29 March 2022 | 10:00 - 12:00 CET

EXTENDING ENERGY LABELLING FOR EXISTING HEATING APPLIANCES

Replicating the HARP project in non-participating countries

Labelling methodology

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HARP

Introduction

Definition of an **energy label** for space heating and water heaters **old appliances**. For the appliances that were in the market before the introduction of energy label directive (regulations 811/2013 and 812/2013).

Give the possibility to final user and to professionals to **compare** the old appliance label with the one of a new product.

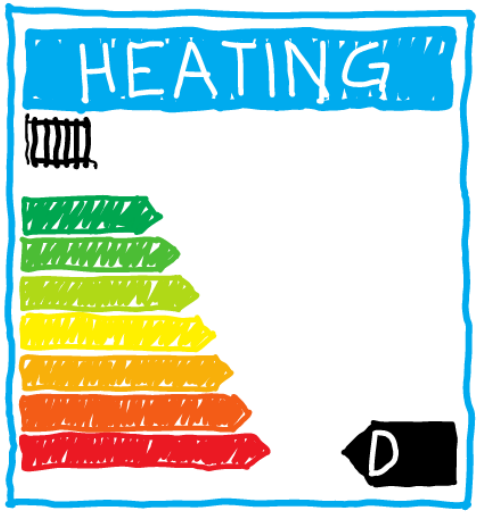
- **Simplified** version for a **common user**
- **Detailed** version for a **professional user**

Introduction

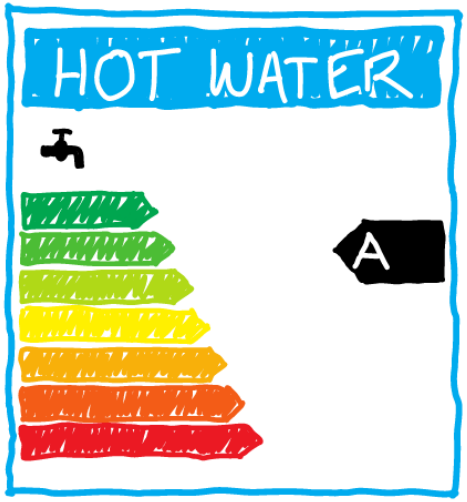
First step of the HARPa tool.

The labelling proposed in HARP is **voluntary** and made to **inform** the final user. Therefore the graphics recalls the official label.

Your existing boiler has an estimated efficiency of 70%, reaching an energylabel class of D.

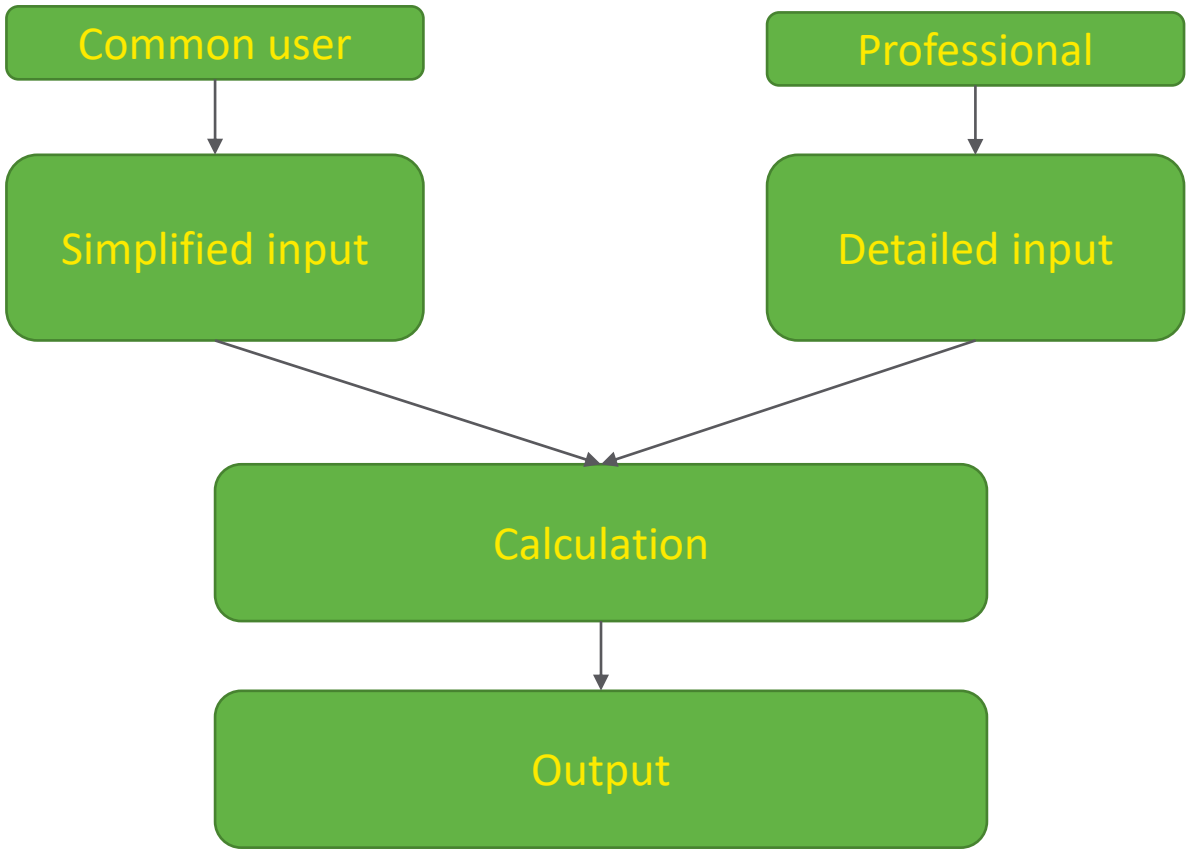


Your existing gas instantaneous water heater has an estimated efficiency of 83%, reaching an energylabel class of A.



Energy Labelling for old appliances

Defined two levels: for common users and for professional users:



Energy Labelling for old appliances

	Space heating appliances	Water heaters
Simplified Input	Fuel Boiler Group Age (Nominal Power)	WH Type Age Number of inhabitants
Detailed Input	**Fuel** **Boiler Group** **Boiler Age** **Nominal Power** FL and PL efficiency Electrical consumption Stand by heat losses Pilot light consumption	**WH Type** **WH age** Storage volume Nominal Power FL Efficiency Electrical Consumption Thermal losses Tapping profile
Output	Seasonal Efficiency Energy Class	WH Efficiency Energy Class

Energy Labelling for SH appliances

NEW

$$\eta_s = \eta_{son} - \sum F_{(i)}$$

$$\eta_{son} = 0.85 \cdot \eta_1 + 0.15 \cdot \eta_4$$

OLD

$$\eta_s = \eta_{son} \cdot \boldsymbol{C_{age}} - \sum F_{(i)}$$

$$\eta_{son} = 0.85 \cdot \eta_1 + 0.15 \cdot \eta_4$$

Calculation of seasonal efficiency (that defines the energy class) according to regulation EU 811/2013.

Energy Labelling for water heaters

NEW

$$\eta_{WH} = \frac{Q_{ref}}{(Q_{fuel} + CC \cdot Q_{el}) \cdot (1 - SCF \cdot smart) + Q_{cor}}$$

Calculation of water heater efficiency (that defines the energy class) according to regulation EU 812/2013.

OLD

$$\eta_{WH} = \frac{Q_{ref}}{(Q_{fuel} + CC \cdot Q_{el}) + Q_{cor}} \cdot \boldsymbol{C_{age}}$$

smart = 0

Qref from tapping profile

Qfuel / Qel calculated

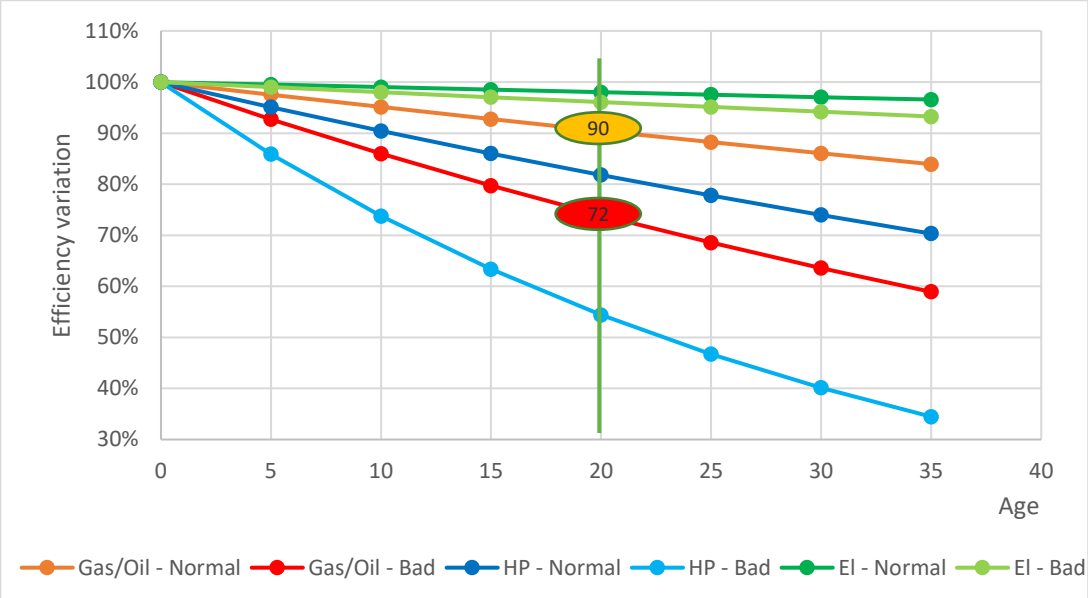
Aging Effect

Aging Effect - Degradation coefficient Cage

- Defined in cooperation with manufacturers and used function of Hendron:

$$C_{age} = (1 - M)^{age}$$

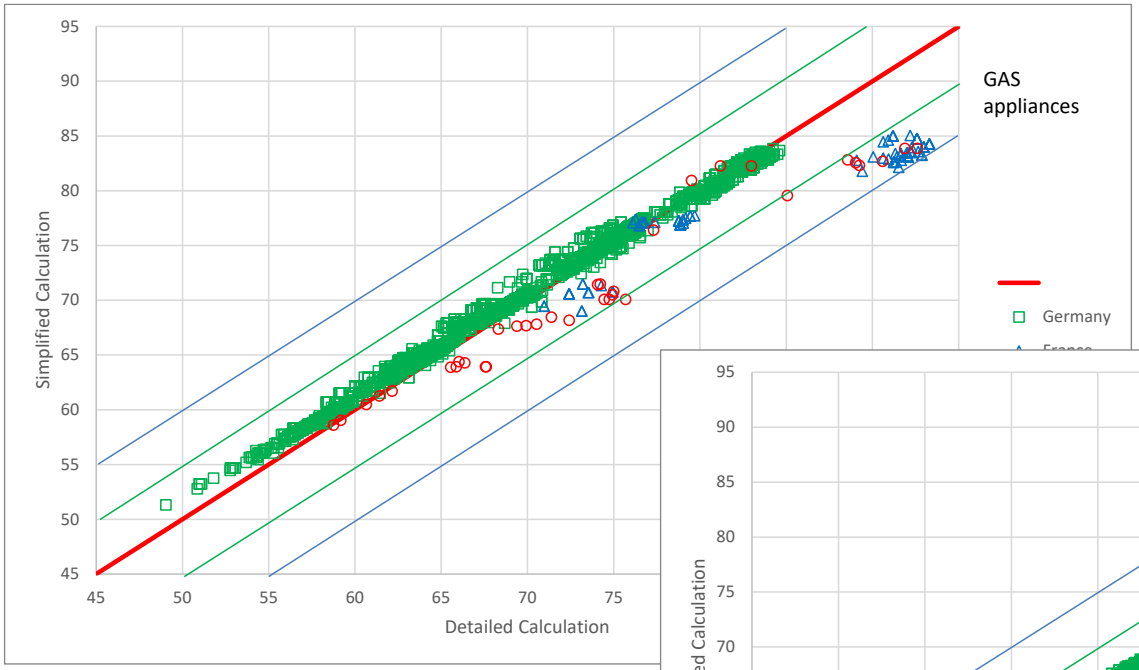
We considered different degradation coefficients for “normal” or “bad” maintenances.

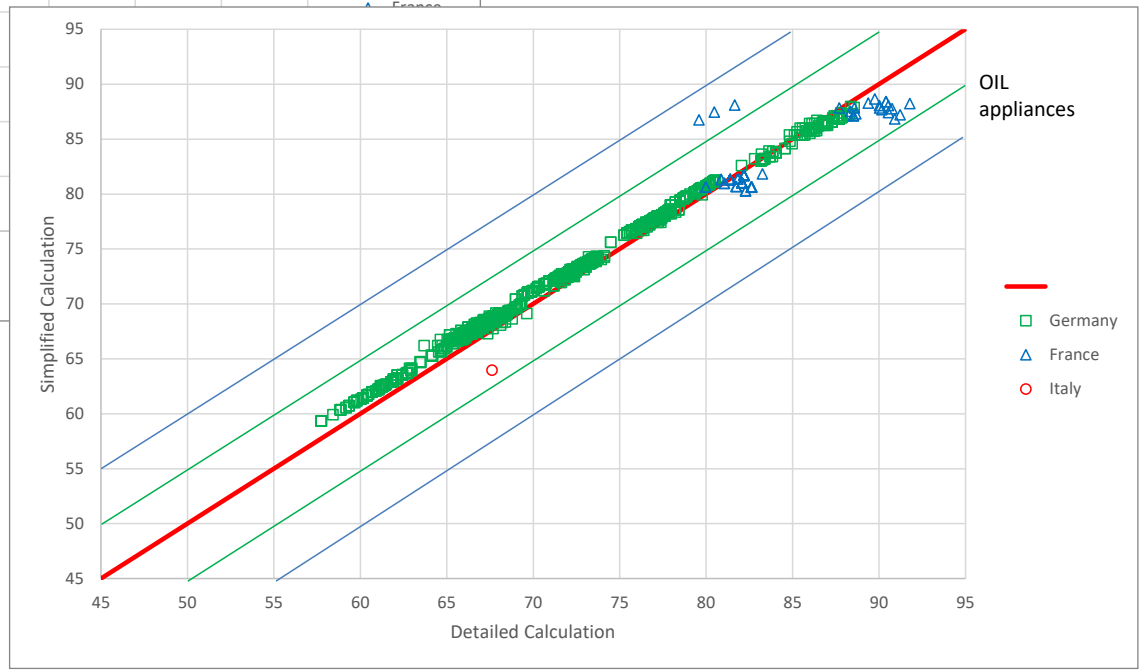


Energy Labelling for old appliances

1) The default values were selected from EN 15316 and from a market analysis.
2) The selection of default values has been simplified.
3) The validation has regarded:
   - about 4600 gas boilers
   - about 200 gas instantaneous water heaters
   - about 200 electric storage water heaters
   - with construction year from 1972 to 2019

Energy Labelling for old SH appliances



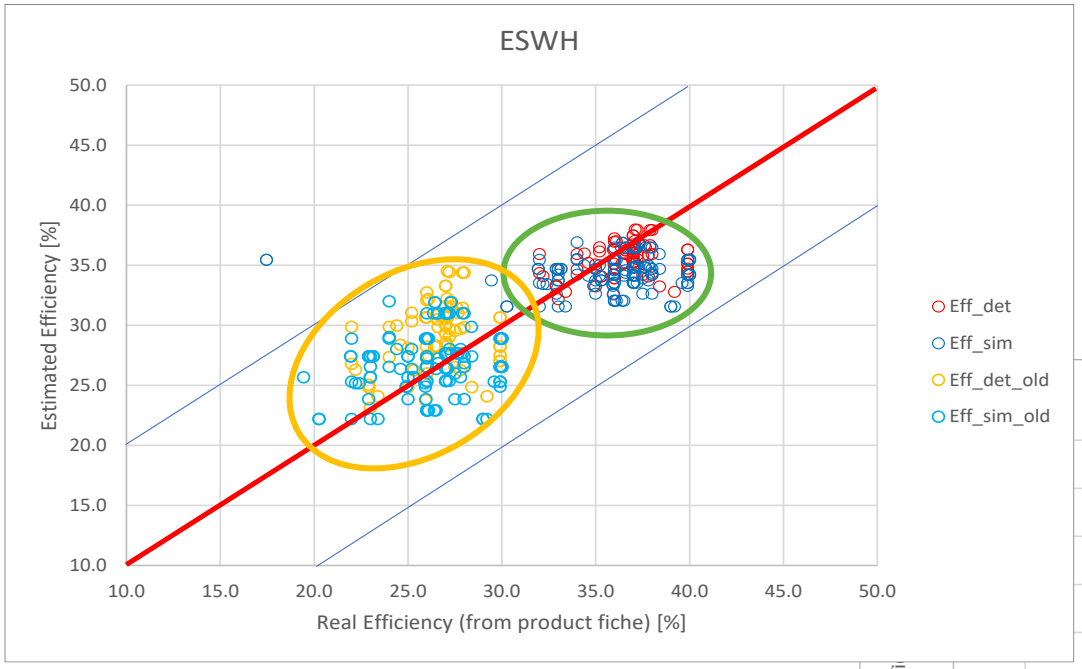


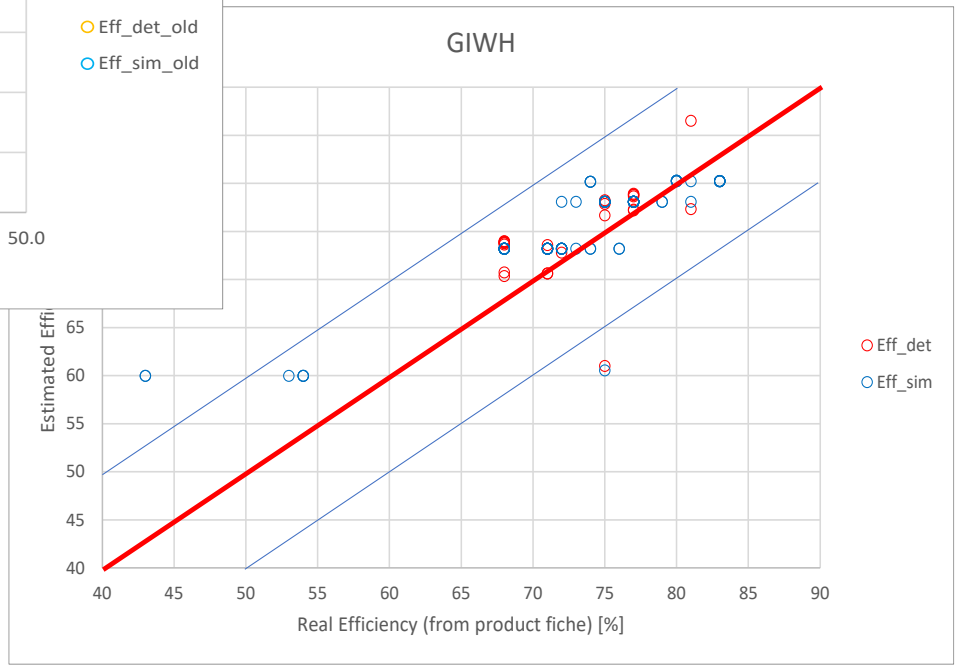
Energy Labelling for old WH appliances

Simplified version – the number of inhabitants defines the tapping profile

	Energy	N° inhabitant
S	2.1 kWh/day	0
M	5.85 kWh/day	1 – 2
L	11.7 kWh/day	3 – 5
XL	19.1 kWh/day	6 – 8
XXL	24.5 kWh/day	9+

Energy Labelling for old WH appliances





Energy Labelling for old appliances

Laboratory test.

Comparison of parameters between simplified, detailed inputs and measured values.

- Three gas boilers (one standard of 31y, two condensing of 11y)
- Two gas instantaneous water heaters (22y and 10y)

The laboratory results confirmed the labelling methodology.

Thank you for your attention!

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HARP
Heating Appliances Retrofit Planning