

State of product energy efficiency in Europe – market insights from the new EU product registration database for energy labelling

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Abstract

In July 2017, the European Commission published the revised Energy Labelling Regulation (2017/1369/EU), setting deadlines for rescaling the current energy efficiency classes and introducing a product database. As from 1 January 2019, before placing on the market a unit of a new model covered by a delegated act, suppliers have to enter relevant product information in the new EU Product Registration database for Energy Labelling (EPREL). The database consists of a compliance part and a public part, which will be made accessible via an online portal. Its main goals are 1) supporting national market surveillance authorities, 2) informing consumers on the energy efficiency of appliances and 3) providing the Commission with up-to-date information for reviewing energy labels. The Regulation requires that the information will be made available as open data.

Since 1st January 2019 manufacturers can manually input the requested data in EPREL and since 1st February 2019 a system-to-system mass-upload approach has been made available. However, the Commission postponed the access to the open data (public part of the database) to the second quarter of 2019, for which reason we could not perform a first data analysis of EPREL at this stage, as initially intended.

The main objectives of the paper are fourfold. First, we introduce EPREL by providing a short historical background of the new EU database. Second, we show the structure and the main functionalities of the database as well as the main obligations for manufacturers. Third, we provide a brief overview

over selected programmes in countries that have already implemented an online register system for energy related products in the past. Finally, we conduct a reduced market analysis for televisions on the German market, using data from the German comparison site www.idealo.de instead of EPREL.

Background

In order to improve the environmental performance of energy-related products, the EU has put in place different Regulations and Directives. On the one hand, the Eco-design Directive 2009/125/EC [1] addresses this problem by ‘pushing’ the market towards more environmental friendly (in particular, more energy efficient) products by removing the worst performing ones from the market. On the other hand, the Energy Labelling Directive 2010/30/EU [2] ‘pulls’ the market towards more energy efficient products through energy labels. Energy labels inform consumers about the energy efficiency and other resource use of products, thereby reducing information asymmetries and encouraging customers to buy more energy efficient products.

The Eco-design Directive and the Energy Labelling Directive have shown to be successful in the past and helped to reduce overall energy consumption coming from energy-related products. At the same time, the European Commission identified untapped potential for energy savings and reducing other environmental impacts in its evaluation of the Directives in 2015 [3]. One of the listed shortcomings was related to non-compliance with product-specific requirements, in part related to weak enforcement by national market surveillance authorities (MSA), estimated to be responsible for around 10 % of the reduction in potential energy savings.

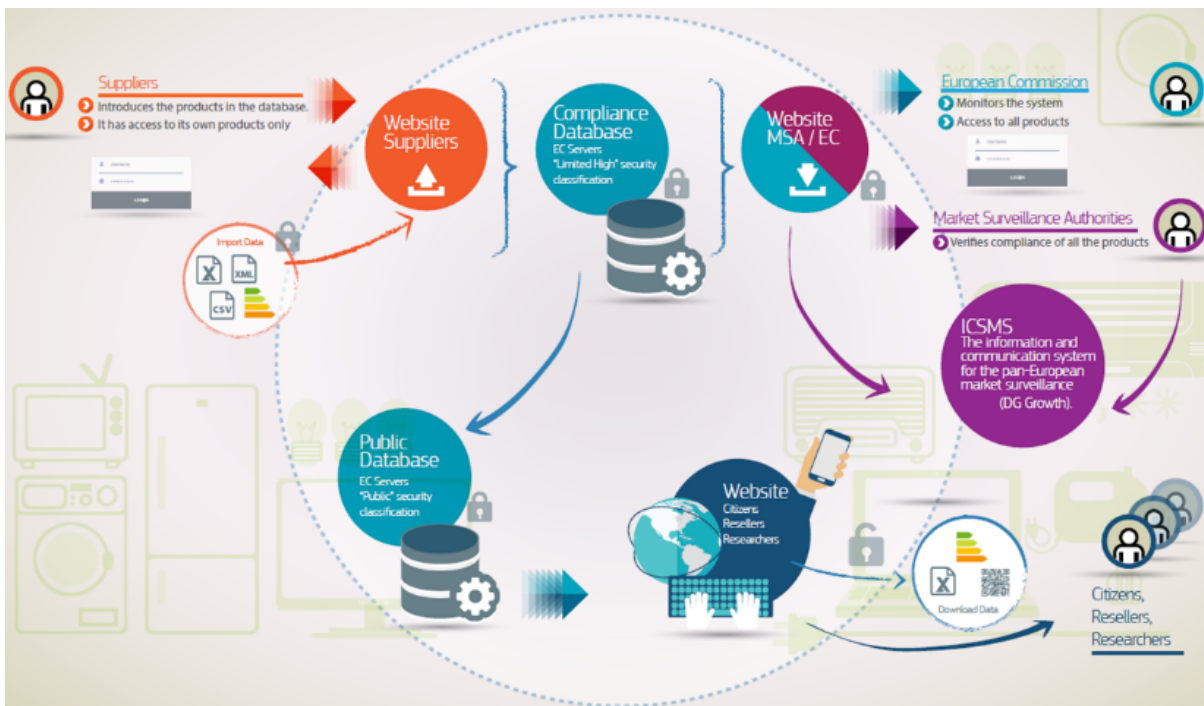


Figure 1. Structure of the database.

So far, MSA in the EU had to request product specific information from manufacturers each time they inspect a product. The evaluation document states that this remedy could be partly addressed by a central product registration database as it has been put in place in other countries, such as Australia, Brazil, Canada, China, India, South Korea, US and Vietnam. However, the introduction of such a database required a change to the Energy Labelling Directive, which happened in 2017.

The EU Framework Regulation 2017/1369 [4] for energy labelling, in force since 1 August 2017, has replaced EU Energy Labelling Directive 2010/30/EU. While the scope of the new Regulation has remained essentially unchanged, the new framework regulation foresees the introduction of a pan-European product database for all energy-related products (including imported second-hand products).

The implementation of the database was followed by a stakeholder consultation with regular meetings for manufacturers, MSA and representatives of the general public. The consultation process continues in 2019.

The new EU product registration database for energy labelling

PURPOSE OF EPREL

According Article 12(2) of Regulation (EU) 2017/1369 the product database shall serve three main purposes:

1. to support market surveillance authorities in carrying out their tasks under this Regulation and the relevant delegated acts, including enforcement thereof;
2. to provide the public with information about products placed on the market and their energy labels, and product information sheets;

3. to provide the Commission with up-to-date energy efficiency information for products for reviewing energy labels;

EPREL went live in the beginning of 2019 and allows manufacturers to register product information related to the energy label and technical documentation manually and through a system-to-system approach. While EPREL allows manufacturers to comply with Regulation (EU) 2017/1369 in its current state, the full technical implementation of the database has yet to be realised by the Commission. Only few companies perform systemic mass data uploads through system-to-system solutions for the time being and the database does not allow for consistency checks when data is entered. Furthermore, access for market authorities and the general public will only be made available in the second quarter of 2019¹, for which reason the database is not meeting its intended goals for the time being.

STRUCTURE OF THE DATABASE

The Figure 1² shows the general structure of the database.

EPREL will consist of a publicly accessible part, a compliance section and an online access portal for these two parts. The information relevant for consumers and retailers will be made available in the public part of the product database in the second quarter of 2019. The implemented features should allow customers to compare different features of the models and to select the most energy efficient products. According to Annex I of Regulation (EU) 2017/1369 the information shall be machine readable, sortable and searchable, respecting open standards for third party use, free of charge. This means that the data will be usable by researchers, (mobile) application developers and could be linked to other comparison tools containing

1. <https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-efficient-products>

2. Source: European Commission, EPREL stakeholder consultation forum, March 2018.

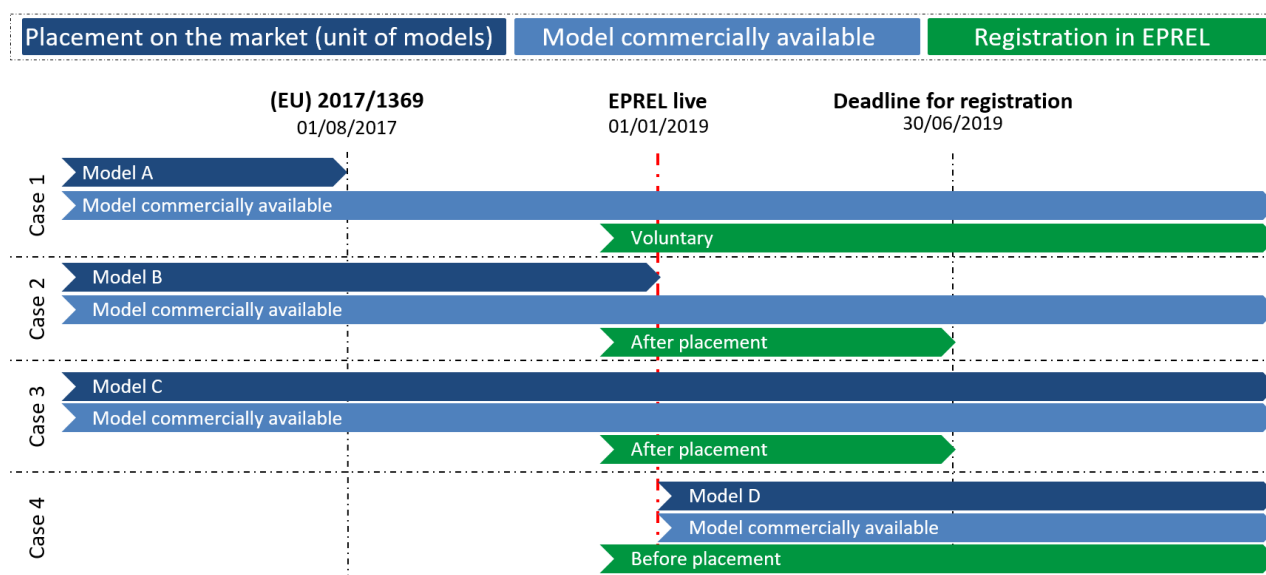


Figure 2. Timeline for product registration.

additional information, such as price. The compliance section will be subject to strict safeguards and will only be accessible to the MSA and the Commission.

The European Commission needs also to provide a link to the Information and Communication System on Market Surveillance (ICSMS), which includes the outcome of compliance checks performed by Member States and specific measures adopted.

OBLIGATION FOR SUPPLIERS

As of 1 January 2019, suppliers (manufacturers, importers or authorised representatives) have to register their appliances, which require an energy label in EPREL, before placing them on the European market. EPREL allows manufacturers to register product information related to the energy label, technical documentation and compliance either manually or through a mass-upload system-to-system approach. Some manufacturer associations such as APPLiA, representing the home appliance manufacturers in Europe, have created compliance templates for their members in order to facilitate the data upload³.

For models whose units were only placed on the market before 1 August 2017, the entry in the product database is voluntary. For units of models placed on the market between 1 August 2017 and 1 January 2019, suppliers must enter the information into the product database by 30 June 2019. Figure 2⁴ illustrates the different cases.

Once changes are made to a product that are relevant to the label or product data sheet, the product is considered a new model. Suppliers must specify in the database if units of a model are no longer placed on the market. After placing the last unit of a model on the market, suppliers are required to keep information about that model in the compliance part of the product

database for 15 years. The information in the public part of the database is not deleted.

CONCERNED PRODUCT GROUPS

The scope of EPREL includes all product groups for which delegated regulations supplementing Directive 2010/30/EU exist. Furthermore, the European Commission intends to include tyres as of 1 January 2020. Table 1^{5,6} summarises the concerned product groups, the relevant (Delegated) Regulations.

RELEVANT INFORMATION TO BE ENTERED IN EPREL

- From 1 January 2019, concerned suppliers must enter the information listed in Table 2 before placing their product on the EU market. The suppliers are responsible for the correctness of the entries.

DATA ENTRY

In order to access EPREL, the administrator of the manufacturer or the importer first requires an “EU login” to enter the European Commission’s authentication service (formerly known as ECAS). Afterwards, the administrator is able to create a new supplier organisation. A supplier organisation is identified by its organisation name, country and VAT number/code. Furthermore, a legal address of the organisation is required as well as additional administrative information (e.g. for organisations established in third countries an official registration number/code). When creating a new supplier account, the correct type of organisation has to be chosen between manufacturer, importer and an authorised representative [5].

3. <https://www.applia-europe.eu/initiatives/eprel-compliance-templates>.

4. Source: European Commission, EPREL stakeholder consultation forum, October 2018.

5. In November 2018 the General Court of the European Union annulled the regulation on the energy labelling of vacuum cleaners (Delegated Regulation (EU) No 665/2013) after a lawsuit ruled by Dyson against the EU Commission. The EU Commission did not file an appeal against the ruling within two months, for which reason the regulation is not valid anymore.

6. Lamps: In view of its proposal to no longer require an energy label for luminaires in the revised energy labelling regulation for light sources, the Commission will not implement the luminaire label in EPREL.

Table 1. Product groups subject to registration.

#	Product Group	Regulation	Data entry in EPREL
1	Lamps	Delegated Regulation (EU) No 874/2012	1 Jan 2019
2	Televisions	Delegated Regulation (EU) No 1062/2010	
3	Household dishwashers	Delegated Regulation (EU) No 1059/2010	
4	Household washing machines	Delegated Regulation (EU) No 1061/2010	
5	Local space heaters	Delegated Regulation (EU) 2015/1186	
6	Domestic ovens and range hoods	Delegated Regulation (EU) No 65/2014	
7	Household refrigerating appliances	Delegated Regulation (EU) No 1060/2010	
8	Household tumble driers	Delegated Regulation (EU) No 392/2012	
9	Professional refrigerated storage cabinets	Delegated Regulation (EU) 2015/1094	
10	Residential ventilation units	Delegated Regulation (EU) No 1254/2014	
11	Air conditioners	Delegated Regulation (EU) No 626/2011	
12	Solid fuel boilers	Delegated Regulation (EU) No 2015/1187	
13	Heaters and water heaters	Delegated Regulation (EU) No 811/2013	
14	Tyres	Regulation (EC) No 1222/2009	1 Jan 2020

- **Manufacturer:** any natural or legal person who is responsible for designing or manufacturing a product and places it on the market under his own name or trademark: a manufacturer is responsible for directly register in the database each different model of the products placed on the EU market.
- **Importer:** a natural or legal person established in the Union who places a product from a third country on the EU market. His obligations build on the obligations of the manufacturer. An importer registers in the database each different model of the products it imports.
- **Authorised Representative:** established in the Union, is appointed by a manufacturer, established in the EU or not, to act on his behalf in registering in the database each different model of products placed on the EU market. If, however, the authorised representative of a third country manufacturer supplies a product to a distributor or a consumer within the EU, this organisation then no longer acts as a mere authorised representative but becomes the importer and is subject to the obligations of importers.

The confirmed supplier can associate a list of trademarks that will become available for selection during the manual registration. In addition, the supplier can manage multiple user accounts that will be able to access the system and perform product registration activities. The administrator can either manually import the models into the database on the EPREL website (via structured ZIP files) or through a system-to-system approach (via eDelivery⁷). The system-to-system approach was put in place in February 2019. To help suppliers with data

entry, the European Commission has published documentation on the data exchange model and eDelivery on the official EPREL website as well as use guidelines for using the product database [5, 6]. On the website manufacturers, importers or authorised representatives can also find frequently asked questions (FAQ) and a discussion forum. The European Commission also provides a technical advice centre for suppliers⁸.

Product registration databases in other countries

EPREL is not the first product database of its kind. In the past, countries and states such as Australia & New Zealand, Brazil, California, Canada, China, Taiwan, Hong Kong, India, Japan, Malaysia, Mexico, Philippines, Saudi Arabia, Singapore, South Africa, Thailand, Vietnam and the U.S. have also set up different product databases that serve as authoritative sources of information about the energy performance and other characteristics of products in select markets⁹. The databases differ significantly from one country to another with respect to covered products groups and the collected and provided searchable (or not) information. Table 3^{10, 11, 12, 13, 14, 15, 16} shows a brief overview over selected countries that have already implemented an on-line register system for energy related products.

8. The helpdesk can be reached by the following e-mail address ENER-EPREL-HELPDESK@ec.europa.eu.

9. <https://superefficient.org/tools/product-certification-databases>

10. Australia & New Zealand: <http://www.energyrating.gov.au/suppliers/registration>.

11. Brazil: <http://www.inmetro.gov.br/consumidor/tabelas.asp>.

12. Canada: <https://www.nrcan.gc.ca/energy/regulations-codes-standards/6859#labelling>.

13. China: <http://www.energylabel.gov.cn/>.

14. India: <http://www.beestarlable.com/Home/Searchcompare>.

15. South Korea: http://www.kemco.or.kr/new_eng/pg02/pg02100200_2.asp.

16. U.S.: https://www.regulations.doe.gov/certification-data/#q=Product_Group_s%3A*.

7. eDelivery is one of the building blocks of the EC's Connecting Europe Facility (CEF). eDelivery helps public administrations to exchange electronic data and documents with other public administrations, businesses and citizens, in an interoperable, secure, reliable and trusted way. For more information see: <https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/What+is+eDelivery+-+Overview>.

Table 2. Relevant information to be entered into EPREL.

Information to be entered in the public part of the database by the supplier (Annex I, 1)	Information to be entered in the compliance part of the database by the supplier (Annex I, 3)
The name or trademark, address, contact details and other legal identification of the supplier	The model identifier of all equivalent models already placed on the market
The model identifier	Specific technical documentation (Art. 12(5)): <ul style="list-style-type: none"> • a general description of the model, sufficient for it to be unequivocally and easily identified • references to the harmonised standards applied or other measurement standards used • specific precautions that shall be taken when the model is assembled, installed, maintained or tested • the measured technical parameters of the model • the calculations performed with the measured parameters • testing conditions
The label in electronic format	
The energy efficiency class(es) and other parameters of the label	
The parameters of the product information sheet in electronic format	

Table 3. Overview of selected countries with an online product register system.

Country	Programme	Regulation	Label System	Mandatory	# Product Groups
Australia & New Zealand	Equipment Energy Efficiency (E3) program	Greenhouse and Energy Minimum Standards (GEMS) Act (2012)	Up to 6 stars, in some categories up to 10 stars.	Retail stores: Mandatory Online stores: Voluntary	8
Brazil	Programa Brasileiro de Etiquetagem	Law No. 10295 (Energy Efficiency Law, 2001)	A to E-G	YES	11
Canada	ENERGY STAR®	Voluntary partnership between the Government of Canada and organizations in the public, private and not-for-profit sectors (since 2001).	A certified model is in the top 15-30% of its class for energy performance.	NO	> 75 product categories
	EnerGuide	Canada's Energy Efficiency Act (1992) and Energy Efficiency Regulations (2016)	An energy consumption indicator positions the model compared with the most efficient and least efficient models in the same class.	Mandatory for 7 product groups, voluntary for 5 product groups	12
	Lighting product lamp label		The label on the lamp packaging indicates the light output in lumens, the energy used in watts, and the life of the bulb in hours.	Mandatory for some types of lamps	3
China	China Energy Label (CEL)	NDRC and AQSIQ Order No.35 "Regulation on China Energy Label" (2005)	Numbers ranging from 1 (best) to 3 or 5, QR code.	YES	35 types of products in 5 categories
India	Standards & Labelling Program	The Energy Conservation Act, 2001 and Standards & Labelling Scheme (2006)	Up to 5 stars	Mandatory for 5 product groups Voluntary for 16 product groups	21
South Korea	Energy Efficiency and Standard Programme	Regulation on Energy Efficiency Labelling and Standards No. 2011-263. 2011.12.23)	Numbers ranging from 1–5. The 1 st grade product is 30–40 % more efficient than the 5 th grade.	YES	35
U.S.	Compliance Certification Management System (CCMS)	Energy Policy and Conservation Act of 1975 (as amended)	FTC EnergyGuide label shows the estimated yearly energy costs compared with the most efficient and least efficient models in the same class.	YES	> 65 categories of consumer products and commercial equipment
	ENERGY STAR®	Voluntary program launched by the U.S. Environmental Protection Agency in 1992.	Specifications vary from one product type to another, but certified products are usually 10–25 % more efficient than minimum standards.	NO	> 75 product groups

While all countries use their product registration databases for compliance reasons and policy deductions, a trend can be observed towards the use of the data by end-customers. As an example, China integrated QR codes in its energy labels in 2016, allowing customers fast access to comprehensible information via their smartphone [7]. In the same year, a mobile app (BEE Star label) was established in India giving consumers on demand access to energy performance data of the devices covered by the database. The Mobile app is linked with the Star labelled appliances database, which is updated daily. The app also provides a platform to receive real-time feedback from customers¹⁷.

One of the main challenges surrounding the existing databases, incl. EPREL, is the large heterogeneity between the existing programmes with respect to requested information, but also to data formats and standards. For this reason, the SEAD initiative¹⁸ in its Energy Efficiency Data Access Project [8] is urging to align global data standards and on an international level to facilitate both compliance and the effective use of the generated data by end-users. The main recommendations of the report are:

- Capturing individual product model numbers for certification records
- Capturing universal product codes (UPC) and European Article Numbers (EAN) for each product in certification records
- Normalization of Manufacturers/Brands at an international level
- Declaring the usage assumptions and test procedures used within each of the certification data files.
- Normalizing the way units of measurement are written at an international level

Current market insights for televisions (case study Germany)

Our initial plan was to use the EPREL database at this stage in order to provide current market insights for selected product groups on a European level. In the end of 2018, the European Commission announced that the access to EPREL open data will be only made available in the second quarter of 2019. For this reason, we perform a reduced overview over the current market situation of televisions for the German market, using data from the comparison platform www.idealo.de.

As of January 2019, the [idealo.de](http://www.idealo.de)¹⁹ price comparison platform contains data for >3000 televisions sold on the German market²⁰. The platform contains information on price ranges, manufacturers, screen sizes, energy efficiency classes, product types (4K, Full-HD, curved, etc.), display technologies, etc.

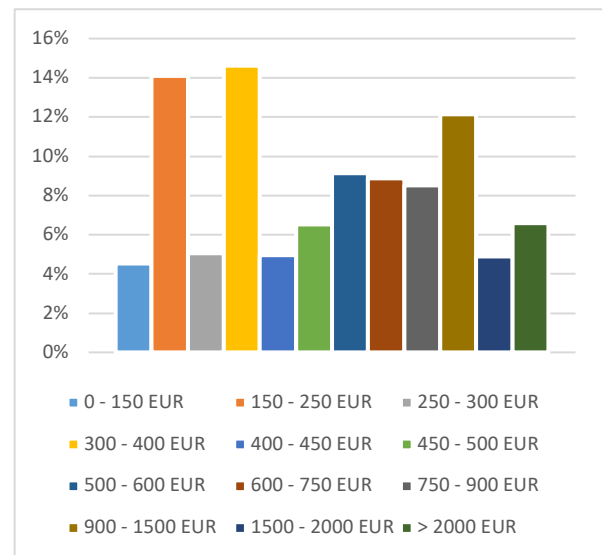


Figure 3. TV offering, by price ranges (%), data for 3,078 TVs).

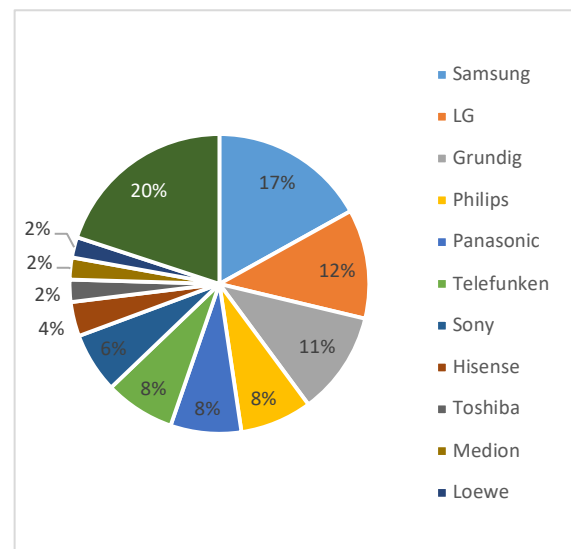


Figure 4. TV offering, by manufacturer (%), data for 3,078 TVs).

While the analysed data shows the market offer in Germany, it does not provide information on sold products.

According to idealo.de, 50 % of televisions offered on the German market cost up to 500 EUR (Figure 3²¹). The most represented price ranges are 150–250 EUR (14 %) and 300–400 EUR (15 %). Four manufacturers offer almost half the television models available on the German market (Figure 4²²). The list is headed by Samsung (17 %) followed by LG (12 %), Grundig (11 %) and Philips (8 %).

Televisions are labelled on an energy efficiency scale from A++ (most efficient) to G (least efficient). An A+++ label has been available for the most efficient televisions since 2017. Most of the televisions sold on the German market are situated in the energy efficiency classes A (47 %) and A+ (40 %).

17. <http://www.bee-starlabel.com/Home/MobileApp>

18. The Super-efficient Equipment and Appliance Deployment (SEAD) Initiative is a voluntary collaboration between 19 member governments to address urgent global energy challenges and promote the manufacture, purchase, and use of energy-efficient appliances, lighting, and equipment worldwide.

19. <https://www.idealo.de/>.

20. Data for 3078 televisions was retrieved on 12. January 2019.

21. Source: idealo.de.

22. Source: Statista.

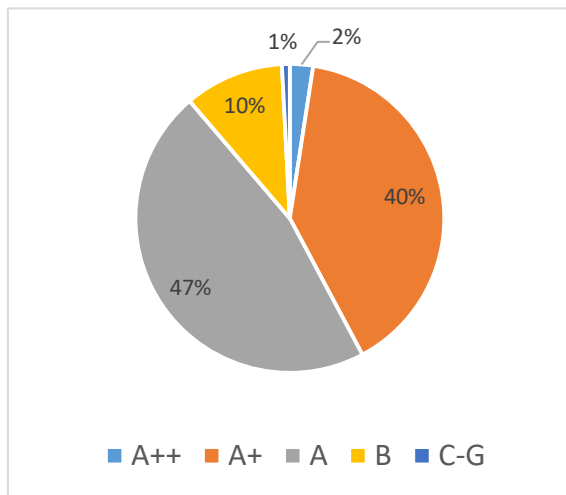


Figure 5. TV offering, by energy efficiency class (data for 2,303 TVs). Source: see footnote 22.

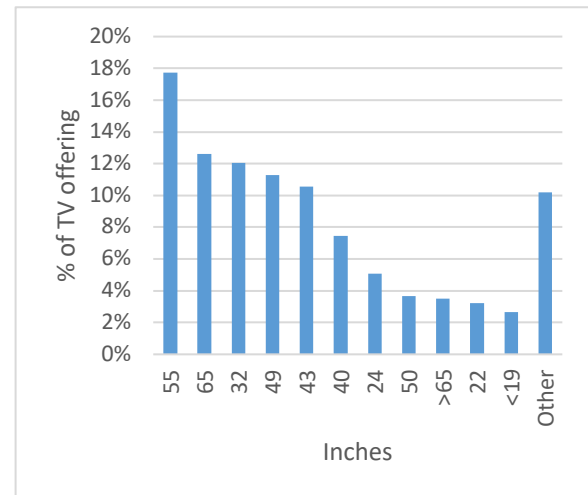


Figure 6. TV offering, by screen size (inches, data for 2,425 TVs). Source: see footnote 22.

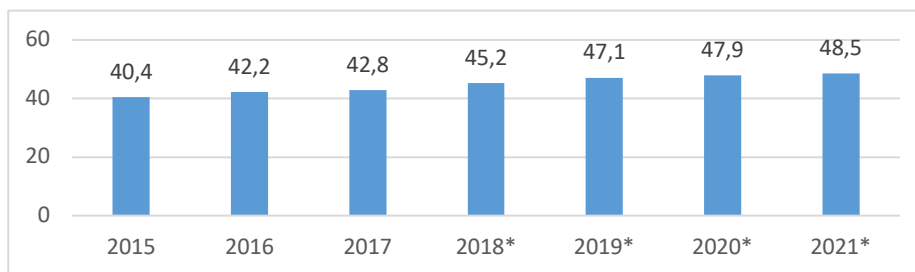


Figure 7. Average size of LCD TV screens worldwide from 2015 to 2021 (in inches). Source: see footnote 22.

Only 2 % of the products reach the energy class A++ (Figure 5). Most of the televisions offered on the online platform come with a screen diagonal of 55 inches (18 %), followed by 65 inches (13 %) and 32 inches (12 %) as can be observed in Figure 6.

The energy consumption of televisions depends on a broad variety of different parameters and is mainly driven by screen size and brightness levels (measured in luminance). Other factors, such as incorporated equipment (e.g. tuners, receivers, hard discs ...), display technology (LED, OLED ...) as well as consumer behaviour also have an impact on the energy consumption. Within the last years, the average size of televisions has been increasing worldwide and it is forecasted that it will rise further (Figure 7).

However, at the same time power density has decreased faster than screen area has increased. The result is that the overall trend is towards lower power displays [9]. While total energy consumption increases with the size of the displays, this does not mean that smaller TVs are generally situated in better energy efficiency classes. Annex II of Commission Delegated Regulation (EU) No 1062/2010 with regard to energy labelling of televisions defines a formula according to which an energy efficiency index (EEI) is calculated, taking into account the area of the screen. As can be observed in Figure 8 there is no clear relation between screen size and energy efficiency classes.

Conclusion and outlook

In July 2017, the European Commission published the revised Energy Labelling Regulation (2017/1369/EU), setting deadlines for rescaling the current energy efficiency classes and introducing a product database. Since 1st January 2019, before placing on the market a unit of a new model covered by a delegated act, suppliers have to enter relevant product information in the new EU Product Registration database for Energy Labelling (EPREL). Manufacturers can either manually input the requested data in EPREL or use the systematic mass upload of data which was set up in February. The access to the public part of the database (open data) will be made available in the second quarter of 2019. For this reason we could not perform a first data analysis of EPREL at this stage, as initially intended. For a reduced market overview of the German market we collected data for televisions from the German comparison online site www.idealo.de.

The main objectives of the paper were fourfold. First, we provided a historical background of the new EU database EPREL, which is still under construction. Second, we showed the basic structure and the main functionalities of the database as well as the main obligations for manufacturers. Third we showed a short overview over existing product registration databases in other countries. Last but not least we provided some current market insights for televisions on the German market, using data from the German comparison site www.idealo.de instead

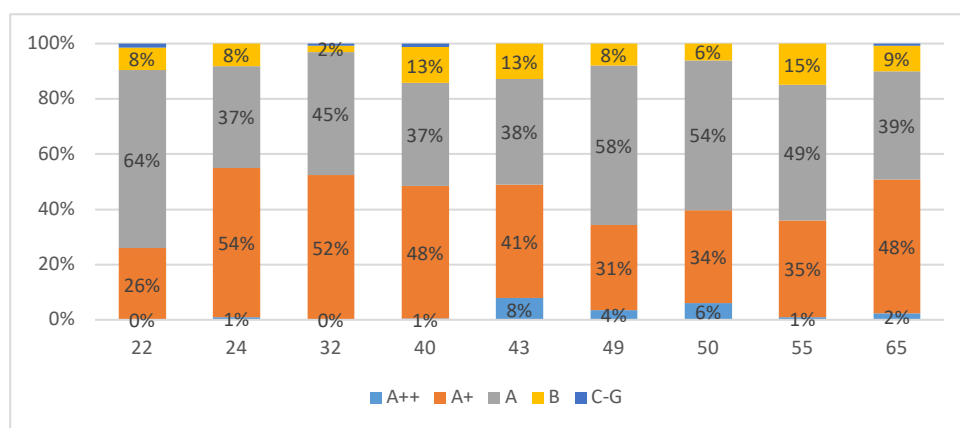


Figure 8. Energy efficiency labels, by screen size (inches). Source: see footnote 22.

of EPREL data. A more extended analysis can be performed in the future, using larger data sets from EPREL covering all energy-related products available on the EU market.

The Commission plans to improve and expand the EPREL product database over the next few months and years. While the first version from 1 January 2019 is only meeting the legal minimum standards, successor versions will integrate plausibility checks and address the rescaling of labels (2nd half of 2020). In order to meet the three main objectives as stated in Article 12(2) of Regulation (EU) 2017/1369, the Commission will need to ensure the usability of the database for manufacturers, MSA, the public and third-party providers (information campaigns, access to EPREL).

While large trade associations such as APPLiA have put in place some guidance documents and online-templates for their members, smaller companies that are not represented by associations might find it more difficult to comply with the new requirements. In this case national support, especially for SMEs, would be desirable. Due to a large amount of models (e.g. in case of lamps), it can be challenging for producers to handle the data upload manually. The system-to-system data upload solution was implemented by the Commission in February 2019, but producers still need to set up and change their IT systems, which will take time and resources. This is a particular challenge for SMEs, since it is related to additional costs.

EPREL has the objective to support MSA in carrying out their tasks. So far, MSA do not have access to the database, but as soon as the access will be granted, the Commission has to make sure that an easy workable link to the Information and Communication System on Market Surveillance (ICSMS) is established that will disburden the MSA and put no additional workload on them. In this respect training measures on national levels could help MSA to optimise their work.

Last but not least, EPREL has also the objective reduce information asymmetries between manufacturers and consumers by providing the public with information about products placed on the market and their energy labels. Provision of such a database can be seen as a crucial first step, but its effect will be determined by the usability of the database and how the data will finally be presented to the consumer. Here some best practices should be considered that can be found in China or India, where either QR-codes or mobile Apps for smartphones were linked to the existing databases in the last years. Only if data will be presented

in an intuitive and easy way it can be expected that consumers will take them into account in their purchasing decision.

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