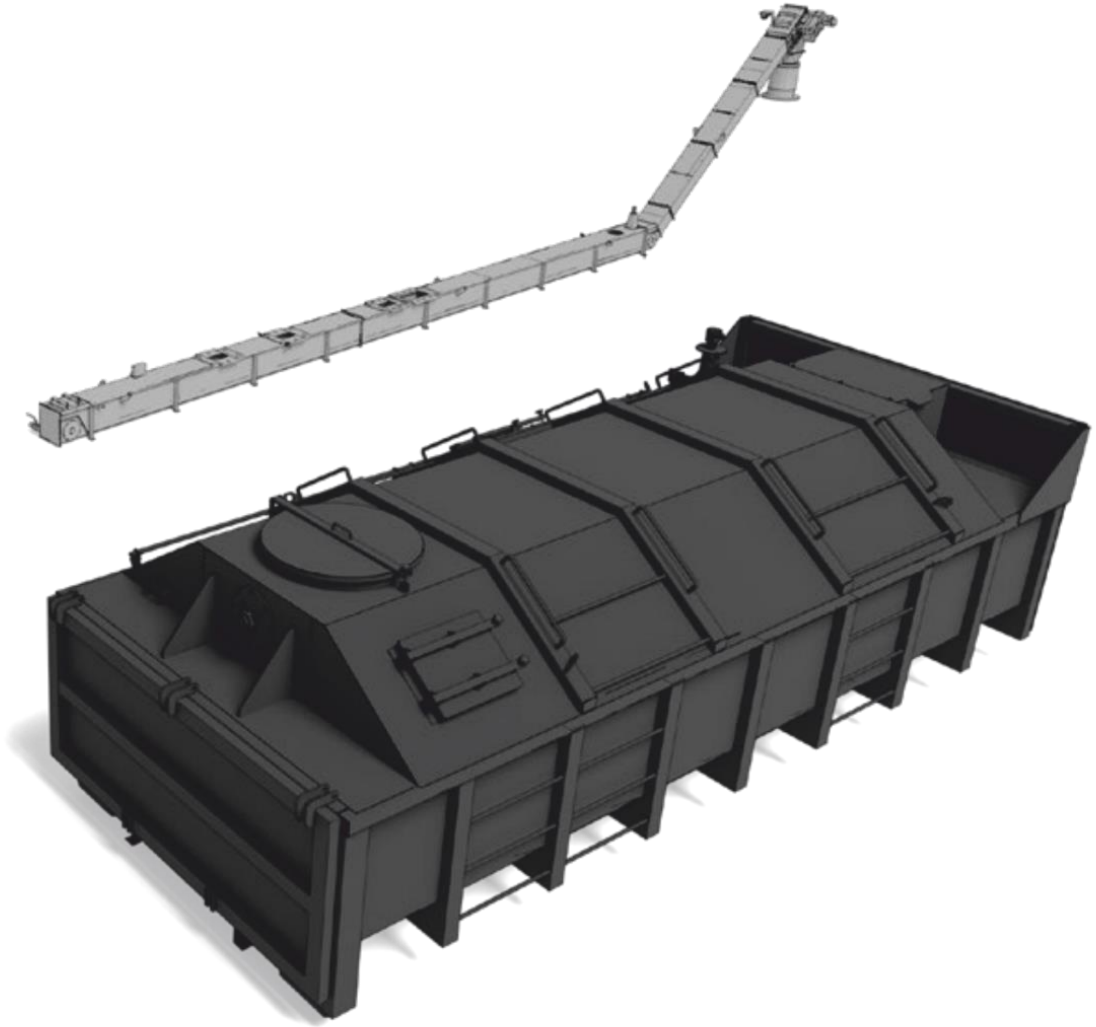







ASH DISPOSAL SYSTEM

- Dry ashes scrapper conveyor
- Wet ashes scrapper conveyor
- Screw transporter for ashes
- Rotary dispenser
- Ash container
- Other ash disposal elements



Get in touch!

info@axt.eu

www.axt.eu

AXISTech

GROUP DISCUSSIONS

Instructions

Select the group

- Policy framework
- Biomass supply
- Biomass use

Bored?

=> Change group at any time

Sound

- Microphone muted
- Webcam off

Questions/Comment?

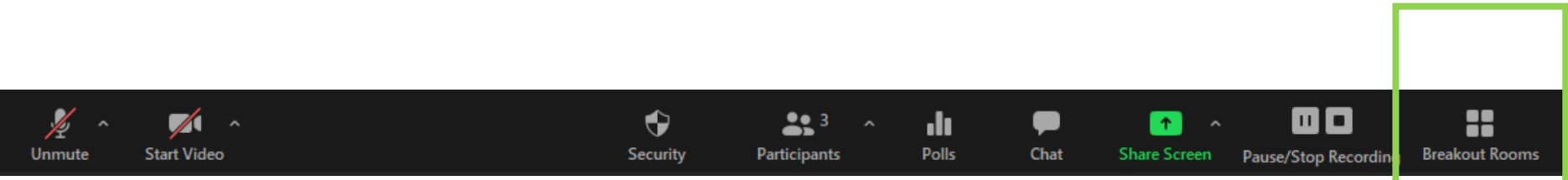
- Use Chat

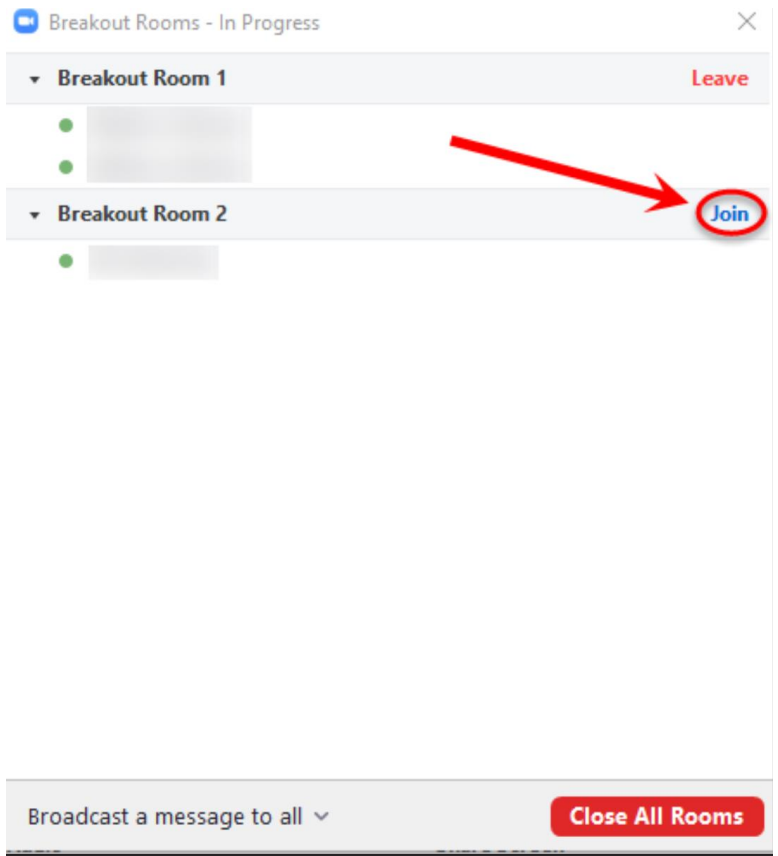
Want to speak?

- Virtually raise hand

GROUP DISCUSSIONS

Instructions





Small group discussions

WRAP-UP

Jean-Marc Jossart
Secretary General
Bioenergy Europe

Cristina Calderon
M. Intelligence Director
Bioenergy Europe

Simon Lavergne
Technical Officer
Bioenergy Europe

BIOENERGY EUROPE

Thank you for your attention!

BioEnergy EUROPE