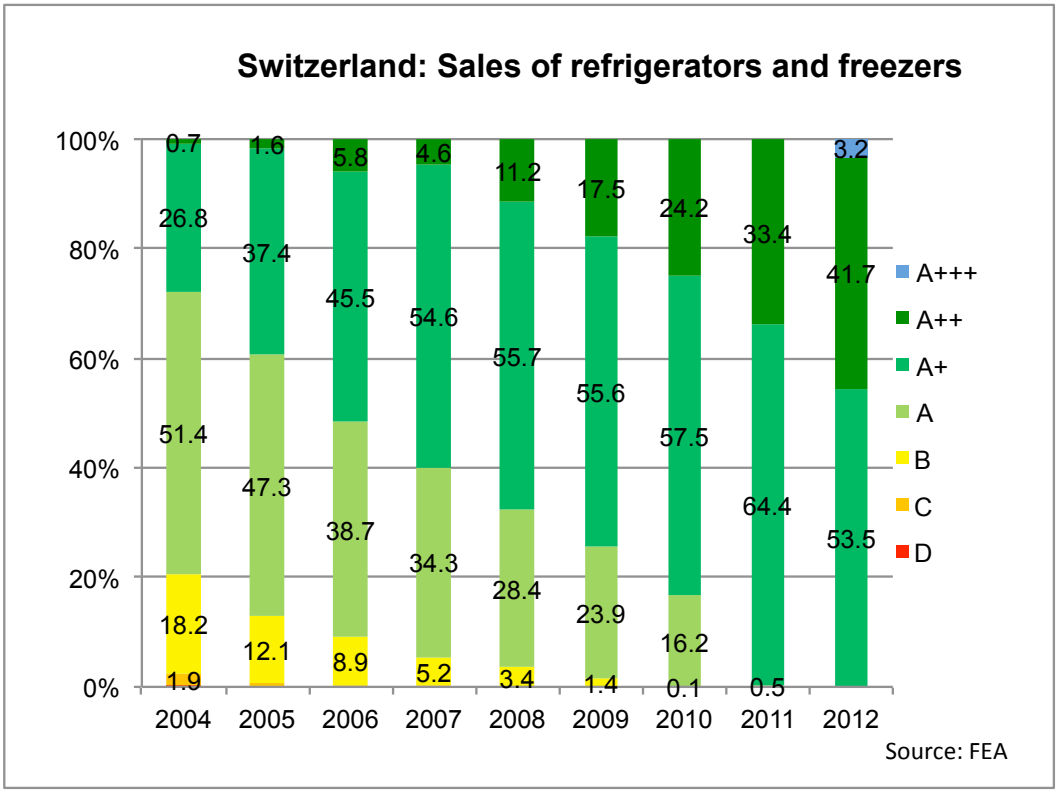
Swiss appliance sales data, 2004 – 2011: Analysis and conclusions for EU market monitoring

24. July 2013

Anette Michel, Eric Bush, Topten International Services (TIS)



Content

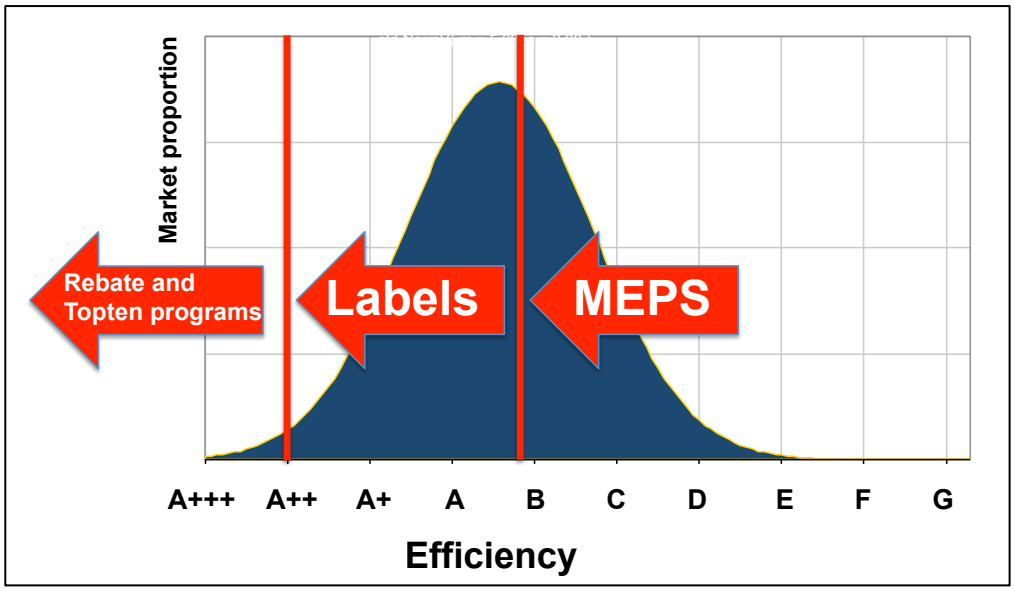
1. Summary

The Swiss FEA sales data on refrigerators and freezers, washing machines, tumble driers, dishwashers and ovens allow observing the technical development of these products towards higher efficiency. Linking the different rates of development visualised by the graphs to implemented policy instruments such as energy label, minimum efficiency requirements and rebate programs allows to conclude that these are vital for technical development to happen – most of all an energy label with an appropriate classification scale. To define, monitor and revise these policy instruments systematic market data like the ones interpreted here are key. A systematic market monitoring in the EU could avoid efficiency measures with only little or no effect.

2. Background

Different policy instruments help to push or pull the appliances markets towards higher efficiency. The scope of the most important of these instruments are shown in graph 1:

- Energy labels or other labels make the efficiency of products visible to consumers, driving the consumers' choice towards higher efficiency products. At the same time labels exert an incentive towards manufacturers to develop more efficient models. Apart from these direct effects, the energy label serves as a basis for most other instruments. Therefore a good energy label with an appropriate labelling scale is absolutely crucial for the technical development of appliances.
- Rebate programs and other initiatives such as Topten websites focus on the top segment and help new technologies to reach the market breakthrough. Rebate programs are most easily defined based on the energy label: focusing on the top class only. In absence of a functioning energy label (if almost all models are in class A for instance) it is difficult to define criteria that are easy to be verified.
- Minimum efficiency requirements (also MEPS: minimum energy performance standards) eliminate the least efficient products from the market. Also minimum efficiency requirements are difficult to be defined and implemented if no good energy label (with more than just one or two classes on the market) can serve as a basis.



Graph 1: different instruments push or pull the appliance market towards higher efficiency

Statistics like the ones published by S.A.F.E. and FEA (2013) on the development of the Swiss appliance sales markets are crucial to define these policy instruments appropriately and to monitor their effect. The European Union does not systematically monitor the development of the appliance markets in its member states.

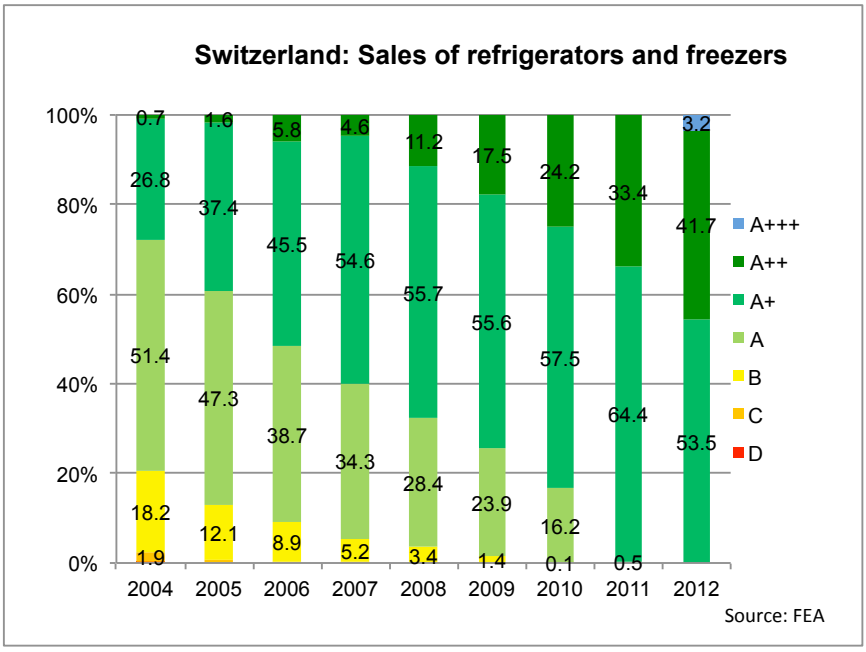
Switzerland usually adopts the EU energy label and in most cases also the EU ecodesign measures. In some cases however the country with a high per capita income and generally high quality standards implements more ambitious minimum efficiency requirements than the EU – this is the case for instance for refrigerators and freezers or tumble driers. In these cases the decisions on the level of MEPS were based on the market data discussed here.

The Swiss Association of the Domestic Electrical Appliances Industry each year publishes the sales data for six product categories. The present interpretation of the sales development from 2004 to 2012 shows the potential a similar, systematic market monitoring in the European Union holds.

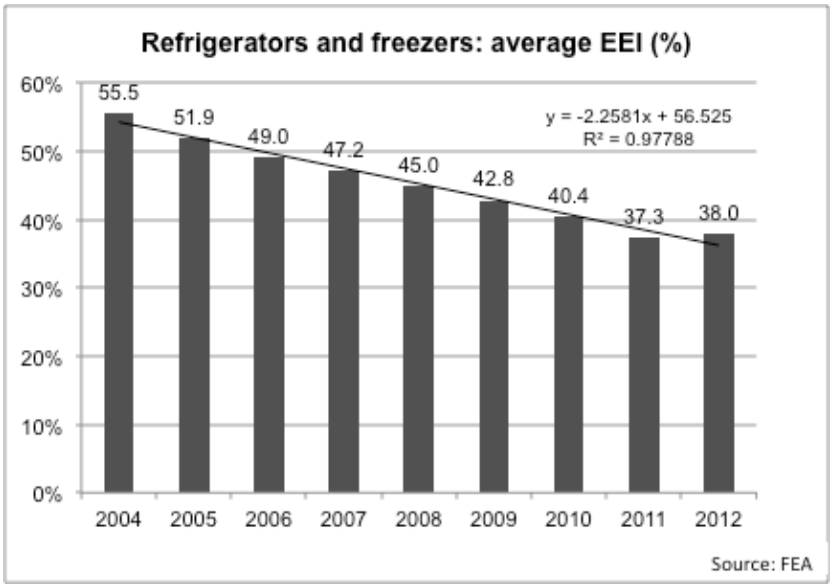
3. Refrigerators and freezers

Description

The graphs on refrigerators and freezers published by S.A.F.E. and FEA (2013) show a constant improvement of the efficiency from 2004 to 2012. Starting with almost 30% in 2004 the classes A+ to A+++ made up 100% of the sales after 2011. In 2004 the typical refrigerator/freezer model was of class A (EEI= 55.5), in 2011 it was between A+ and A++ (EEI=37.3). The typical refrigerator/freezer model has improved by 33% in those seven years (refrigerators: 31%, freezers: 36%). The average EEI increased from 2011 to 2012, even though the sales shares were shifted towards more efficient models. The reason for this is the new Energy Label, which introduced classes with a bit less ambitious class limits.



Graph 2: Swiss refrigerator and freezer market development.
Graph source: S.A.F.E. and FEA (2013)



Graph 3: Development of the refrigerators and freezers efficiency in Switzerland.
Graph source: S.A.F.E. and FEA (2013)

Interpretation: Policy Instruments
The refrigerator/freezer graphs show nicely the effect an energy label in combination with the announcement of minimum efficiency requirements can have. The efficiency of the market kept increasing at a constant rate.

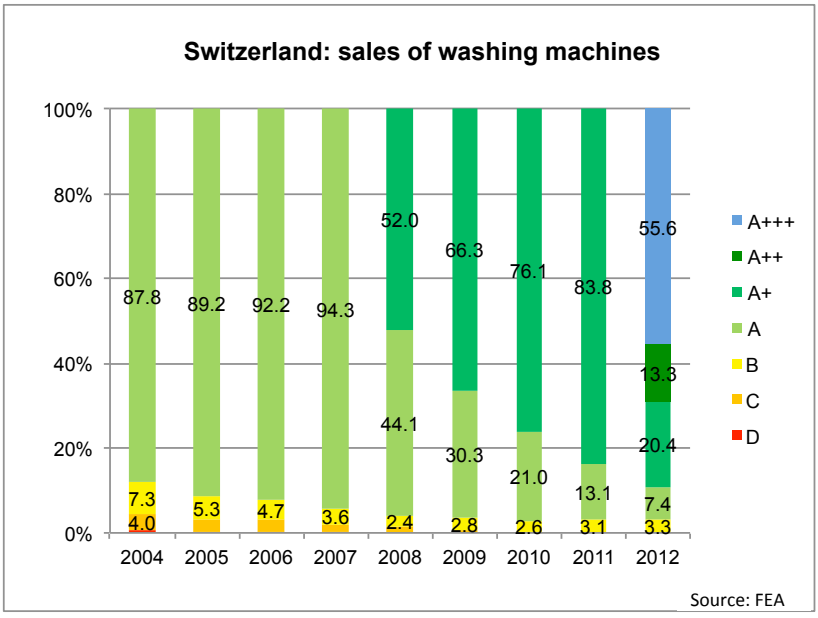
1. Energy Label
In 2003/2004 the original energy label from 1994 was amended with the two classes A+ and A++. The A+-threshold however had been used before this for rebate programmes. Graph 2 shows that after 2004 the new classes quickly helped to shift the market to higher efficiency. When added in 2003, the A++ class was virtually empty. It acted as an incentive for manufacturers to develop better products. In 2011 one third of all products reached the class A++ threshold.
In 2012 the next class was introduced: A+++. With 3.2% this best class is only starting to fill up and will continue to have a pull effect on the market for another one or two years. In order to have a strong effect on innovation, the Label will need the next, fundamental revision soon.

2. Minimum efficiency requirements
Based on FEA sales data, Switzerland has defined minimum efficiency requirements ahead of the EU: while class A was also introduced as minimum requirement in 2010, A+ must be met since January 2011 in Switzerland. Since January 2013 only products of class A++ or better are allowed on the Swiss market. The EU will fully implement A+ as requirement in July 2014 only (incl. smaller measurement tolerances) and so far has not defined any further steps.
In 2012 still more than 50% of the sales were in class A+. The announced ban of these appliances has not had a big effect ahead of its implementation. The next report in 2014 will show a large jump towards higher efficiency from 2012 to 2013.

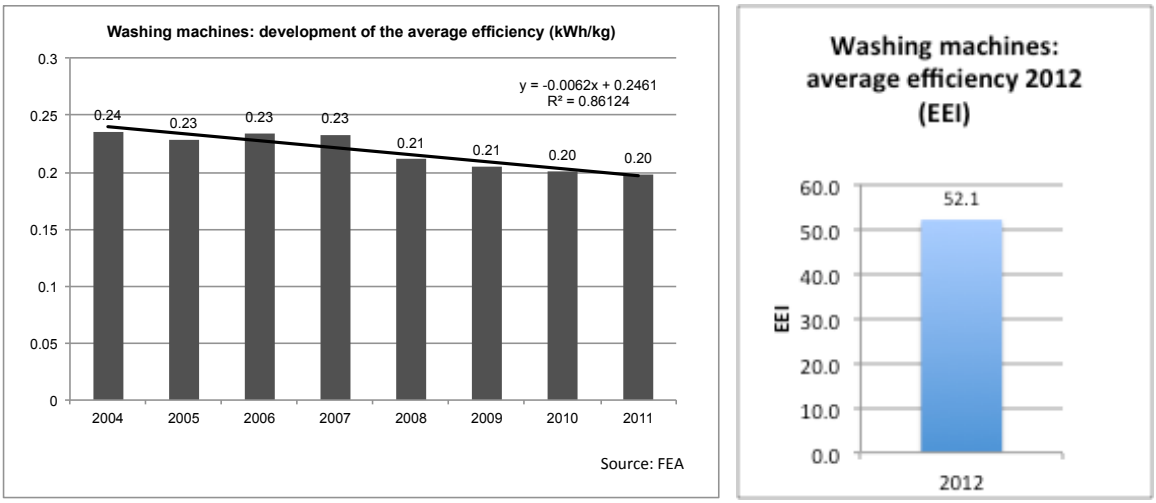
4. Washing machines

Description

The washing machines efficiency development graphs show only little improvement from 2004 to 2007. Class A makes up the vast majority of all sales (88% to 94%). The average efficiency consequently remains almost at the same level during those years, only improving by 4% from 2004 to 2007. In 2008 the class A+ is added and makes up more than 50% of all sales, increasing to 84% by 2011. The calculated average efficiency improves from 0.23 kWh/kg to 0.2 kWh/kg – with 13% a much stronger improvement than in the four years before. A similar development happens in 2012 with the introduction of the new Energy Label, which adds the classes A++ and A+++: the vast majority of all sales is in these classes in 2012.



Graph 4: Swiss washing machine market development. Graph source: S.A.F.E. and FEA (2013)



Graph 5: Development of the washing machines efficiency in Switzerland. Graph source: S.A.F.E. and FEA (2013)

Interpretation: Policy Instruments

1. Energy Label

The washing machines graphs show two different situations: from 2004 to 2008 up to more than 90% of all products were in the top class, there was no way to market more efficient washing machines. Consequently there is no efficiency development to be observed in this period. In 2008 Switzerland autonomously added a class A+. This new class filled up over the next four years and drove a development to some extent. The 52% A+ models in 2008 were not newly developed products, but models exceeding the class A threshold before this – without official possibility to communicate this though. The added A+ class did not drive the development of much more efficient washing machines, but at least lead to an increase of models reaching this new class. In 2011 the situation resembled the one from 2004 – only at a one class higher level.

As expected, also the 2012 situation with the new Label resembles the one to 2008: many models already met the efficiency levels of A++ and A+++, and these classes accounted for the majority of the sales from the start of their implementation. Even the A+++ threshold is exceeded by 30% by some washing machines on the market (www.topten.eu), some of them exceeding the A+++ threshold by 30%. The revised Label has not been ambitious enough to trigger real innovation. A profoundly revised energy label with ambitious top classes has the capacity to induce more than that and to trigger more energy savings.

2. Minimum efficiency requirements

Switzerland's announced minimum efficiency requirements are in line with the EU ecodesign regulation: since January 2012 a minimum efficiency corresponding to class A is required, from December 2013 class A+ will apply.

Still 3% of class B washing machines were sold in 2012. In the first half of the year it was yet allowed to sell machines that were on stock. The proportion of class B sales has however been very small since 2004 already, therefore the ban of this class has a limited impact on the efficiency of the typical washing machine. Graph 4 and sales data however show that the class B sales were higher in 2011 and 2012 than in the three years before – maybe a result of discount marketing in order to clear the stocks of the products soon to be banned from the sales.

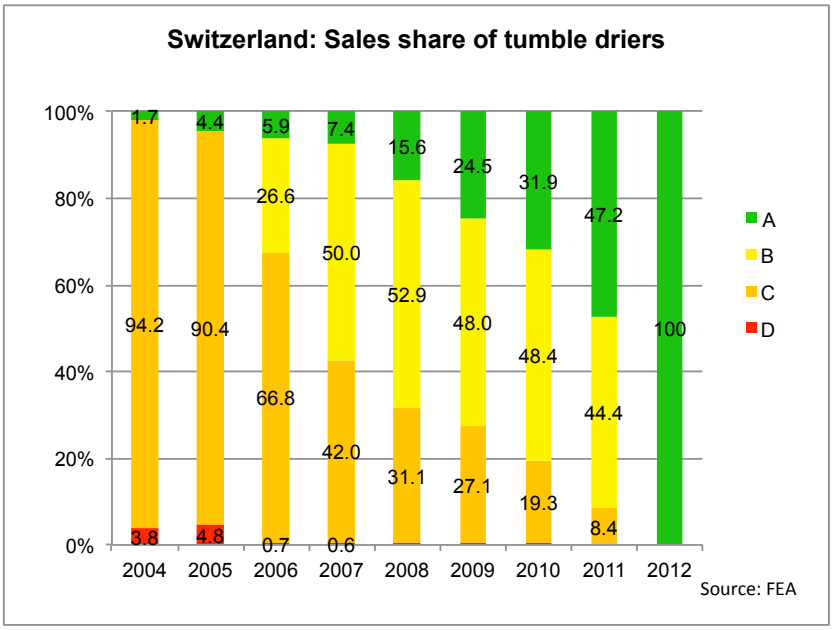
Unfortunately the newly introduced EEI cannot be compared to the previously used energy efficiency indicator. Therefore in 2012 a new graph is started.

5. Tumble driers

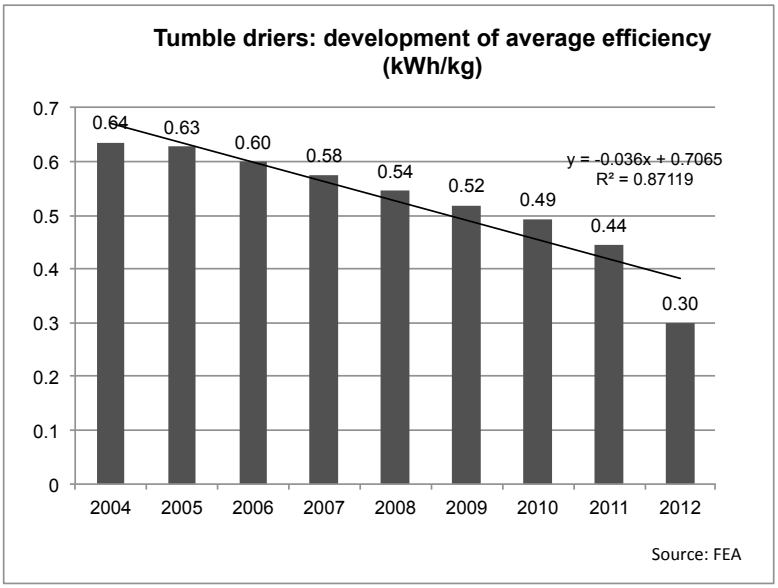
Description

The development in the case of tumble driers that is visualized by the two graphs published by S.A.F.E. and FEA (2013) is special and interesting in two ways:

- Class C, which was dominating the market until 2006, was displaced by classes B and A at the same time by 2011. Class B emerged on the market later then class A, but then its sales proportion increased very quickly. In 2011 class A reached a higher sales proportion than class B. With close to 50% sales share in 2011, class A has been much more successful in Switzerland than in other European countries. In 2012, class A was implemented as minimum efficiency requirement in Switzerland. Only these were allowed on the market since January 2012.
- While class B driers are not much more efficient than class C driers, class A driers represent a different technology, which is much more efficient: only heat pump driers, which are nearly twice as efficient as class B driers, reach class A. This fact is reflected in the average efficiency development curve, which shows a strong improvement thanks to the emerging class A driers: from 2004 to 2011 the efficiency of the typical drier model increased by 30%. From 2011 to 2012 it made a jump – due to the MEPS being implemented.



Graph 6: Swiss tumble drier market development. Graph source: S.A.F.E. and FEA (2013)



Graph 7: Development of the tumble driers efficiency in Switzerland. Graph source: S.A.F.E. and FEA (2013)

Interpretation: Policy instruments

1. Energy Label and rebate programs

The energy label for tumble driers has been unchanged since its introduction in 1995. For a long time it seemed that efficiency values exceeding class C could only be reached by the new technology of heat pump driers. Only when class A heat pump driers emerged on the market there seemed to be incentive enough to also develop class B driers. The energy label does not reflect the huge gap in efficiency between the two classes: while class B driers barely reach the threshold of 0.56 kWh/kg, the vast majority of heat pump driers exceeds the class A threshold by far: instead of the required 0.5 kWh/kg heat pump driers reach 0.3 kWh/kg (by now even 0.19 kWh/kg).

By 2004 manufacturers had developed heat pump driers reaching class A that were satisfying in all aspects and put them onto the market. The initially very high purchasing price was a barrier, which was targeted by public procurement and rebate programs by the city of Zurich (2004), by the utility of Zurich (2006) and other utilities (since 2007). Consequently the sales proportion of class A driers increased to close to 50% in 2011.

The 2012 figures are not very interesting, but consist uniquely of class A.

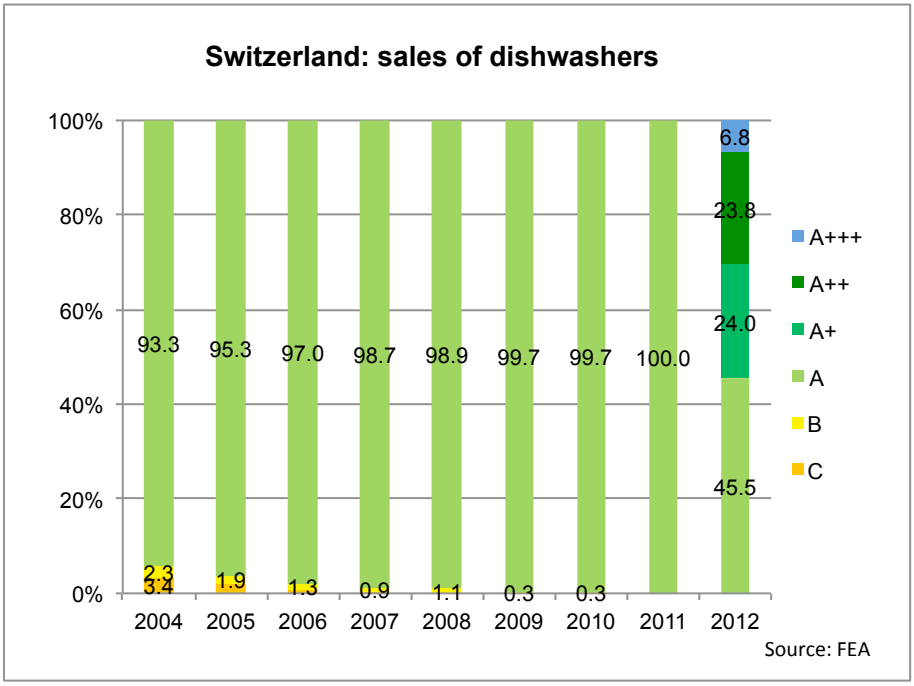
2. Minimum efficiency requirements

In June 2009 the Swiss government already announced the ambitious minimum efficiency requirements that was put into force in January 2012: only class A tumble driers were announced to remain on the market. The announced ban of class B and C driers certainly helped considerably to further push the sales share of class A driers. The ban of tumble driers without integrated heat pump has been implemented in January 2012 without any problems.

6. Dishwashers

Description

Class A has been dominating the market from 2004 to 2011; its sales proportion climbed from 93% to 100%. In this period no improvement of the average EEI could be observed. In 2012 the new Energy Label with classes up to A+++ was introduced – and instantly these new classes accounted for more than half of the sales.



Graph 8: Swiss dishwasher market development. Graph source: S.A.F.E. and FEA (2013)

Interpretation: Policy instruments

1. Energy Label

The energy label for dishwashers was implemented in 1997. Graph 8 shows that at least since 2004 until 2011 there remained virtually only class A on the market. Manufacturers did not have any possibility to market more efficient products, so there was no visible development towards higher efficiency during all those years. The energy consumption per cycle remained at the same level – just above the class A threshold- for many years. In 2012 the new energy label has been introduced, and classes up to A+++ are on the market. The new classes don't seem to have been designed very ambitiously: many products already reach the new A+++ class, and the +-classes account for more than half of the sales.

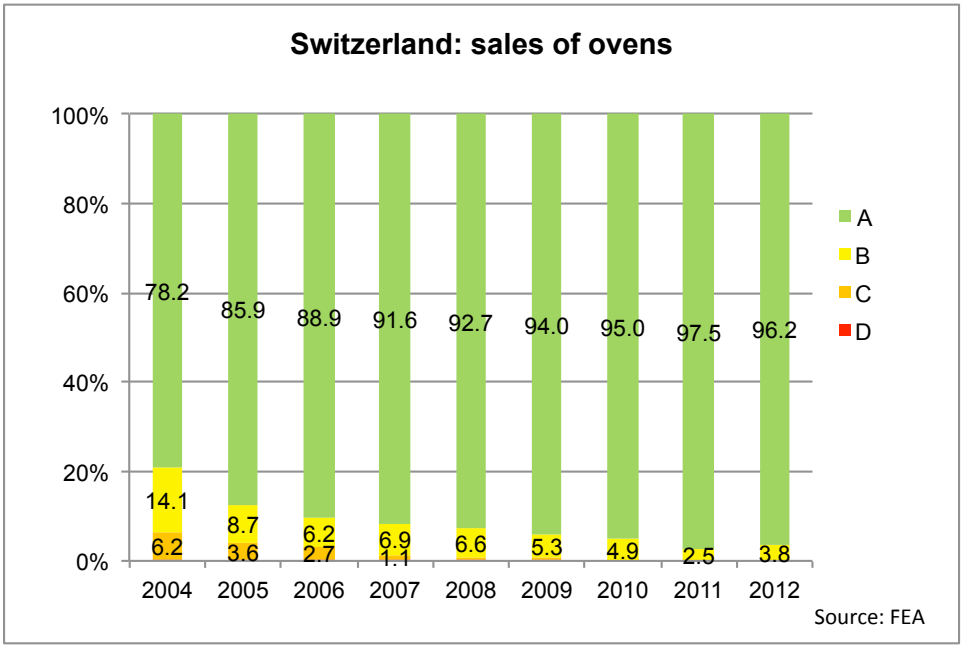
2. Minimum efficiency requirements

Since December 2011 only class A dishwashers are allowed on the markets of the European Union. Switzerland has not yet adopted the minimum efficiency requirements, but this is without effect since there are only A class dishwashers anyway. Had effective policy instruments such as an up to date energy label and a systematic monitoring been at hand, more effective minimum requirements could have been formulated. Now class A as minimum requirement is superfluous– but before it was not possible to release more ambitious requirements because there was no helpful energy label to base these upon. Now it'd be possible to ban class A.

7. Ovens

Description

The sales proportion development graph for ovens resembles the one for dishwashers until 2011: class A is dominating the market over the entire period of observation. Its sales proportion increases from 78% in 2004 to 96.2% in 2012. Because for different sizes of ovens different classification scales apply and the sales proportion of the oven sizes is not known, it is not easily possible to calculate an average EEI.



Graph 9: Swiss oven market development. Graph source: S.A.F.E. and FEA (2013)

Interpretation: Policy instruments

1. Energy Label

The energy label for ovens has been unchanged since its implementation in 2002. Obviously it was designed with too unambitious classes, since in 2004 already it would have been due for a revision. It has not been revised up to today – as a consequence there has been no development towards higher efficiency. The most efficient normal-sized (55/60cm wide, <65l) ovens today exceed the A class threshold of 0.8 kWh per baking process by just 6% (www.topten.ch). In the case of ovens the efficiency development has virtually been supressed by the outdated labelling scale: if there is no possibility to market technical innovations, no such innovations are developed and put on the market.

A revised energy label is currently being discussed in the European Union.

2. Minimum efficiency requirements

Switzerland introduced class B (ovens > 65l: class C) as minimum efficiency requirement in January 2010. This measure shows to have been of little effect, eliminating only a very small proportion of the ovens on the market.

The European Union has no efficiency requirements for ovens so far, but future measures are currently being discussed.

8. Conclusions

The discussion of the different efficiency development graphs shows that a technical development towards higher efficiency of appliances does not happen *per se*, but needs to be fostered by appropriately designed policy instruments. Where these instruments are absent or lacking in effect, the development towards higher efficiency can stop almost completely. Therefore energy labels and minimum efficiency requirements as the two most important policy instruments need to be redefined regularly, in parallel with the technological development.

EU: Systematic market monitoring needed

The European Union does not systematically monitor the development of the appliance markets in its member states. Most of the ecodesign regulations and (new) energy labels were defined based on partial market data (samples), most of it collected for the EuP preparatory studies and outdated by the time of adoption. For example, the implementing measures on cold appliances were enforced in 2010 based on market data from 2005.

A new energy labelling scale and minimum efficiency requirements can only be appropriately designed if they are based on up-to-date and sound market data. Policy measures which are based on outdated or partial data bear the risk to bring no or only little effect, while still leading to costs during elaboration and implementation. Next to serving as a basis to design policy measures, systematically gathered market data also allows to monitor the effect of policy measures. Furthermore comprehensive sales data as shown here allows estimating the stock of the different product categories in EU households and, through the knowledge on its efficiency, the total electricity consumption of the stock. If data is available for a period corresponding to the typical lifetime of a product, the stock's electricity consumption can be deduced quite precisely.

The monitoring of market transformation has been tried on national and international level, but never with a systematic, comprehensive and long run approach, covering national and European data. Bringing transparency on the market is a prerequisite to policy implementation and policy design.

A recent pilot study looking at the developments on the TV market shows well the potential a systematic market monitoring holds, for all products with an Energy Label: the study on the TV market analyses the developments regarding sales, technologies, price and power for 2007 - 2012 and allows to see the efficiency of the TV market in 2012 in Europe and on six national markets (Michel, Attali, Bush, 2013).

Energy Labels: redesign

The energy label serves as a basis for other policy instruments such as MEPS and rebate programmes. Therefore an up-to-date energy label with an appropriate labelling scale is key for the efficiency development of appliances. The energy label must allow an identification of the most energy efficient products on the market and make the average efficiency of the products visible.

In order to remain effective the classification scale of the energy label needs to be redefined every 5 to 10 years in order to reflect the state of the art. Market data show what the current efficiency of the typical model is – this should be defined as new class D in an A-G scale. Currently a simpler approach is implemented by adding classes A+ to A+++ on top of A. At least this measure allows manufacturers to communicate the efficiency of their good products, but for consumers it is confusing if A is not the best but – sometimes - the worst or too bad to be even allowed on the market. Also the recent revisions with added classes show to have been defined way too unambitiously: in the case of refrigerators and freezers, dishwashers and washing machines for example, dozens of products already reach the new top classes A+++ (www.topten.eu), which have been introduced in 2011 only, and one year later these top classes have a large sales share already. The best washing machines already exceed the A+++ limit by 30%. In all four cases two years after

the amendment of the energy label already no incentive remains to develop more efficient models, since currently they cannot be marketed this way.
Had profound market data been at hand and considered for the revision, the new energy labels could have been designed to be more than an interim solution which has to be re-revised after three years only. Now a market monitoring program could help to observe the development after the introduction of the new energy labels closely. The needed re-revision should be based on the results of a market monitoring programme.

Ambitious MEPS in advance
If announced several years in advance MEPS can be defined at an ambitious level and contribute to a market shift before actually applying. Prerequisites for well designed MEPS are an up-to-date energy labelling scale with several 'active' classes and a systematic market monitoring. Like in the case of the energy label also the effect of MEPS is reduced with the technical development – which is the very aim of these instruments. But a regular adaptation to the technical development is needed in order to keep MEPS effective. Based on sound and up-to-date market data ambitious and appropriate minimum efficiency requirements can be announced and implemented.

Outlook: is further technical development possible?
The research and development departments of appliance manufacturers keep making possible what sometimes seems to be impossible: to develop even more efficient products, when it seemed that all potentials had been exploited. One such example are TVs, where the innovation of LED backlight led to a reduction in electricity consumption of between 25% and 40% - just after the EU had defined an energy label and MEPS based on the assumption that no considerable development potential was remaining.
The manufacturers' R&D departments will keep finding innovative solutions for further improvement – as long as innovations can be rewarded by a yet untouched efficiency class on the energy label.

Current and concrete potentials for further development can be found in a range of products:

- For refrigerators and freezers the current improvement potentials lie in vacuum isolation and efficient compressor motors (variable speed drive permanent magnet motors).
- Washing machines and dishwashers can be mainly rendered more efficient by improving cold wash programmes, or by connecting them directly to the hot water supply. The latter is effective where the water is heated at least partially with renewable energy.
- For heat pump tumble driers further development will mainly target the compressor motors, introducing frequency-controlled high efficiency permanent magnet motors.

9. References

Swiss appliances sales development 2004 – 2012. S.A.F.E. and FEA, August 2013:
www.topten.eu/uploads/File/FEA-Geraetestatistik-2004-2012-EN.pdf

FEA (Swiss Association of the Domestic Electrical Appliances Industry), www.fea.ch

Topten, best products of Europe: www.topten.eu

Swiss energy regulation 730.01, updated 1. March 2012: www.admin.ch/ch/d/sr/730_01/index.html (in German) / www.admin.ch/ch/f/rs/730_01/index.html (in French)

EU energy labelling and ecodesign regulations:

EU regulation 1060/2010 on energy labelling of household refrigerating appliances
www.topten.eu/uploads/File/Energy%20Label%20regulation%20cold%202010.pdf

EU regulation 643/2009 on ecodesign requirements for household refrigerating appliances
www.topten.eu/uploads/File/Household_refrigerator_regulation_090723.pdf

EU regulation 1061/2010 on energy labelling of washing machines
www.topten.eu/uploads/Upload/Labelling_Regulation_WM_EN_OJL_30-11-2010.pdf

EU regulation 1015/2010 on ecodesign requirements for washing machines
www.topten.eu/uploads/Upload/REG_1015_2010.pdf

Directive 95/13/EC on energy labelling of household tumble driers (current label)
www.topten.eu/uploads/File/95_13_EC_drier%20label%20Directive.pdf

EU regulation 392/2012 on energy labelling of household tumble driers (new label)
www.topten.eu/uploads/File/Energy%20Label%20Driers%20March%202012.pdf

EU regulation 1059/2010 on energy labelling of household dishwashers
www.topten.eu/uploads/File/1059-2010_Energy_label_dishwasher.pdf

EU regulation 1016/2010 on ecodesign requirements for household dishwashers
www.topten.eu/uploads/File/Ecodesign%20REG_1016_2010_dish.pdf

Commission Directive 2002/40/EC on energy labelling of household electric ovens
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:128:0045:0056:EN:PDF

Anette Michel, Sophie Attali, Eric Bush: European TV market 2007 – 2012. Energy efficiency before and during the implementation of the Ecodesign and Energy Labelling regulations. Topten International Services, Jul 2013.
www.topten.eu/uploads/File/European_TV_market_2007–2012_July_2013.pdf