Topten ACT Criteria Paper:

Ovens

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Topten ACT aims at transforming the European market of energy-using products towards higher energy efficiency.
Topten ACT identifies the top energy-efficient products in 16 European countries, and makes this information available to consumers and large buyers on tailored national websites. The most energy efficient models in different product categories (such as household appliances, lighting, office equipment, consumer electronics, cars) are presented with comprehensive product information based on official labels and standardized declarations. Topten works with manufacturers and thus increases both market offer and consumer demand of high energy efficiency products. Topten is strictly neutral and independent from manufacturers and retailers, its selection criteria are always published online.
Topten ACT is supported by the European Commission's research and innovation programme Horizon 2020, and many national organisations (energy agencies, environmental and consumer organisations, research institutes). The Topten ACT project involves 17 partners in 16 European countries. It is coordinated by ADEME (Agence de l'Environnement et de la Maîtrise de l'Energie).
More information and access to all national websites on the European site: www.topten.eu

WP2 European Product Analysis , Task 2.1 Determining energy efficiency criteria, D 2.1 Periodic Criteria Papers (first set)

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1. Topten.eu: Ovens - current selection criteria and products selected

Topten.eu selection criteria:
Energy efficiency class at least A+

Numbers of oven models currently on Topten.eu according to
(last update: July 2015):

	With steamer	**Without steamer**	Total
Volume ≤ 34l	2	-	2
Volume 35l - 64l	5	3	8
Volume ≥ 65	2	5	8
Total	9	8	**17**

Similar models have not been counted if from the same brand.

The one Grundig model has energy efficiency class A++, all others A+

There are 17 oven models of 6 different brands on the Topten.eu product list: Bauknecht, Bosch, Grundig, Miele, Siemens, V-ZUG.

2. Expected selection criteria in 2016

The new Energy Label with classes up to A+++ has only been mandatory since January 2015, before there was a virtual standstill regarding efficiency development for ten years. The new classes will pull the market to higher efficiency, but the pace cannot be estimated. Therefore it is very difficult to make a valid prognosis for the Topten.eu selection criteria next year. From today's BAT overview we can't be sure that we'll be able to tighten the selection, so the expected selection criteria for 2016 are the same as we have now:
Energy efficiency class A+.

If differentiation is difficult we could require that Topten ovens meet A+ efficiency in both baking modes, conventional and fan-forced convection (if available). The Energy Label simply uses the better value.
Also we should consider not to list ovens with a pyrolytic cleaning function (see below).

3. Technical background

Electric ovens use a resistance heater at the bottom, today most ovens also have a heating element at the top of the cavity. In the fan-forced convection mode (if available) the heat is more evenly distributed by a fan, and it can be generated by a third heating element that is located around a fan.

Some ovens have a pyrolytic cleaning function. This heats up the oven to very high temperatures, so that all soiling is burnt, falls down as ashes and can be cleaned off. This cleaning function usually consumes close to 4 kWh – more than four times as much as one standard baking cycle. Topten teams should therefore consider listing only models that do not have a pyrolytic cleaning function (done so on Topten.ch).

A different, less energy consuming option is the catalytic cleaning. These ovens have a special coating on the inside of the cavity. Thanks to this material the cavity can easily be cleaned.

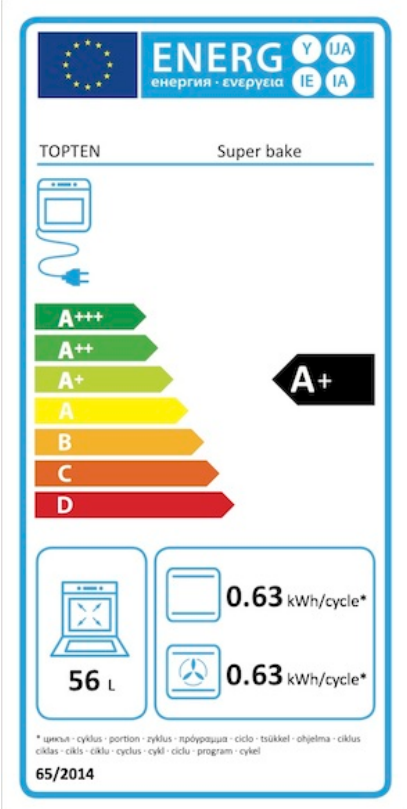
Ovens have special incandescent lamps that are resistant to heat.

4. Policy measures, standards and labels

Apart from the mandatory EU Energy Label, there are no other Ecolabels for ovens (e.g. EU Ecolabel, Blue Angel).
The Labelling and Ecodesign regulations cover gas and electric ovens, but not ovens with a microwave functions and steamers (if steaming is the primary function). Very small (w, d < 250mm or h < 120mm) and portable ovens are also excluded.
Next to ovens, the labelling regulation also covers range hoods, the Ecodesign regulation additionally hobs. The savings expected from all these measures amount to 60 PJ per year by 2030 (according to the regulation text).

Energy Label
Since January 2015 the new Energy Label for ovens is mandatory, based on regulation No. 65/2014. It's introduced classes A+ to A+++, and the labelling scale is now based on an energy efficiency index (EEI) instead of kWh/cycle.

Energy efficiency class	Energy efficiency index (EEI)	Ecodesign tiers 1- 3	
A+++	<45		
A++	<62		
A+	<82		
A	<107	Jan 2019	EEI < 96
B	<132	Jan 2016	EEI < 121
C	<159	Jan 2015	EEI < 146



Next to the efficiency class, the Label also indicates the cavity volume (litres), and the energy consumption per cycle for conventional baking (without fan-forced convection) and, if available, in fan-forced mode.
The Label further shows if the oven is electric or gas-driven.
The EEI formula is different for gas ovens.

The EEI is declared in the Label Fiche.

The EEI of electric ovens is calculated as follows:

$$EEI_{cavity} = \frac{EC_{electric\ cavity}}{SEC_{electric\ cavity}} \times 100$$

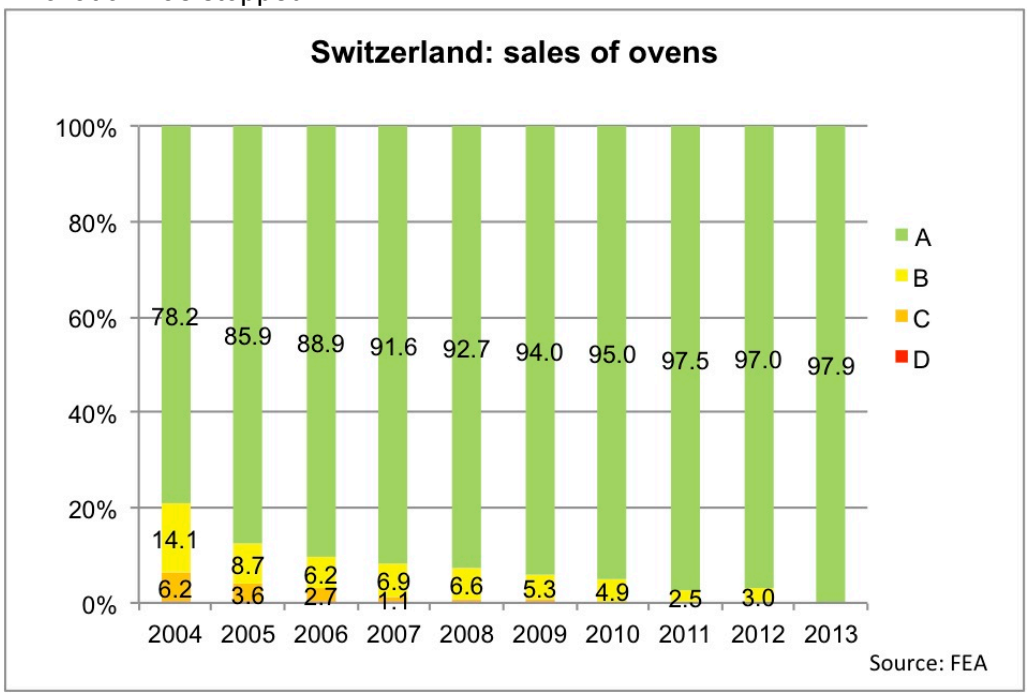
$$SEC_{electric\ cavity} = 0{,}0042 \times V + 0{,}55 \text{ (in kWh)}$$

EC is the energy consumption that has been measured in the standard baking cycle (kWh). If the model offers both conventional and fan-forced convection mode, the lower value is used.
SEC is the standard energy consumption (depending on the volume of the cavity, in kWh/l) and V is the cavity volume in litres (l).

Ecodesign requirements
Ecodesign requirements for ovens are based on regulation No. 66/2014 (covering also hobs and range hoods). Energy efficiency requirements ban the less efficient half of the classes C, B and A from January 2015, 2016 and 2019 (see table above). The Ecodesign requirements do not ban entire classes, but cut through the classes.
Apart from the energy efficiency requirements, only information requirements in line with the Labelling regulation apply.

5. Market analysis

Market data from Switzerland up to 2013 shows that close to 100% of the market has been in class A for the past few years. With nearly all products being in the Label's top class, innovation has stopped.



The new Label with better classes certainly triggers some innovation towards better energy efficiency.

6. FAQ: common questions from manufacturers and consumers

Is pre-heating necessary?

No, it is not necessary. It is more efficient to use the heat when the oven is heated up. Pre-heating is usually recommended for convenience food preparation, because like this a clear indication of the baking time is possible.
A test with a ready-made Pizza by Topten.ch revealed that only 5%-8% electricity could be saved when we renounced on preheating. At the same time it becomes more difficult to say when the food is ready – if it is baked for too long energy will be wasted, too. So, we think that pre-heating is not so much of an issue.

Should I bake in conventional or fan-forced mode?

Fan-forced is more energy efficient: in this mode the temperature can be set 20°C to 30°C lower than in conventional mode. In our Pizza test, this lead to energy savings of around

15%. The energy can be used even more efficientl if different items are baked at the same time on different 'floors'. This is also possible in fan-forced mode.

How much energy does baking consume?

Compared to other cooking methods, baking consumes a lot of energy - mostly because of the high temperatures. Topten.ch prepared potatoes in the oven and compared the energy consumption with other methods: oven potatoes used 1 kWh – more than ten times as much as the most energy-efficient method (a double-walled insulation pan used on an induction hob: 95 Wh). Preparing the potatoes in the oven was the most energy intense method. The second inefficient method was the steam function of the same oven (745 Wh), while the separate steamer used less energy because it was smaller (401 Wh). Except for the most inefficient method on a hob (no lid, too much water, old metal hob), all hob-based methods used less energy for preparing potatoes than the oven and steamer methods.

Total oven energy consumption obviously depends on how often it is used. If used twice a week, its consumption will amount to 100 kWh per year. In relation to total household consumption this is not too much.

Pyrolytic or catalytic cleaning?

Pyrolytic cleaning is very energy intense: one cleaning cycle usually consumes nearly 4 kWh – more than four standard cleaning cycles. Ovens with catalytic cleaning should therefore be preferred.

7. References and links

Useful links

Topten.eu ovens product lists:
http://www.topten.eu/english/household/ovens/without-steamer.html
http://www.topten.eu/english/household/ovens/with-steamer.html

Topten.eu ovens selection criteria:
http://www.topten.eu/english/criteria/oven-2.html&fromid=

Topten.ch study on energy efficient cooking methods (in German):
http://www.topten.ch/uploads/File/Energieeffizienz%20von%20Kochmethoden_Bericht%20April%202012.pdf

The European Commission's Energy Label generator:
http://eepf-energylabelgenerator.eu/eepf-labels/label-type/domestic-ovens

References

Energy Labelling regulation No. 65/2014 for domestic ovens and range hoods:
http://www.topten.eu/uploads/Upload/65:2014_Label_Ovens_Hoods.pdf

Ecodesign regulation No. 66/2014 for domestic ovens, hobs and range hoods.
http://www.topten.eu/uploads/File/66:2014_Ecodesign_Ovens_Hobs_Hoods.pdf

Information about the EU ecodesign process:
http://www.coolproducts.eu/