

ceeee 2021 Summer Study on energy efficiency
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Energy regulations: Transferring lessons from household to commercial appliances

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Topten product lists of top products

- Online platform for best products
- 11 B2B refrigeration product lists, 392 products
- 1.9 million pageviews/year
- Basis for rebate programmes
- European platform: topten.eu

The screenshot shows the 'Energy Efficient Vertical Display Cabinets' page on topten.eu. It features a navigation bar with categories like Household, Lighting, Office & TVs, Cars, Building Components, and Professional Refrigerators. The main content area includes filters for Brand, Temperature class, Type of cabinet, and Total net volume. A table lists 20 items, showing details for three products:

	Brand & Model	Energy	Type	Dimensions	Cost (€)
	True T-15G-HC-FGD01 Series products: T-11G-HC-FGD01, T-23G-HC-FGD01	Energy (kWh/year): 802 Efficiency index (%): 13,2 Temperature class: M2 Climate class: 3	Vertical display refrigerator	Total display area (m²): 0,66	Electricity in 8 years: €1'283
	True GDM-19T-HC-TSL01 Series products: GDM-23-HC-TSL01	Energy (kWh/year): 1'021 Efficiency index (%): 13,9 Temperature class: M1 Climate class: 3	Vertical display refrigerator	Total display area (m²): 0,74	Electricity in 8 years: €1'634
	JBG 2 Garmo Multideck / RDGA-1250-L4 3M1-I-R600A-DVO-13Z	Energy (kWh/year): 1'788 Efficiency index (%): 14,1 Temperature class: M1 Climate class: 3	Vertical display refrigerator	Total net volume (l): 908 Total display area (m²): 2,01	Electricity in 8 years: €2'862



Storage refrigerators

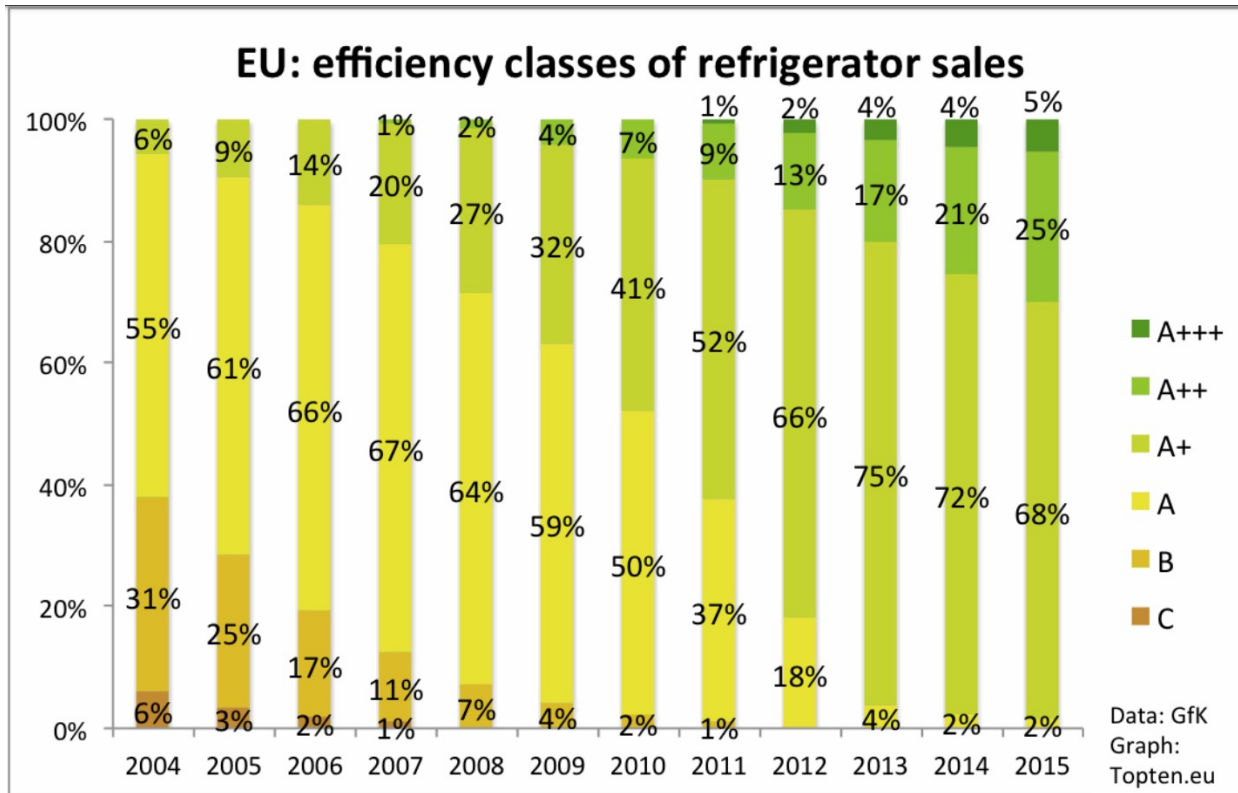
Medicine cabinets,
wine coolers,
minibars



Display refrigerators

Household Refrigerators and Energy Labels

Success story: Energy regulation for household refrigerators in Europe



Often used arguments in Business-2-Business (B2B) markets:

- ❗ *“Unsafe for refrigerated content”*
- ❗ *“Efficiency technologically not possible”*
- ❗ *“Too expensive -> market collapse”*

EU Regulations for B2B Categories

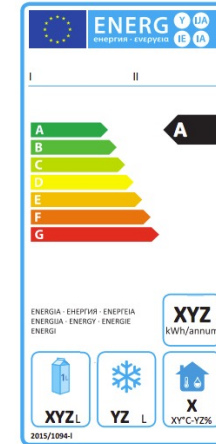
EN 2015/1095 (Ecodesign)

- ✓ Professional refrigerated storage cabinets

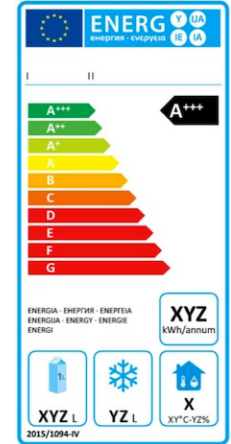
EN 2015/1094 (Label)

- ✓ Professional refrigerated storage cabinets
- ✓ Blast cabinets
- ✓ Condensing units
- ✓ Process chillers

1 July 2016



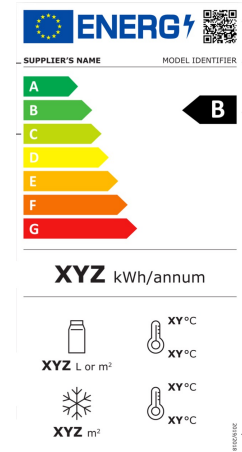
1 July 2019



EN 2019/2024 (Ecodesign) & EN 2019/2018 (Label)

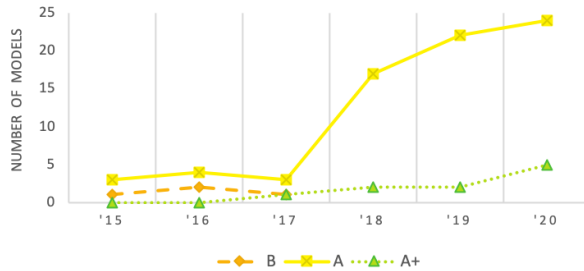
- ✓ Refrigerating appliances with a direct sales function :
 - Beverage coolers
 - Ice-cream freezers
 - Integrated & remote refrigerated supermarket cabinets (horizontal & vertical, chilled & frozen)
 - Refrigerated vending machines

1 March 2021

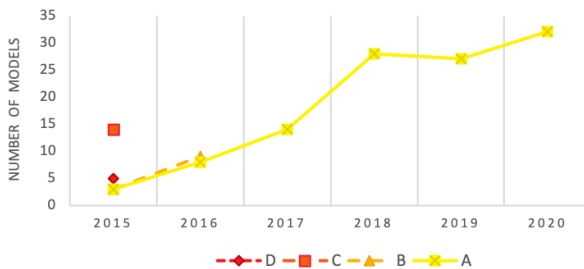


BAT Development Professional Storage Refrigerators

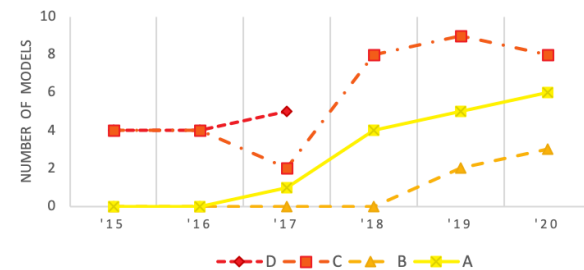
STORAGE COUNTER REFRIGERATORS
2015-2020



STORAGE 1-DOOR REFRIGERATORS
2015-2020



STORAGE 2-DOOR REFRIGERATORS
2015-2020



Significant market transformation since 2016

Storage counter refrigerators:

- First A+ appliances in first year after new label
- 25 class A models within 4 years

Storage 1-door refrigerators:

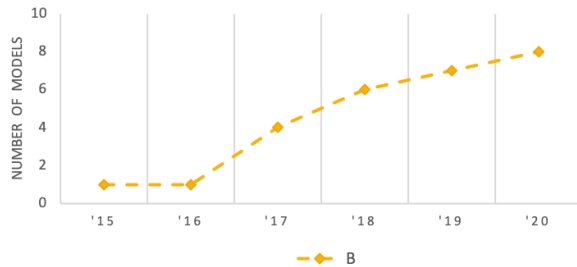
- Before label, classes A-D considered “best available technologies” (BAT)
- 34 class A models by 17 manufacturers within 4 years

Storage 2-door refrigerators:

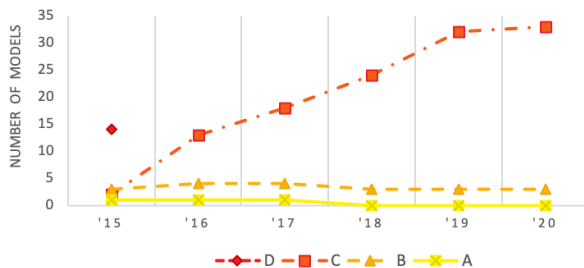
- BAT models in classes A-C
- Class A and B models slowly increasing on market

BAT Development Professional Storage Freezers

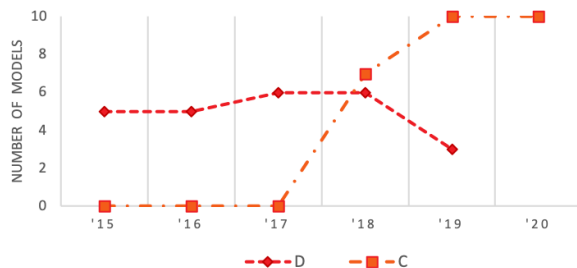
STORAGE COUNTER FREEZERS
2015-2020



STORAGE 1-DOOR FREEZERS
2015-2020



STORAGE 2-DOOR FREEZERS
2015-2020



Significant market transformation since 2016

Storage counter freezers:

- Steady increase of class B models
- No class A or A+ models yet available

Storage 1-door freezers:

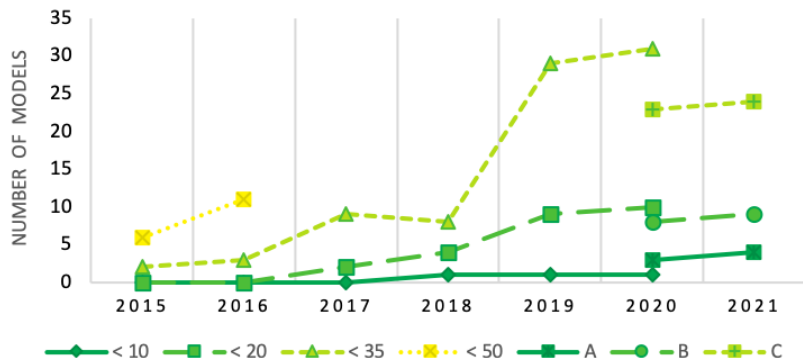
- Class C models increasing over 4 years
- Class A and B models stagnating / wrongly declared

Storage 2-door freezers:

- Class C models increasing on market
- No class A or B models yet available

BAT Development Commercial Display Refrigerators

BEVERAGE COOLERS
2015-2021



Label since 01 March 2021

Policy work re-started in 2018

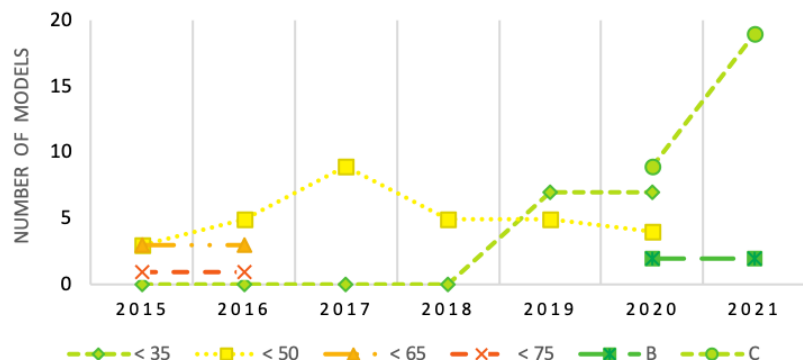
Beverage coolers:

- Class A and B models on the market upon start of label
- High number of class C models available
- CH: stricter MEPS than EU

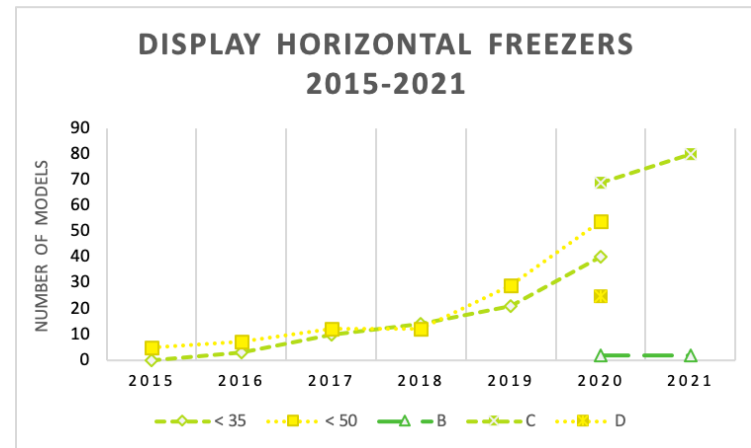
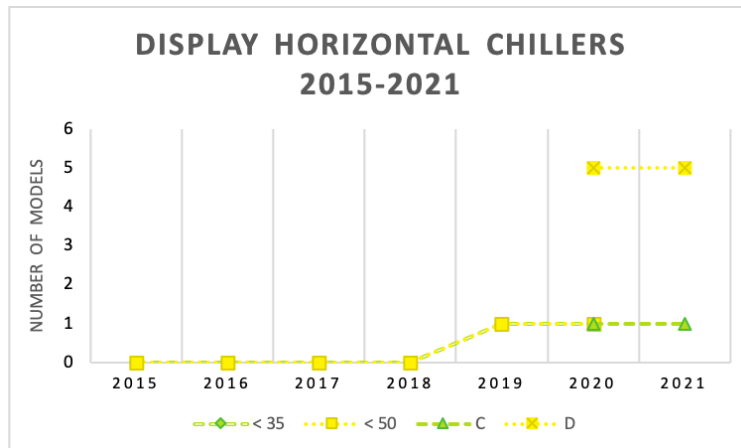
Ice-cream freezers:

- Before label process, class D (EEI 50) considered BAT
- 21 class B and C models since re-start of policy process in 2018

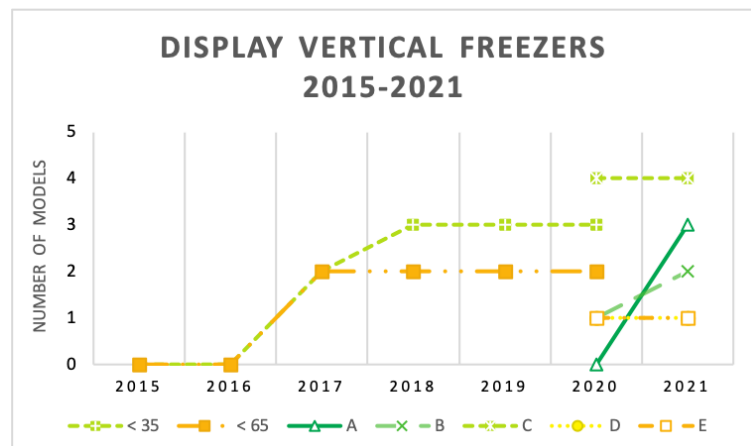
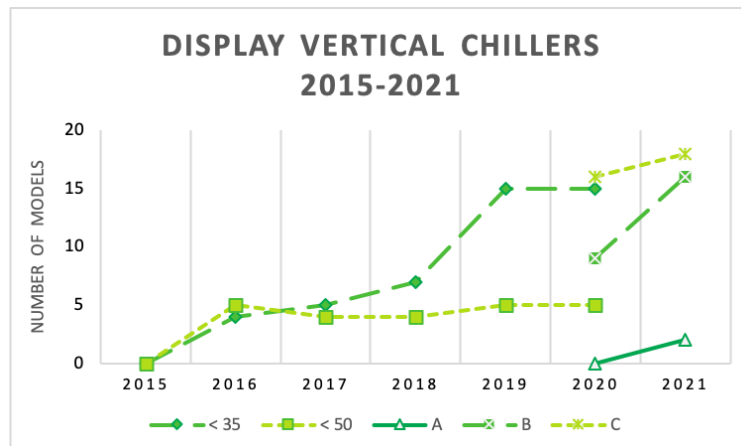
ICE-CREAM FREEZERS
2015-2021



BAT Development Commercial Display Refrigerators



Class A models for vertical chillers and freezers already available



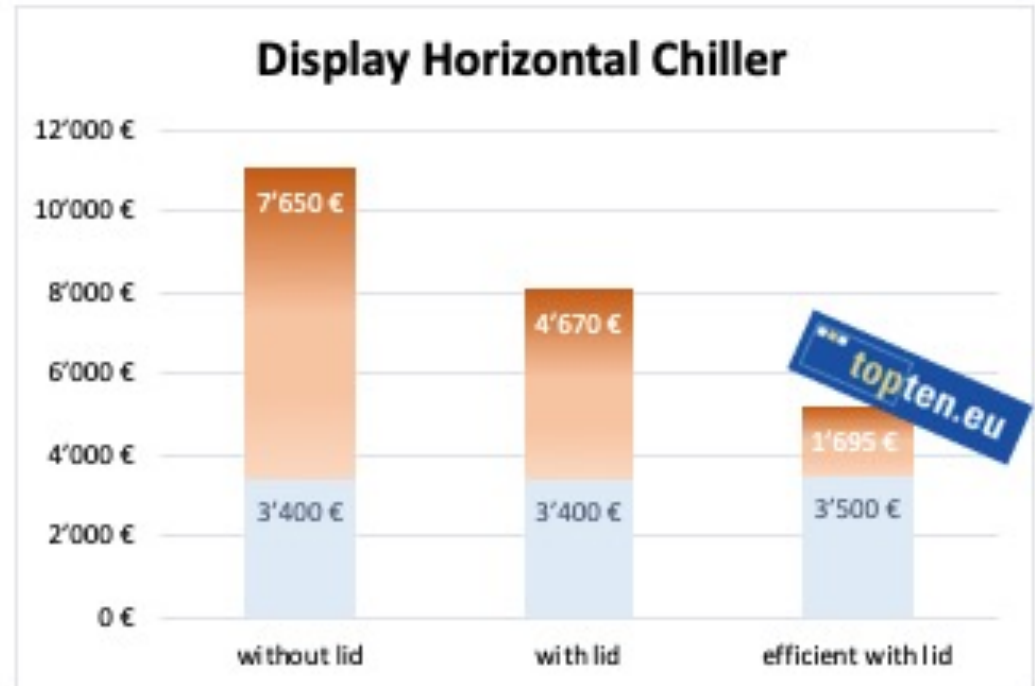
➤ **Strong market transformation already implemented in preparation for label**

Saving Potential Horizontal Supermarket Chillers

Many categories of new label for refrigerating appliances with direct sales function already have class A models (EEI<10) and EEI = 100 MEPS -> 90% EEI saving potential

Display Horizontal Chillers:

- Often open for convenience food
- BAT model saves up to 80% compared to open model
- Studies show no long-term overall change in revenue (barrier of lids vs. “cold-feet effect” of open appliances)

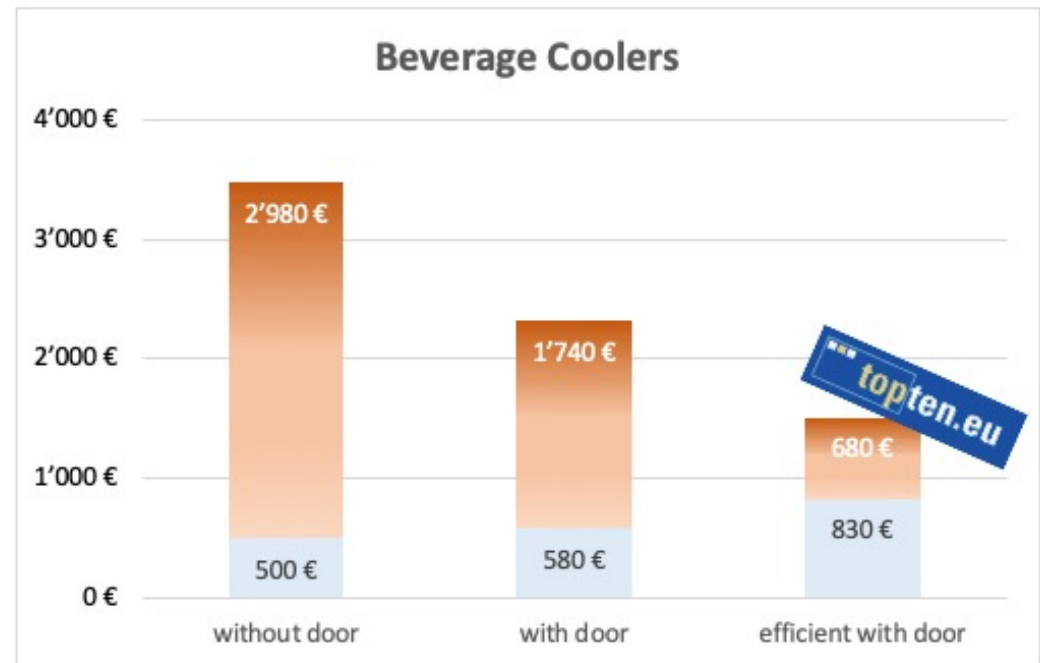


Net volume	320 l	320 l	451 l
Energy	4'780 kWh/a	2'920 kWh/a	1'060 kWh/a
Electricity costs*	7'650 €	4'670 €	1'695 €
Purchase price	3'400 €	3'400 €	3'500 €
Total costs	11'050 €	8'070 €	5'195 €

* 8 years, 0.2 € /kWh

Saving Potential Beverage Coolers

- Top-efficient model saves 75% energy compared to smaller inefficient open model and 60% compared to average model with door
- Life-time cost of efficient model is half of open inefficient appliance
- Often bulk-purchased by food & beverage companies who loan or rent appliances to vendors



Net volume	500 l	500 l	556 l
Energy	1'860 kWh/a	1085 kWh/a	425 kWh/a
Electricity costs*	2'980 €	1'740 €	680 €
Purchase price	500 €	580 €	830 €
Total costs	3'480 €	2'320 €	1'510 €

* 8 years, 0.2 € /kWh

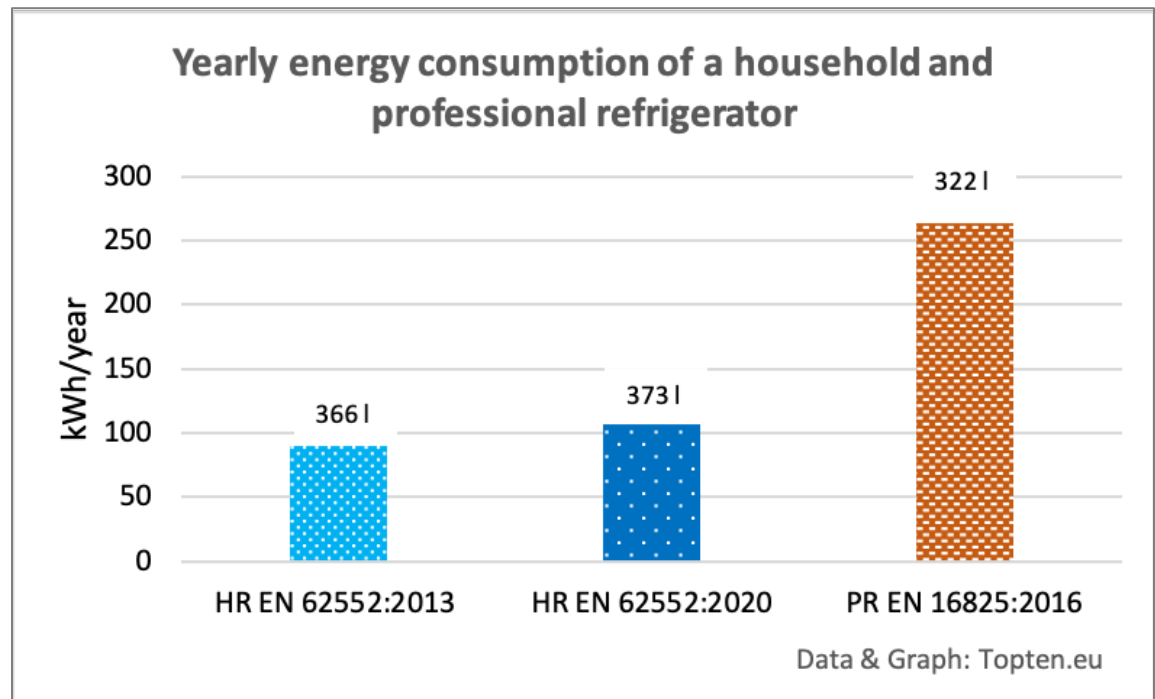
Household vs Professional Refrigerators

Differences in Test Standards:

- **EN 62552** for household refrigerators (no door opening sequence),
EN 16825 for professional storage refrigerators (with door opening sequence),
EN ISO 23953:2015 for supermarket refrigerators (with more intense door opening sequence)
- ProCold laboratory tests: 30-50% higher energy consumption if tested according to EN ISO 23953:2015 as compared to EN 16552:2013

Comparison of BAT:

- **Household refrigerator (HR)**
measured according to EN 62552:2013 and EN 62552:2020
- **Professional storage refrigerator (PR)**
measured according to EN 16825:2016



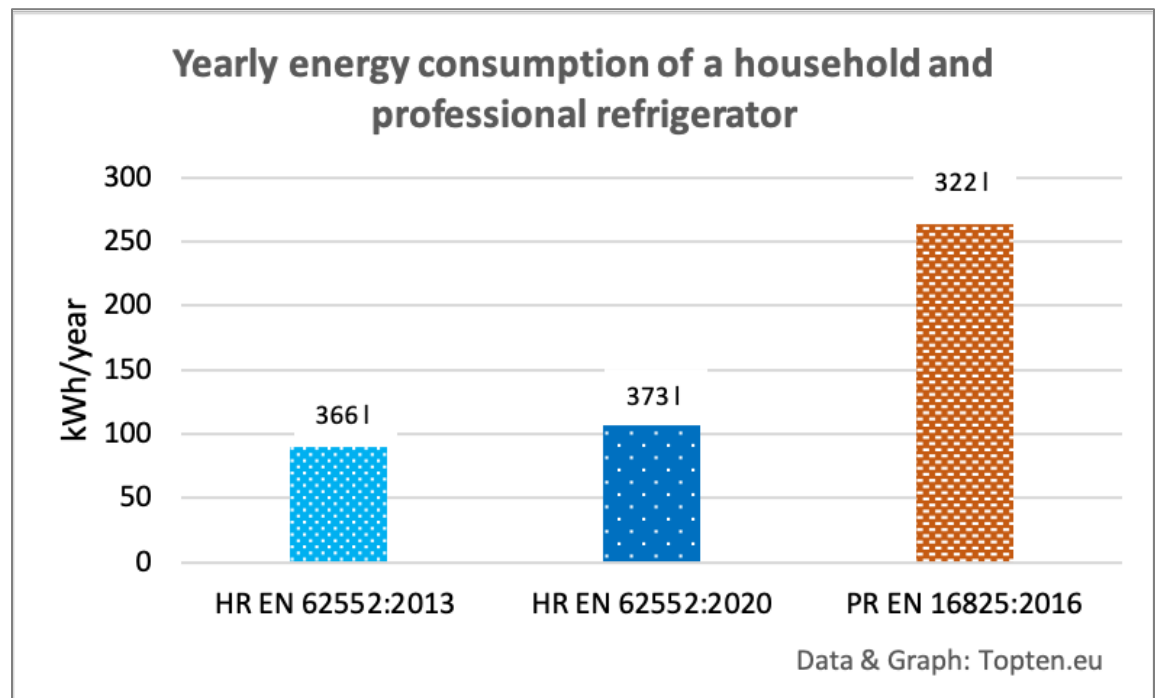
Household vs Professional Refrigerators

Conclusions:

1. **Storage refrigerators have potential to be as efficient as household appliances** (6 years label vs. 25 years label) -> policy highly effective!
2. **Significant saving potential can still be unlocked**

Saving potential PR:

- **2014 standard model (EEI 100) had saving potential of 80%** compared to class A models already on the market
- **In 2021, worst models on the market are class E with a saving potential of 75%** compared to class A models



Technical Aspects - Efficient Technologies

Variable Speed (VS) Compressors:

- Adjust continuously to match output required, ca. 1 energy class difference

Insulation

- Thickness and quality of insulation

Double or triple glazing or air curtains

- Type of insulation

Water loop or remote systems

- Use of waste heat, connecting different types of technologies within the market

Green refrigerants

- Supported by European F-Gas Regulation
- R290 and R600 have Global Warming Potential (GWP) 3, R404a has GWP 3'922 and R134a has GWP 1'430; leakage is widely common phenomenon

Financial Aspects - Rebates

Support purchase of most efficient technologies (BAT)

- In CH implemented since 2014 (Programme 3 ongoing)
- Saved kWh cheaper than purchased kWh



Multiplier effect

- Buyers and dealers encourage manufacturers to develop high efficiency products that qualify for the rebate programme
- Other manufacturers imitate technological innovations
- Dealers adjust product range towards high efficiency products

Programme 1 (2014-2017)

- 1.2 mio €
- 5'955 products
- 54.6 GWh total energy savings
- 2.2 ct/kWh cost effectiveness

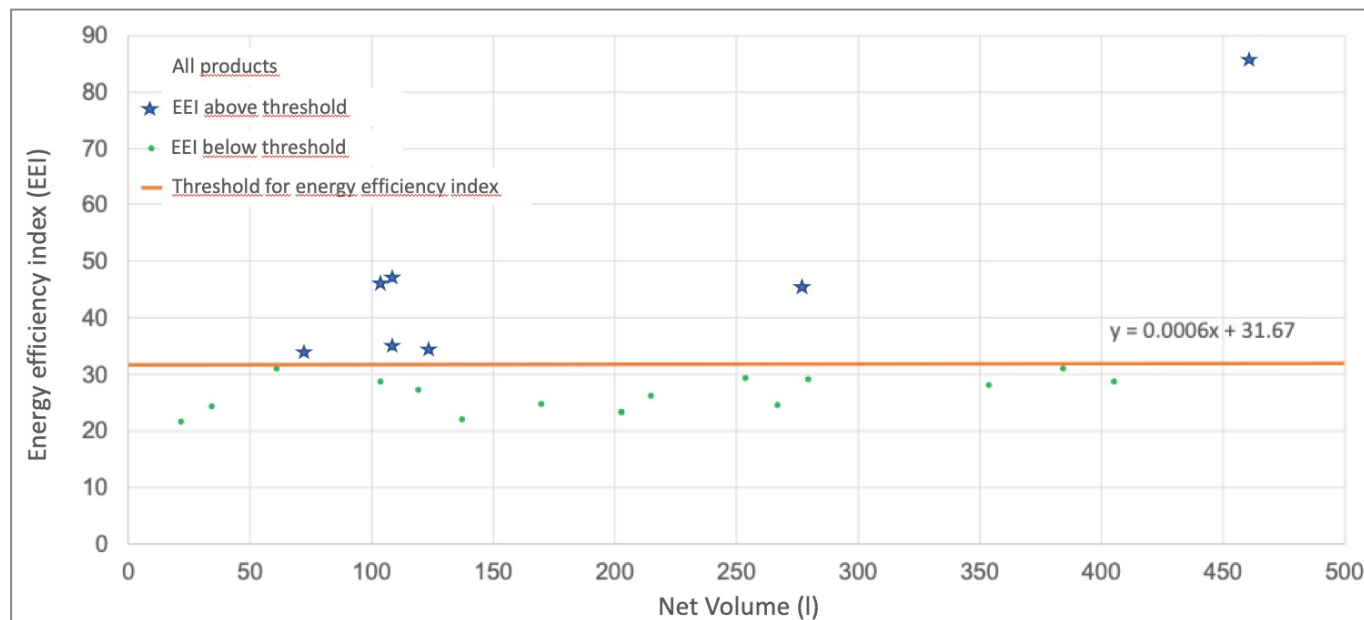
Programme 2 (2018-2020)

- 1.8 mio €
- 10'955 products
- 118.5 GWh total energy savings
- 1.5 ct/kWh cost effectiveness

Further B2B Categories – Medicine Cabinets

Refrigerated Medicine Cabinets are very similar in construction to professional storage refrigerators

- Test standards available for functionality and energy: DIN 58345:2007
- Online research yielded first available data (EEI calculated analogous to storage refrigerators)



Further B2B Categories – Medicine Cabinets

**Energy efficiency class equivalent of A+ reached by first model
(calculated according to EN 2015/1094)**

- Calculations of Swiss study show yearly saving potential of medicine cabinet of 455 kWh (6'825 kWh/15 years lifetime)
 - Efficiency and product safety very compatible
 - Great saving potential, high number of products on the market
- **Next step is energy labelling and ecodesign regulation of realize saving potential and provide data transparency**



Conclusions

1. Energy regulations on B2B market have proven to be highly effective
2. Significant market transformation has been triggered and saving potentials realized
3. Full potentials can be realized by increased market surveillance
4. Technology transfer between categories is possible
5. Rebate programmes are highly effective policy tools to boost market transformation
6. Further B2B categories are ready to be included in the scope (e.g. refrigerated medicine cabinets)
7. Energy regulation on the B2B market gives innovative manufacturers and edge, dealers new sales arguments, investors a chance to make truly informed decisions

Thank you for your attention!

Full report available on

www.topten.eu/documentation

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