



SmartCHP
COGENERATING A RENEWABLE FUTURE

SmartCHP

Cogenerating a renewable future

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(on behalf of SmartCHP project)

**BIOCOGEN 2030 Webinar “Market
perspectives for biomass based CHP”
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SmartCHP in a nutshell

SmartCHP is an EU-funded research project.

It involves European industrial companies, universities and innovation experts, and is coordinated by Biomass Technology Group (BTG).



10 Partners



6 Countries



**June 2019 to
May 2023**

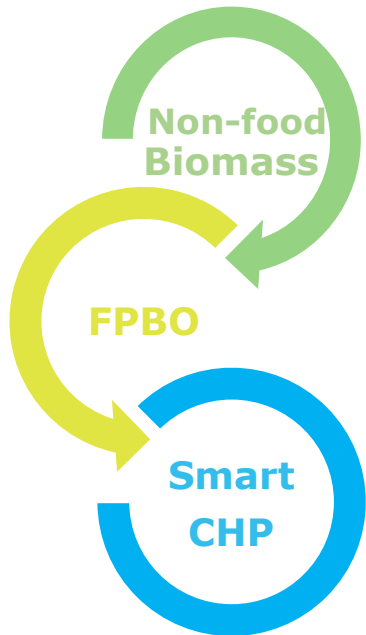


4 million



SmartCHP research project

A combination of Cogeneration and Renewables

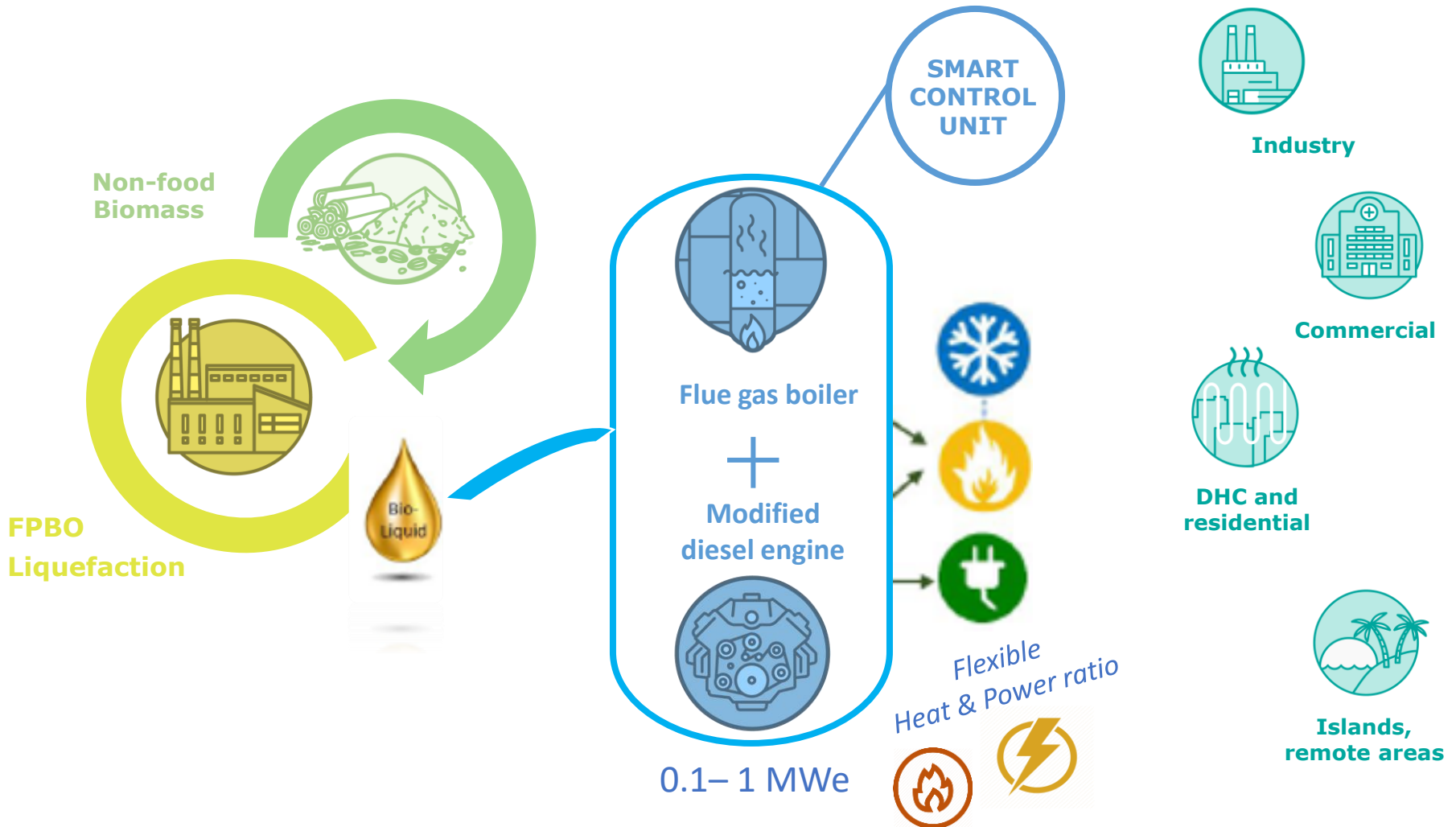


Scope: The development of...

- ✓ A **highly flexible** small-scale Combined Heat and Power (CHP) system (100–1,000 kWe),...
- ✓ Fueled with **Fast Pyrolysis Bio-Oil** (FPBO) produced...
- ✓ From different types of **lignocellulosic biomass and/or residues** (agricultural, forestry or organic waste residues).

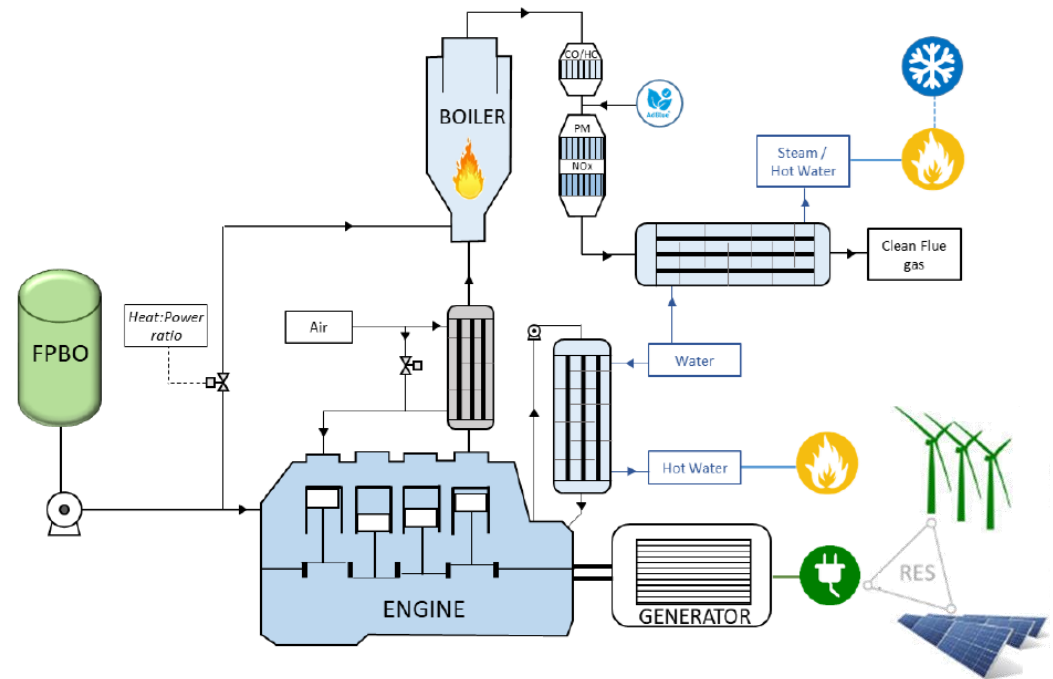


SmartCHP Project: from fields to demand



A clean cost-efficient energy system in the class of 0.1-1 MWe offering:

1. High **flexibility** of the heat to power ratio
2. **Integration** with other RES (PV, Wind)
3. **Standardized** fuel characteristics
4. Possibility of **retrofitting/revamping** old systems
5. **Ease of use** for targeted end-customers compared to other biomass-related solutions (e.g. fresh wood chips)
6. **Reduction of GHG emissions** compared to fossil fuels



SmartCHP KPIs

Technical objectives

- Overall Energy Efficiency **>85%**
- Electric efficiency **> 40%** (@ 80% engine load)
- Variable **heat-to power** ratio ranging from **1:1 to 10:1** within a wide engine load range (from 30 to 100%) enabling to respond directly to actual energy demand

Environmental objectives

- **>80% GHG emission reduction** compared to fossil fuels (RED2 Methodology)

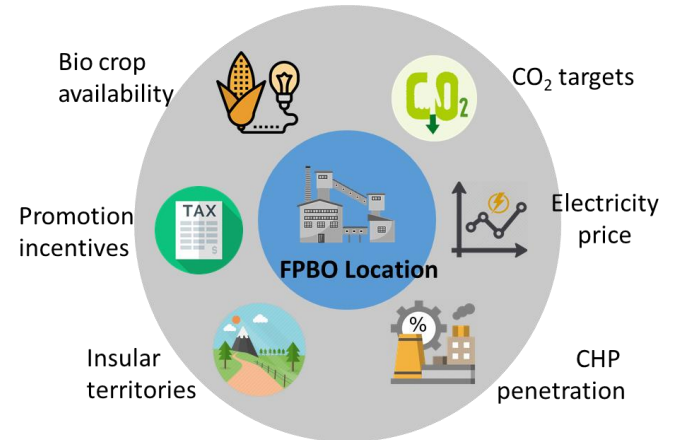
Economic objectives

- **CAPEX < 1,200 €/kWe** and
- **OPEX < 150 €/MWh** (100 €/MWh for electricity and 50 €/MWh for heat)
(at a FPBO price of 210-220 €/ton @ 16 GJ/ton)


Market Drivers for SmartCHP

SmartCHP addresses targets set by the Green-Deal and the EU “Vision to 2050”

- Contribution to the improvement of EE
- Usage a RE fuel (FPBO, source: biomass)
- Contribution to the reduction of GHG emissions



Factors driving CHP development

- 
- Clean energy transition
 - Policy support schemes and mechanisms
 - Environmental Regulations
 - Reduction of energy consumption through increased efficiency
 - Lower Operating Costs
 - Market and Awareness actions
 - Competition within CHP industry



Regulations

- Directive 2004/8/EC on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC
- Energy Efficiency Directive 2012/27/EC (EED)
- EC Regulation 2019/826 amending Annexes VIII and IX to Directive 2012/27/EU
- RE Directive 2009/28/EC
- EPBD Directive 2010/31/EU
- Ecodesign Directive 2009/125/EC

Indicative Target Market segments



CHP of 150 kWel in Hotel Mons in Slovenia (source: Code2)



Commercial sector

- Hotels
- Health Facilities
- Leisure centers
- Shops and malls
- Office buildings
- Public buildings for science and education



DHC and residential sector

- Small scale District Heating / Cooling
- Large residential complexes



Industry and Agribusiness

- Greenhouses
- Agri-Business

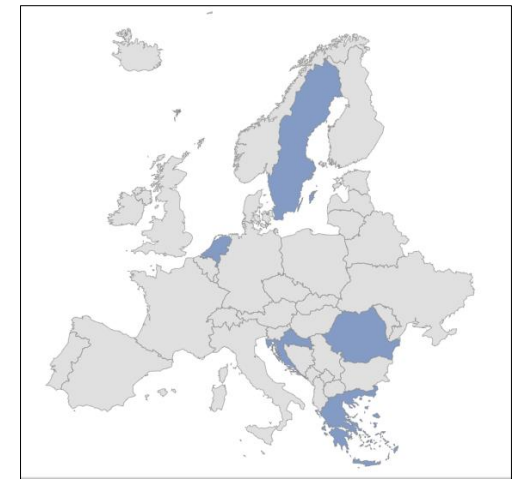
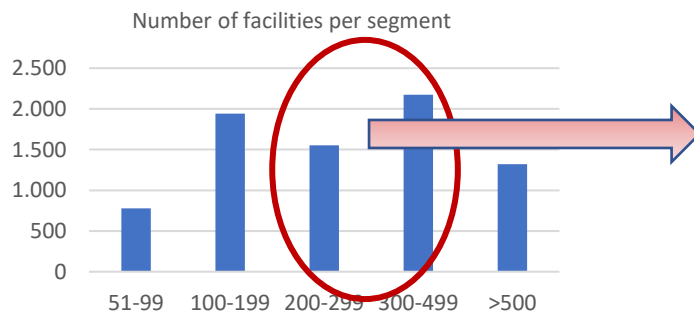


CHP of 330 kWel in Evangelisches Krankenhaus Hubertus Hospital in Berlin, Germany (source: Code2)

SmartCHP – Quantification of Market potential

Methodology for the calculation of the respective SmartCHP potential

- **Step 1:** Collection and analysis of data based on external sources and internal assumptions (expert views) in two levels
 - **First level: volume** of each segment for the five focus countries (e.g. number of bedrooms and bedplaces for hotels, number of in health facilities, total floor area, etc.)
 - **Second level: specific energy consumption** per unit (either per sqm or per bed or other, according to the corresponding unit)
- **Step 2:** Internal assumptions as regards:
 - the **elimination of buildings/facilities** out of the range of a SmartCHP system
 - the **fraction of the energy** that could be served by a CHP system and the **target fraction** for SmartCHP
- **Step 3:** Estimation of the SmartCHP units for each Country

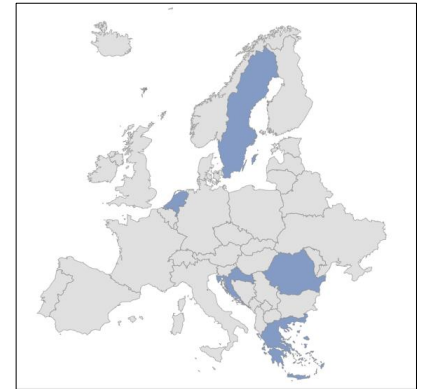


Host Countries for pilot implementation of SmartCHP Technology



Countries for pilot projects

- Feedstock potential and availability
 - Quality of biomass
 - Electricity and heat prices
 - Enabling Environment
 - Geographical spread
- Logistics and infrastructure aspects



Country	Region	Biomass feedstock	SmartCHP Units
Croatia	Central Europe	Miscanthus	>50
Greece	Southern Europe	Olive kernel	>100
Romania	Eastern Europe	Corn stover	>150
Sweden	Northern Europe	Softwood forestry residues	>100
The Netherlands	Western Europe	Pyrolysis oil import scenario from Sweden	>100

Thank you!

On behalf of



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