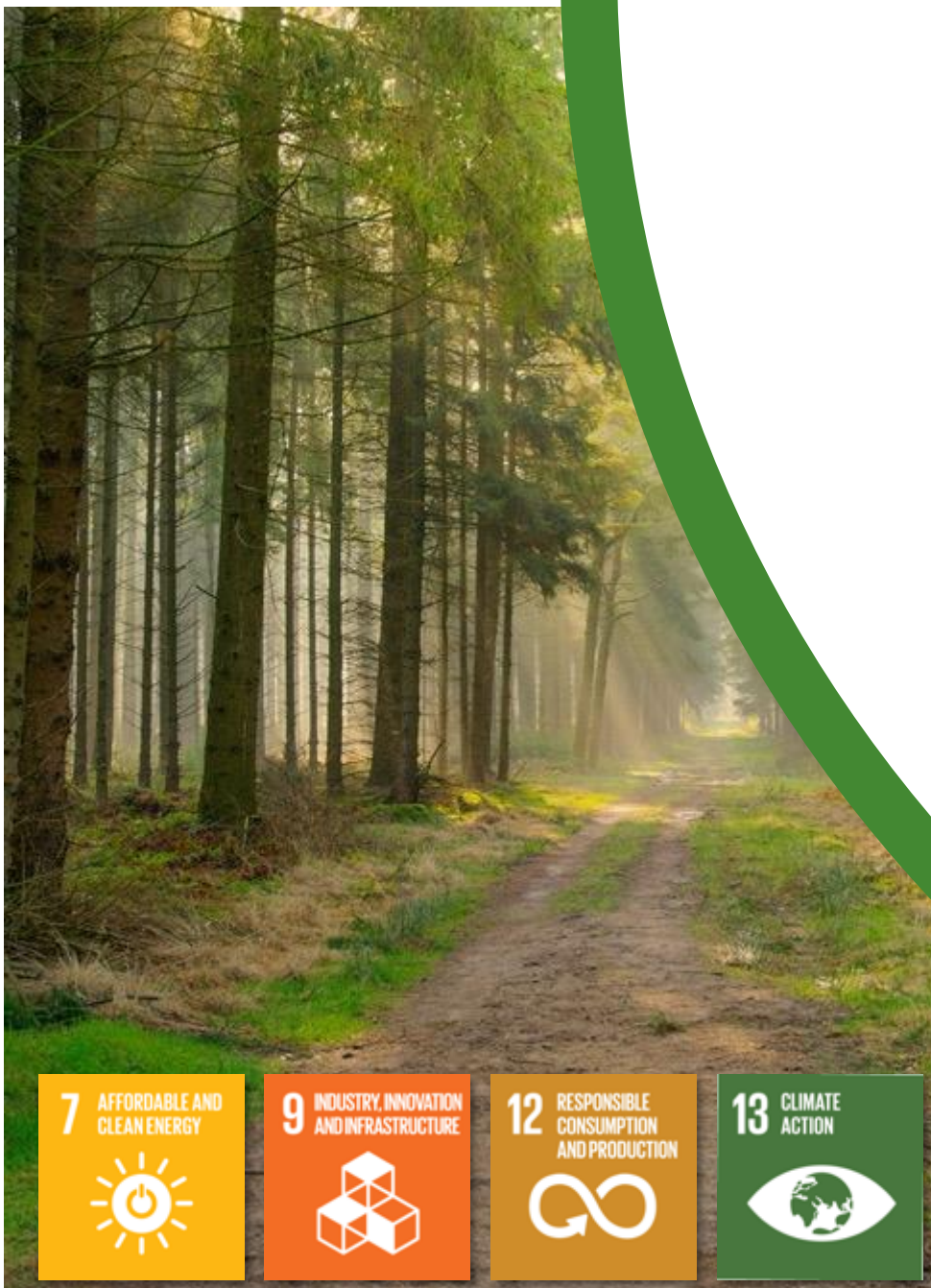

MEVA ENERGY

IEA Task 33 Presentation

November 2021

Renewable and low cost syngas for the future

Late stage development company going large-scale commercial

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- World leading gasification technology for renewable energy production based on small fraction fuels
- Able to replace fossil gas in industrial heat applications or used as fuel for CHP gensets
- Renewable low cost syngas enabling an LCOE of 20 EUR/MWh
- Market potential of EUR 100bn derived from six distinct verticals
- Potential strong growth, well aligned with macro trends for low-carbon industry

Meva Energy at a glance

Unique patented biomass gasification

Description

- Developer of a world leading gasification technology for renewable energy production technology based on small fraction fuels in a uniquely efficient and profitable way.
- Founded in 2008 as a result of biomass gasification research at Luleå University of Technology and Energitekniskt Centrum (ETC) in Sweden.
- While still in the early stages of commercialisation, Meva has signed commercial agreements with the furniture producer IKEA and the tissue producer Sofidel of a combined value of EUR 39m.

Two applications with targeted segments

- High quality process heat (e.g. tissue drying).
- Power and low temperature heat (e.g. furniture MDF/particle board manufacturing).

Three benefits

- Significantly lower production cost than conventional gas from biogas plants.
- Uniquely low carbon footprint, much lower than most other types of biofuel.
- Syngas with an exceptionally stable composition making it well suited for many industrial applications.

4	*Patent families*
16	*Employees*
2	*signed contracts for a total value of **EUR 39m***
15	*verified projects in sales pipeline valued at **EUR >150m***
EUR >100bn	*Estimated market opportunity*

Technology partnerships

Power Generation

eit InnoEnergy

SFC

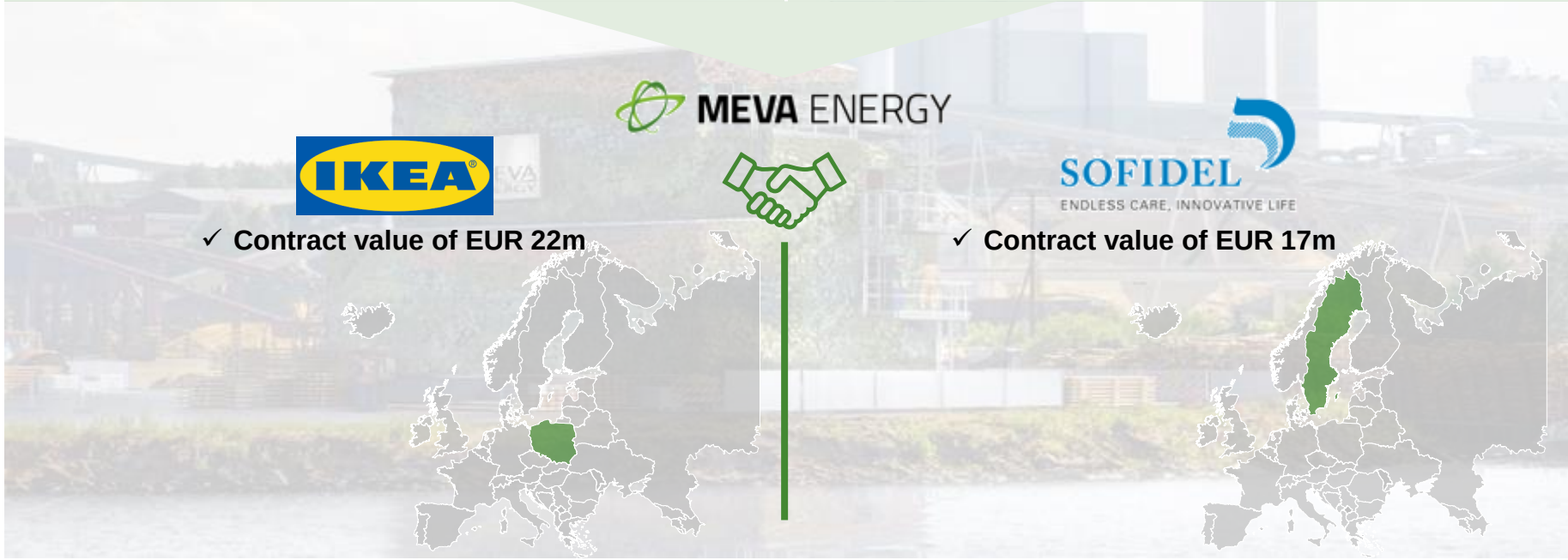
ANDRITZ

UN sustainable development goals

Two applications proven and commercialised

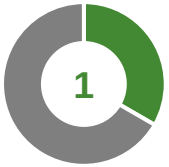
Proven interest through two signed contracts of a combined value of EUR 39m

Cogenerated power and heat	Renewable syngas
▪ Production of electricity by letting the gas fuel a gas engine connected to a power generator ▪ Power range: 1MW-15MW ▪ Power efficiency: 30%	▪ Hot air stream by delivering gas to a gas burner ▪ Tested with industrial burner suppliers ▪ Gas output: 4.2 MW and multiples thereof



Key commercial principles of Meva's technology

Low-cost renewable syngas for industrial consumption



Decentralised production	Raw syngas	Low cost feedstock
Brings biomass feedstock production and energy consumption together	*The gas is fed to either an adapted industrial gas burner or an adapted gas engine system*	*Fine fraction feedstock = low-cost feedstock*
✓ Less or no transport of feedstock ✓ Minimized distribution loss/mddle-man loss ✓ No need for gas grid ✓ Fewer stakeholders to align	✓ The syngas is kept as unconditioned as possible enabling a simple and robust system ✓ Do not strive to produce a perfect gas for all purposes ✓ Minimize total capex and parasitic loss	✓ Solves a waste problem for the industry ✓ Revenue from the production of energy and for the reception of waste residue

Value creation

The value creation from Meva's technology can broadly be separated in two categories: refining and replacement value

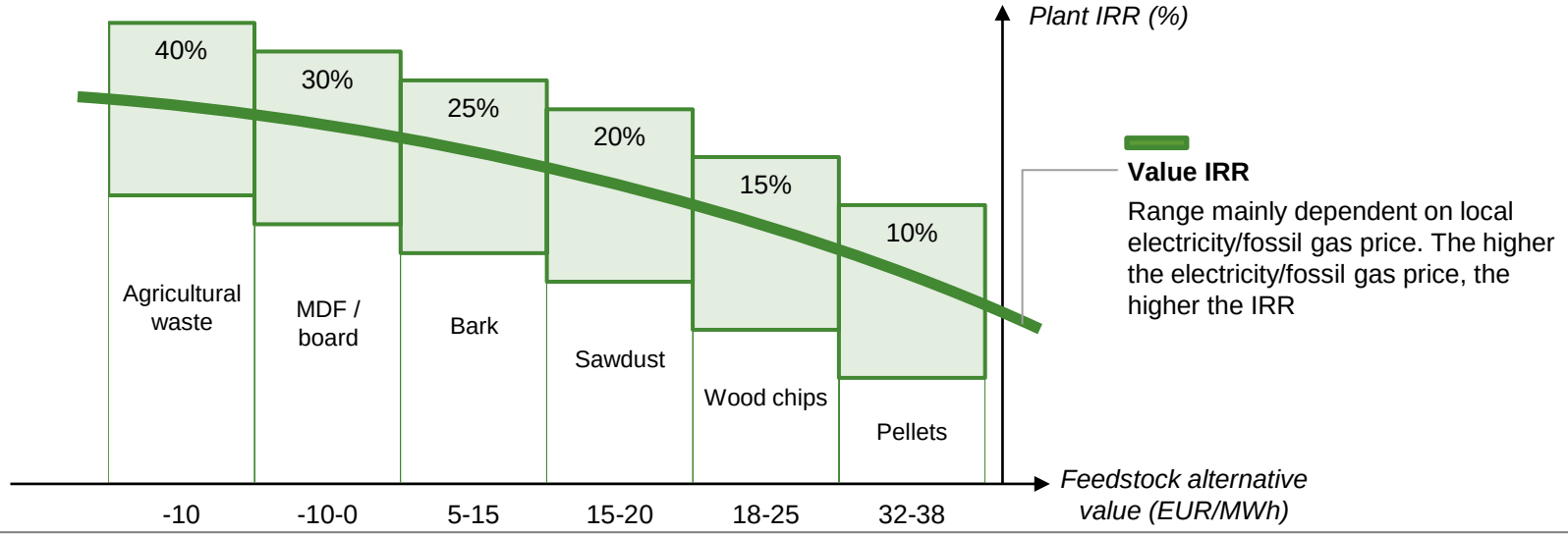
Refining value

- Created when low or negative value biomass residue is used as feedstock and through Meva's technology is converted to heat and power.
- The lower the value of the feedstock and the higher the value of power, the higher the refining value created by Meva.
- This market segment mainly **targets companies with own biomass and wood-based residue.**

Replacement value

- Meva's technology offers an **alternative source for process gas** through small and scalable plants producing **renewable and cost-competitive syngas.**
- The need for renewable alternatives is higher for applications with high quality demands, e.g. where the process heat is in direct contact with the products.
- Replacement market **customers do not typically own the feedstock** and are thus only interested in replacing their fossil-based process gas, in whole or in part.

Value and feedstock relation for refining value



Technology principle

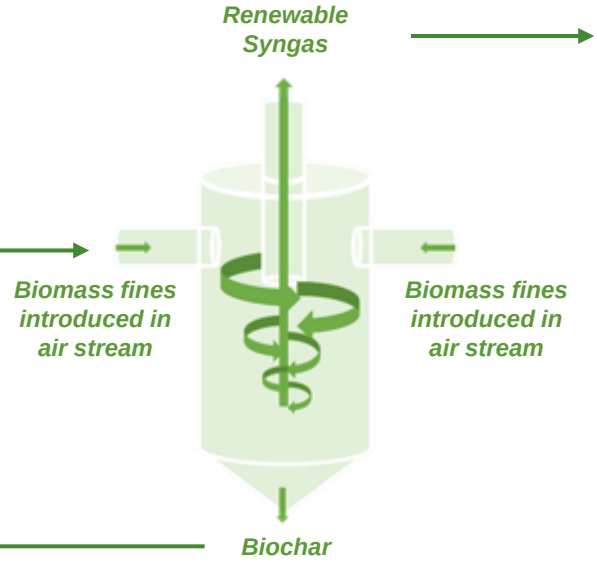
Unique gasification technology turning biomass residue into clean and stable fuel

1 Feedstock

Verified for use of wood biomass residue from MDF/HDF panels and particle board as well as sawdust, bark and other similar residue.

3 Biochar side stream

During the gasification of biomass residue, biochar is produced. The biochar can be used as soil fertiliser and to clean dirty soil which results in an carbon capture storage effect.



2 Renewable syngas

A. Process heating

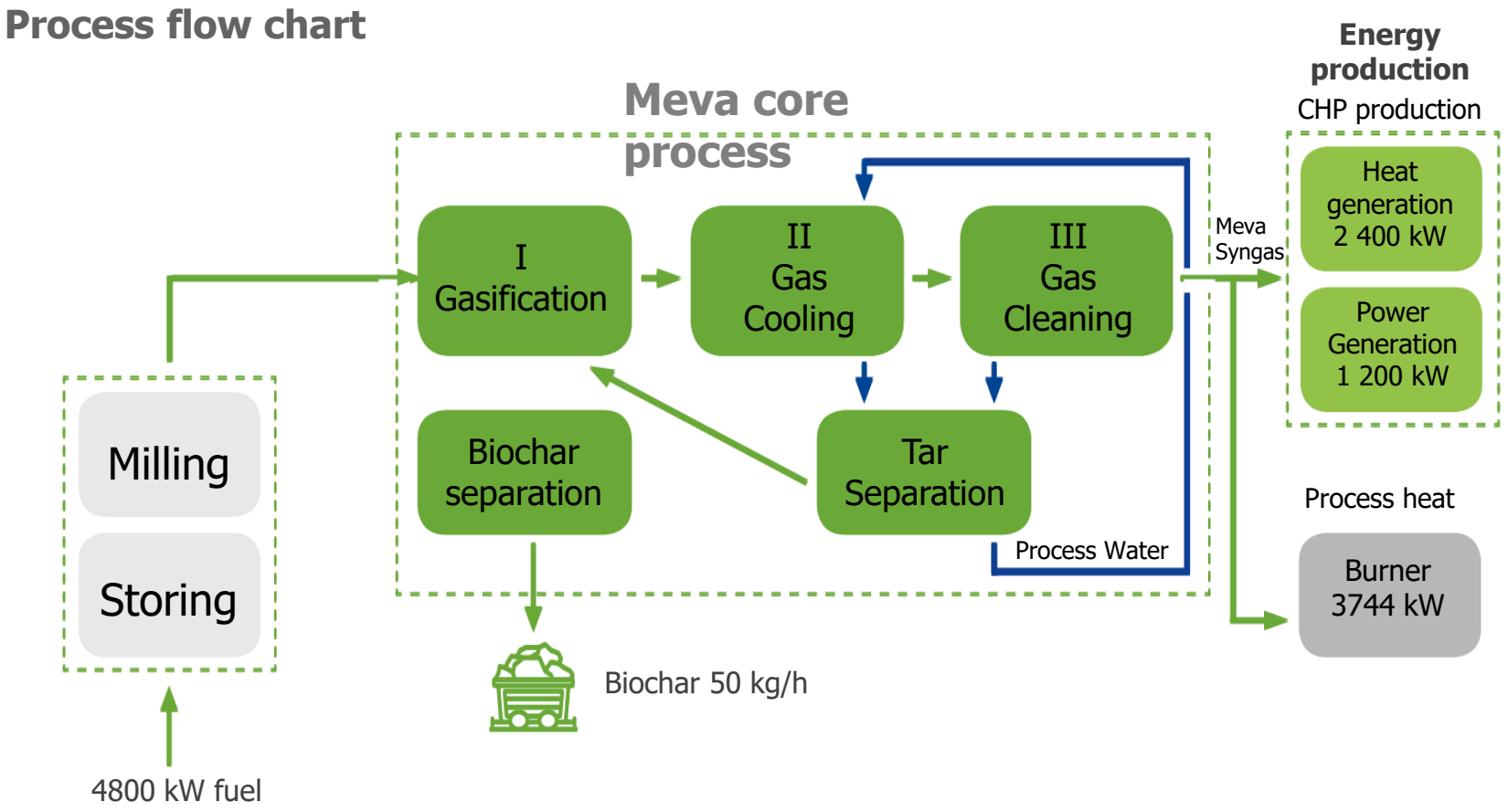
Used in an industrial burner, typically to dry or condition material output in a large industrial context.

B. Power and Heat (CHP)

High-power efficiency is achieved through the combination of biomass gasification and high-efficiency genset.

Commercial advantage	Technical advantage	Environmental advantage
Allows for the smallest fraction feedstock to be used	Gas composition stability	Renewable and low emission gas
Low cost	Key to down-stream application and enables use without costly upgrading to standardised gas	Potential for a CO2-negative footprint

Process flow chart



Learnings: progress is far from straight

Technology challenges- not only maximized cold gas efficency

- Tar handling and water treatment/separation
- Integration with gas engine/ gas burner/ paper machine
- Need for pre-projects with customers!
- Need to challenge established views: “You wont have flame stability with this low heating value”, “Its impossible to burn NH3 in our genset”, “We need methane not raw syngas”,
- Full-scale testing –> less risk but expensive
- Very important to have technology partners for lab and full-scale tests

Commercial

- Be a “focused opportunist”, the commercial landscape constantly changes
- Find right dimensioning: 1-10 MW is expensive to build but doable with private capital. < 1 MW needs high volume and small overheads. 10-100 MW requires strong public stakeholders due to investment size.

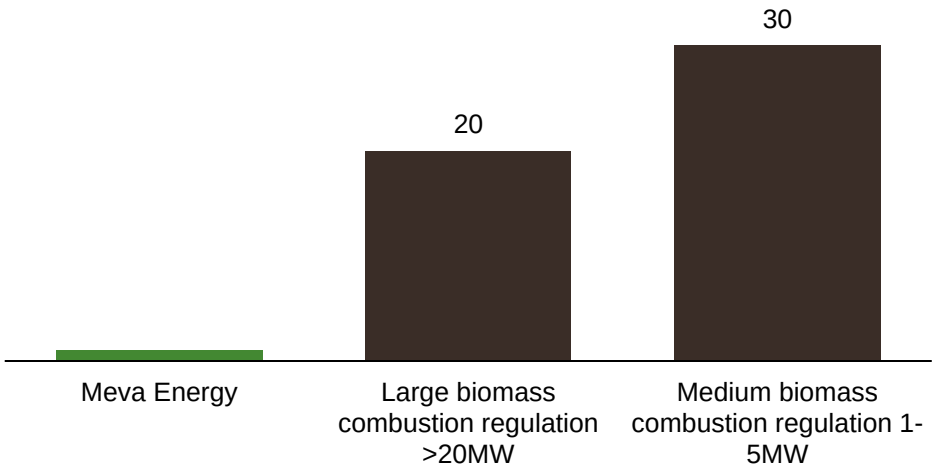
Partnerships

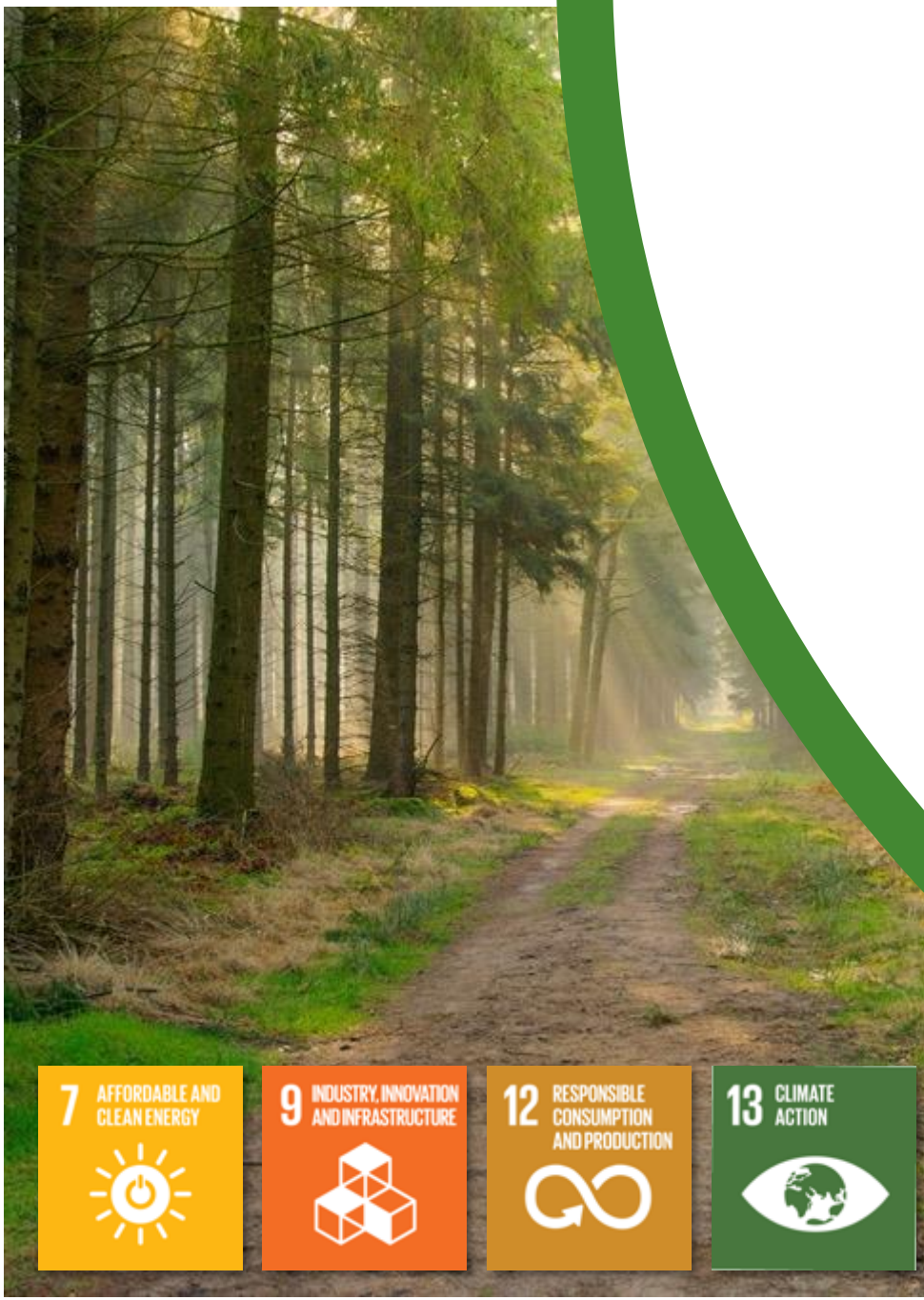
- Impossible to succeed on your own, this technology/industry is too complex. Need partnering with tech institutes, industry, customers, investors.
- Align with macro trends: carbon neutrality, ETS development, waste costs…

Why gasification/pyrolysis?

- Only way to produce large amounts of renewable gas, the feedstock resource or anaerobic digestion is too small
- Biomass gasification plants are smaller and less costly to build than AD plants
- Only way to produce biochar and create carbon sinks from bioenergy.
- Great way to cut particle emissions from biomass energy by gasifying the feedstock instead of combusting it direclty
- Great way to valorize waste resources instead of incinerating/landfilling
- A lot of long-term opportunities: jet fuel, chemicals, vehicle fuel, etc etc.

Meva in relation to EU regulations on dust (particle) emissions from biomass combustion (mg/Nm3)





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Thanks!

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