

Contribution on Guidance on what qualifies a fossil fuel boiler – EPBD Recast

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Workshop: Guidance on phasing-out financial incentives for stand-alone boilers powered by fossil fuels under EPBD
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Important:

The main proposal is a “performance based approach”. The numeric examples are only for illustration and need an update.

This document is a contribution to the guidance on what qualifies as a fossil fuel boiler that the Commission shall issue to support the Member States.

After a recall of fossil fuels boiler phase-out in the Directive, and a general comment related to these requirements, a methodology is proposed. It is considered that the phase-out of fossil fuel boiler is targeting the use of fossil fuels and not the boiler as technology. As for all heat generation devices (boilers, stoves, heat pumps, solar panels, etc), the decarbonisation is depending on the energy carrier used. Boilers can have an essential contribution to the decarbonisation of heating systems, when shifting from fossil fuels to renewable fuels (e.g. locally produced biogas from organic waste and residues, green hydrogen).

Therefore, “what qualifies a fossil fuel boiler” is based on a “**CO₂ emissions level transition roadmap**”, starting in **2025 by boilers using 100 % fossil fuels**, ending **2050 by boilers using 100 % renewable fuels**, with an **intermediate target at 2040**. The emission levels in the transition roadmap are comparable, and even a little more restrictive, to the trends in the use of fossil fuels in the greenhouse gas emission intensity of electricity generation. It creates an EU level playing field between technologies.

The methodology is illustrated by a quantified example. The proposal facilitates an easy reporting by the Member States.

1) Recall related to « fossil fuel boiler » in EPBD Recast

The need for guidance is related to the following statements in EPBD Recast:

- Recital (14)

Two-thirds of the energy used for heating and cooling of buildings still comes from fossil fuels. In order to **decarbonise the building sector**, it is of particular importance to phase out fossil fuels in heating and cooling. Therefore, Member States **should indicate their national policies** and measures to **phase out fossil fuels in heating and cooling in their building renovation plans**. They should strive to phase out stand-alone boilers powered by fossil fuels, and as a first step, no financial incentives should be given for the installation of stand-alone boilers powered by fossil fuels as of 2025, ...

It should still be possible to **give financial incentives** for the installation of hybrid heating systems with a **considerable share of renewable energy**, such as the combination of a boiler with solar thermal or with a heat pump. A clear legal basis for the ban of heat generators based on their **greenhouse gas emissions, the type of fuel used or to the minimum part of renewable energy** used for heating at building’s level should support national phase-out policies and measures.

- Article 11 Technical building systems

Member States shall strive to replace stand-alone boilers powered by fossil fuels in existing buildings to be in line with the national phase-out plans for fossil fuel boilers....

The Commission shall issue guidance on what qualifies as a fossil fuel boiler.

- **Article 15 Financial incentives, skills and market barriers**

From **1 January 2025** at the latest, Member States shall not provide any financial incentives for the installation of stand-alone boilers powered by fossil fuels...,

- **Article 26 Information**

...and on replacing fossil fuel boilers with more sustainable alternatives.

- **ANNEX II Template for the national building renovation plans**

Mandatory indicator: the decarbonisation of heating and cooling,... the phase out of fossil fuels in heating and cooling with a view to a **complete phase-out of fossil fuel boilers by 2040**.

Summary of EPBD recast statements:

The EPBD objective is the **decarbonisation of heating and cooling** by phasing out of fossil fuels. As a first step, **no financial incentives should be given for the installation of stand-alone boilers powered by fossil fuels as of 2025, with a view to a complete phase-out of fossil fuel boilers by 2040**.

2) Comments on the EPBD recast statements related to fossil fuel boilers

The decarbonisation of heating and cooling is the clear objective of the fossil fuel phase-out. This is in line with the EU targets and with actions to mitigate the climate change.

By targeting only « boilers »:

- the cooling part is not considered for decarbonisation,
- fossil fuel radiators are not considered,
- fossil stoves are not considered,
- etc.

The decarbonisation of heating and cooling systems is not only related to fossil fuel boilers, even if in Europe heating systems are still dominant hydronic.

The phase-out should be technology neutral.

Clearly defining the expected impacts, the reduction of greenhouse gas emissions, is a better solution.

Professionals prefer “performance based” regulations, where the results, and not the means, are defined. A technology neutral approach allows professionals to optimise the energy transition solutions.

3) Proposal for the guidance on what qualifies as a « fossil fuel » boiler

A boiler is a **heat generation device**, able to use different energy carriers. It may use fossil fuels, non-fossil fuels (hydrogen, biogas, biomass etc.), grid electricity (mix of fossil and non-fossil fuels).

The greenhouse gas emissions are mostly related to the type of fuel used. To get an idea about the amount of greenhouse gas emissions depending on the fuel used, weighting and conversion factors are provide in the informative **table B16 of EN ISO 52000-1:2016**.

Table B.16 — Weighting factors (based on gross or net calorific value)
(See 7.3.5, 9.5.1, 9.6.2, 9.6.5 and 9.6.6.3)

Energy carrier Delivered from distant		f_{Pren}	f_{Pren}	f_{Ptot}	K_{CO2e} (g/kWh)	
1	Fossil fuels	Solid	1,1	0	1,1	360
2		Liquid	1,1	0	1,1	290
3		Gaseous	1,1	0	1,1	220
4	Bio fuels	Solid	0,2	1	1,2	40
5		Liquid	0,5	1	1,5	70
6		Gaseous	0,4	1	1,4	100
7	Electricity ^c		2,3	0,2	2,5	420
Delivered from nearby						
8	District heating ^a		1,3	0	1,3	260
9	District cooling		1,3	0	1,3	260
Delivered from on-site						
10	Solar	PV electricity	0	1	1	0
11		Thermal	0	1	1	0
12	Wind		0	1	1	0
13	Environment	Geo-, aero-, hydrothermal	0	1	1	0
Exported						
14	Electricity ^{b c}		2,3	0,2	2,5	420
15	To non EPB uses		2,3	0,2	2,5	420

In this table, **biofuels** are using up to one third of fossil fuels. **Grid electricity** is produced by using **90% of fossil fuels**.

Today grid electricity includes 20, 30% or more of renewable energy. In the future, the amount of fossil fuel use for production/transportation of biofuels will be lower reducing the associated CO₂ conversion factors. Therefore, the values for the examples to illustrate the methodology have been updated as follows:

- **Electricity:** EU average **2022: 251 gCO₂/kWh** and **30 gCO₂/kWh** for grid electricity in **2050** (European Environment Agency, 24 Oct 2023. Greenhouse gas emission intensity of electricity generation in Europe)
- **Gaseous biofuels:** **2022: 44 gCO₂/kWh** and **30 gCO₂/kWh** in **2050** (France)

When defining “fossil fuels phasing out”, it is important to keep in mind that biofuels or electricity are also containing fossil fuels.

Taking into account the updated values, in 2022:

- a **boiler using gaseous fossil fuels**
has an operational Global Warming Potential (GWP) of **220 gCO₂/kWh**;
- a **boiler using gaseous biofuels** (biogas)
has an operational GWP of **44 gCO₂/kWh**;
- a **boiler using electricity**
has an operational GWP of **251 gCO₂/kWh** (at the electricity power plant).

The boiler using gaseous biofuel has the lowest operational GWP. The boiler using electricity has the highest GWPs in 2022. In case of a combustion boilers, the GHG emissions will be on-site, while with electric driven boiler the GHG emission will be off-site.

In this example, there is no « zero CO₂ emission » heat generation system, except when using 100% PV electricity in combination with the electric boiler.

Boilers can contribute to the decarbonisation of heating systems when shifting from fossil fuels or electricity to biofuels.

➤ **Proposed methodology to qualify a fossil fuel boiler**

The methodology is based on the following principles.

Recital (14) states that the **legal basis** for the **ban of heat generators** should be based on their **greenhouse gas emissions**, the **type of fuel** used or the **minimum part of renewable energy**. The minimum part of renewable energy should be “**considerable**”.

EPBD recast defines also a **transition period** for the decarbonisation of heating systems: 2025 no more financial incentives for fossil fuel boilers, 2040 complete phase out of fossil fuel boilers.

It is important to underline that in 2040 it is still possible to give financial incentives for the installation of hybrid heating systems with a **considerable share of renewable energy**. Therefore, it is considered that a boiler can still use a minimum amount of fossil fuels.

Based on these principles, “what qualifies a fossil fuel boiler” is related to the **CO₂ emissions levels stated in a transition** roadmap and defined by :

- the starting point is a “ **fossil fuel boiler**” in **2025**;
- the final objective is a «**100 % biofuel boiler**” in **2050**;
- the transition is proposed to be **linear**.

Example

- Starting point: A boiler using 100 % gaseous fossil fuel emitting 220 g CO₂/kWh.
- Final objective: A boiler shifting to 100 % biofuel emitting 30 g CO₂/kWh
- Transition: With a linear regression related to the reduction of 190 g/kWh CO₂ in 25 years (around 7,5 g CO₂ /kWh y) a boiler would be defined as a boiler using fossil fuels if emitting in 2040 more than 107 g CO₂/kWh (see table hereafter). It means that in 2040, the share of biogas in the gas grid should be around **60%**. This could be qualified as « considerable » or « significant » (as stated in EPBD recast). The trajectory (here linear) could be country or region specific, for example depending on the ramp up of biofuels production, as biogas or biomethan from organic waste and residus.

Fossil fuel boiler if CO ₂ emission per unit of heat is equal or greater than			
Year	2025	2040	2050
Fossil fuel boiler	220 gCO ₂ /kWh	107 g/kWh	30 g/kWh
<i>Electricity (for comparison)</i>	<i>251gCO₂/kWh</i>	<i>116 gCO₂/kWh</i>	<i>30 gCO₂/kWh</i>

Table: Example: What qualifies a fossil fuel boiler – transition roadmap of CO₂ emission

The transition roadmap from fossil fuel to biofuel is of comparable to the emission level of fossil fuels contained in the electricity production. As it is even a bit lower, the transition roadmap has a higher ambition level for the decarbonisation of heating systems.

➤ **Lock-in effect – commitment of energy providers.**

Boilers are an essential component of the of the gaz infrastructure which could be used also for the distribution of biogas, hydrogen. A boiler, once installed, has a lifespan of around 20 years (EN 15459). Therefore, the following lock-in effects should be considered:

- a **boiler phase-out**, before the biofuel production ramps up and reach a “considerable” share, would hamper the future development of the renewable energy sector,
- if an **installed boiler continues using fossil fuels**, instead of shifting to renewables, would hamper the decarbonisation of heating systems.

Therefore, boilers still using partly fossil fuels, but able to use biofuels now or in the future, may **only be allowed to be installed**, if **the energy provider takes the commitment that the CO₂ emissions are kept according to the defined transition roadmap (see table before)**. The commitment may be related to the public distribution network emission factors or to individual certificates (e.g. certified purchase of biofuels).

➤ **Implementation**

The values and dates are related to the **installation of the boiler**. For the calculation of the CO₂ emissions, the primary energy factors and CO₂ emission factors, like those reported by the Member States to the Commission, could be used. They should be reported in the CO₂ emission scenarios planned in the National building renovation plans accordingly to the RES and EED directives.

The values in the table before (years, limits) are only examples and should be adapted by each Member State.