



Promoting the penetration of agrobiomass heating in European rural areas

## Ecodesign and non-woody biomass fuels – future review and AgroBioHeat suggestions



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The logo for Expo Biomasa features the word 'EXPO' in a small, white, sans-serif font above the word 'Biomasa' in a large, white, stylized script font, all set against an orange background.

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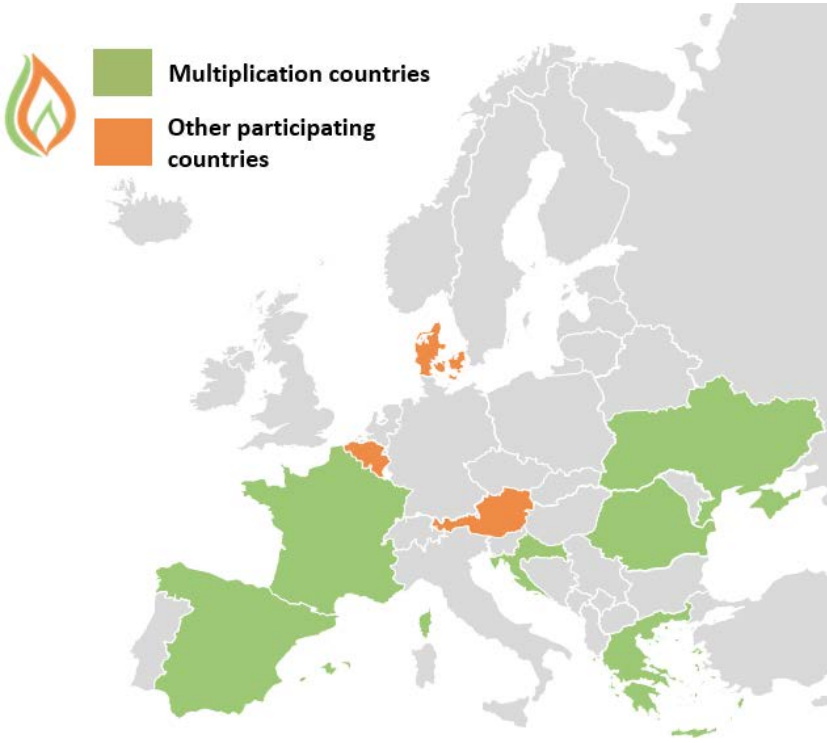
**Ecodesign: implementation, control and future**

Room # AVEBIOM · 21 sept. 10: 00-12: 00h.



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- The AgroBioHeat project
- Ecodesign Regulation 2015/1189 – non-woody biomass fuels and future review
- The AgroBioHeat approach regarding Ecodesign Review
- Agrobiomass performance in biomass boilers / Summary of lab test runs
- AgroBioHeat suggestions for Ecodesign Review




⇒ **Providing support to develop the use of agrobiomass heating in Europe**

## Our approach

### Providing Support

**Targeted actions** for specific stakeholders and policy makers to assist early adopters and create a level playing field



### Generating Vision

**Roadmap / vision** for agrobiomass heating: inclusion in political agenda, business strategies, local and regional development priorities



### Developing Trust

**Proof** that agrobiomass heating works, that it is economically, environmentally, socially sustainable and that other adopters have succeeded



## Our strategy for change

- ✓ Accompaniment of new initiatives
  - ✓ **Policy recommendations for revision of Ecodesign Regulation based on combustion tests**
  - ✓ Trainings to installers
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- ✓ Policy roadmaps / recommendations & advocacy actions
  - ✓ Increased sector visibility in fairs & expos
  - ✓ Social surveys & local / regional workshops & community hearings
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- ✓ Agrobiomass Heating Observatory
  - ✓ Visualization and promotion of success cases
  - ✓ Organization of site-visits
  - ✓ Targeted dissemination actions
  - ✓ Performance testing of modern agrobiomass heating devices (lab-scale & operating facilities)

# Ecodesign Regulation 2015/1189

## COMMISSION REGULATION (EU) 2015/1189

- Establishes Ecodesign requirements for placing on the market and putting into service solid fuel boilers with a rated heat output of **up to 500 kW**
- **Compulsory fulfilment by 1<sup>st</sup> January 2020** (for new boilers sold in the market)
- For solid biomass boilers, applicable only to **woody biomass; non-woody biomass is out of scope**
- Current requirements for **seasonal space heating efficiency and emissions** (CO, OGC, PM, NOx) – biomass boilers:

Feeding Method	Nominal heat output	Seasonal space heating energy efficiency	Seasonal space heating emission limits (mg/m <sup>3</sup> at a 10 % oxygen concentration)			
			Carbon Monoxide, CO	Organic Gaseous Compounds, OGC	Particle Matter, PM	Nitrogen Oxides, NOx
Manual	≤ 20 kW	≥ 75 %	700	30	60	200
	> 20 kW	≥ 77 %				
Automated	≤ 20 kW	≥ 75 %	500	20	40	
	> 20 kW	≥ 77 %				
Benchmarks for Best Available Techniques (BATs)		90 % condensing 84 % non-condensing	6	1	2	97

**Note:** At the time of entry into force of the Regulation, no single solid fuel boiler was identified meeting all the benchmark values. Several solid fuel boilers met one or more of these values.

## Article 2 / Definitions

- ‘biomass’ means the biodegradable fraction of products, waste and residues from biological origin from agriculture (including vegetal and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste;
- ‘woody biomass’ means biomass originating from trees, bushes and shrubs, including log wood, chipped wood, compressed wood in the form of pellets, compressed wood in the form of briquettes, and sawdust;
- ‘non-woody biomass’ means biomass other than woody biomass, including straw, miscanthus, reeds, kernels, grains, olive stones, olive cakes and nut shells;

## Issue:

- The definition of “woody biomass” includes wood of non-forest, agricultural origin (e.g. orchard prunings) that often has different properties (e.g. higher ash, higher nitrogen content) from the woody biomass used for the production of graded wood pellets (ISO 17225-2), graded wood briquettes (ISO 17225-3) and graded wood chips (ISO 17225-4)

## Preamble / justification for non-woody biomass exclusion

- “Non-woody biomass boilers are exempted, because at present there is insufficient European-wide information to determine appropriate levels for the ecodesign requirements for them and they may have further significant environmental impacts, such as furan and dioxin emissions. The appropriateness of setting ecodesign requirements for non-woody boilers will be reassessed when reviewing this Regulation.”

## Article 7 / Review

1. The Commission shall review this Regulation in the light of technological progress and present the result of that review to the Consultation Forum no later than 1 January 2022. In particular, the review shall assess whether it is appropriate:
  - a) **to include solid fuel boilers with a rated heat output of up to 1 000 kilowatt;**
  - b) **to include non-woody biomass boilers, with ecodesign requirements for their specific types of pollutant emissions;**
  - c) to set stricter ecodesign requirements beyond 2020 for energy efficiency and for emissions of particulate matter, organic gaseous compounds and carbon monoxide; and
  - d) to vary the verification tolerances.
2. The Commission shall review whether it is appropriate to introduce third party certification for solid fuel boilers and present the result of that review to the Consultation Forum no later than 22 August 2018.



- Process has not started yet / delay expected
- Next steps: launch of review & impact assessment studies (probably combined)
- Some trends from ongoing reviews of other regulations covering similar products (e.g. oil and gas boilers):
  - Scope extended to products with higher thermal outputs (closing the gap between Ecodesign and MCP)
  - Emphasis on performance under real life operating conditions → continuous monitoring & reporting of performance parameters (not emissions for the time being)
- General framework condition: increased pressure on biomass / bioenergy sector

# The AgroBioHeat approach regarding Ecodesign Review

## Revised Ecodesign Regulation for solid fuel boilers

### Option 1 / non-woody biomass continues to be out of scope

- BaU, but...
- ... heavy discussion on air quality across Europe
- → member-states or regional / local authorities may be prompted to take (non-informed) action on their own (see Northern Italy example of banning sales of wood pellets A2 quality)

### Option 2 / adoption of very strict / unrealistic non-woody biomass emission limits

- Market is “killed”: agrobiomass boilers become impossible to install or require very expensive air emission control measures

### Option 3: Ecodesign adopts informed emission limits for agrobiomass boilers

- Possible to be met with modern installations and appropriate fuels
- Manufacturers that have already worked in this direction have a head start
- Others have time to comply (for wood boilers, a 5-year period was provided from adoption of regulation in 2015 till compliance for new products is required by 2020)

How does AgroBioHeat intend to suggest “informed” emission limits of agrobiomass boilers (up to 1 MW) for the upcoming Ecodesign review?

## 1. Lab-scale tests

- Test procedure according to EN303-5 (full and partial load)
- 6 boilers to be tested
- 3 different agrobiomass fuels in each boiler (defined for each boiler based on market potential as well as interest of manufacturers)

## 2. Field measurements at operating facilities

- Experienced operators + real operating conditions + fuels of interest
- Tested procedure to be established based on internal methodology + interests of operators (+ manufacturers)
- Measurement campaigns in France, Spain, Denmark and Ukraine

## 3. Direct contacts with agrobiomass boiler manufacturers

- Questionnaire for opinion gathering (available upon request)
- Sharing of state-of-the-art results (e.g. previous test reports, etc.)
- 2 workshops planned in Brussels (with boiler manufacturers + experts)

# Agrobiomass performance in biomass boilers / Summary of lab test runs

- Tests performed by project partners BIOS, CERTH and CIRCE + DTI (as external contractor)
- Common test methodology, following EN 303-5 and other established standards
- Boilers already tested:
  - Boiler 1 (45 kW with wood chips): based on innovative extreme air staging concept
  - Boiler 2 (49 kW with wood chips, 40 kW with agrofuels): moving grate technology and conventional air staging, coupled with ESP
  - Boiler 3 (135 kW): moving grate technology and conventional air staging, coupled with ESP (undersized)
  - Boiler 4 (60 kW): moving grate technology and conventional air staging, coupled with ESP
- 2 more tests under evaluation / pending
- First results already published at EUBCE 2021 proceedings: [Brunner et al. \(2021\) Assessment of Agrobiomass Combustion in State-of-The-Art Residential Boilers, DOI: 10.5071/29thEUBCE2021-2AO.5.1](#)

	CO [mg/Nm <sup>3</sup> ]	OGC [mg/Nm <sup>3</sup> ]	NO <sub>x</sub> as NO <sub>2</sub> [mg/Nm <sup>3</sup> ]	PM ds boiler [mg/Nm <sup>3</sup> ]	PM ds ESP [mg/Nm <sup>3</sup> ]
Ecodesign emission limit / SE*	500	20	200	40	
Boiler 1 / Sunflower husk pellets	4.5	<1.0	369.4	16.6	
Boiler 1 / Poplar	52.9	<1.0	299.9	15.4	
Boiler 1 / Agropellets	7.0	<1.0	480.8	12.8	
Boiler 2/ Miscanthus	169.4	<1.0	238.7	91.7	28.0
Boiler 2/ Olive stones	267.8	<5.5	177.6	68.7	21.0
Boiler 3 / Olive stones	3,440	70	188	472	44
Boiler 3 / Sunflower husk pellets	8,212	77	781	1,090	664
Boiler 3 / Olive tree pruning pellets	5,296	67	723	865	380
Boiler 4 / Wheat straw pellets	856	6	320	147	5
Boiler 4 / Sunflower husk pellets	4,578	<6	357	521	11
Boiler 4 / Miscanthus	872	6	226	101	< 4

All emission data relate to seasonal emissions and dry flue gas @10 vol% O<sub>2</sub>

\* According to the Ecodesign Regulation 2015/1189 and applicable for woody biomass fuels

	Within limit
	Out of limit

# AgroBioHeat main findings & suggestions for Ecodesign Review



## CO & OGC emissions

- In principle, can be met with modern combustion systems & appropriate combustion settings
- AgroBioHeat suggestion: current Ecodesign emission limit could be adopted for agrobiomass

## PM emissions

- In principle, can be met either through coupling grate-fired systems with properly dimensioned PM control devices (ESPs) or through innovative extreme air staging concepts (without secondary PM control)
- AgroBioHeat suggestion: current Ecodesign emission limit could be adopted for agrobiomass
- Note: some agrobiomass fractions with very high K content cannot meet the current limit, even with such systems

## NOx emissions

- With few exceptions (olive stones), higher values than the current Ecodesign ones due to higher fuel-N content
- However, NOx limit of MCP Directive can in principle be met for all agrobiomass types tested
- AgroBioHeat suggestion:
  - Option 1: adopt more relaxed limit for most agrobiomass assortments, aligned with MCP ( $\sim 500 \text{ mg/Nm}^3 @10\% \text{ O}_2$ )
    - Implication: agrobiomass assortments with very high fuel-N content (e.g. exhausted olive cake) would still not be able to meet this limit
  - Option 1a: current Ecodesign limit could be adopted for some assortments, with low fuel-N content e.g. olive stones, nut shells
  - Option 2: remove NOx limit altogether, in line with some EU member states national legislation (is it an option?)

## Other suggestions

- Differentiate between forest and agricultural woody biomass assortments (e.g. prunings, SRC)
- For facilities between 500 – 1,000 kW
  - Option 1: keep out of Ecodesign scope; instead of type testing, introduce permitting and on-site monitoring of emission performance every three years (aligned with MCP)
  - Option 2: include within scope of Ecodesign; for agrobiomass assortments, same limits as installations < 500 kW should be feasible

- Online workshop with boiler manufacturers organized by Bioenergy Europe – expected November 2021
- Complete laboratory and field measurement campaigns of AgroBioHeat and incorporate findings
- Online workshop with wider stakeholder groups (e.g. policy makers, scientists, civil society, etc.) – expected within first half of 2022
- Final project recommendations regarding informed emission limits for “non-woody” / agrobiomass boilers → to be submitted to European Commission services



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# Thank you for your attention!

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