Follow-up of the MEErP Preparatory Study on Taps and Showers

Final Report

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1 INTRODUCTION

1.1 Background

The Commission Services have worked in the past years on a preparatory study (Cordella et al. 2014) to analyse the potential to implement policy measures on Taps and Showers (TS). The study pointed out that:

- Water consumption and scarcity is an increasing problem in many areas of the European Union;
- A large number of taps and shower models are on the market which offer to consumers the possibility of choosing between different levels of water and energy consumption;
- Water-saving technologies represent technically effective, economically affordable and flexible product options;
- Environmental improvements achieved through market transformation and existing policy and labelling initiatives could be further enhanced through the implementation of additional policy measures and/or a broader labelling of products (see Table 1);
- The water- and energy-saving potential of taps and showers can be significant at European level, as also reported in the Ecodesign Working Plan 2016-2019 (European Commission 2016a).

Among the possible policy options assessed in the study, a European mandatory label was considered able to accelerate the market transformation towards water- and energy-saving products without limiting consumers, which could ultimately result in benefits at EU level in terms of water, energy and cost savings and reduction of GHG emissions.

Implementing ecodesign requirements (e.g. water flow restrictions, mandatory presence of water/energy-saving devices) instead appeared less attractive considering:

- The technical difficulties associated with the scope definition (e.g. conventional vs. luxury/wellness products; bathroom vs. kitchen taps; exhaustive but flexible list of water/energy-saving devices);
- The risk of not meeting the expectations of consumers;
- The more limited benefits which would be achievable, as modelled in the study, compared to labelling options.

Also based on such considerations, the potential development of an energy label for water-related products has been included in the Ecodesign Working Plan 2016-2019 (European Commission 2016a). In parallel, a part of industry has been working on the development of a unified label for taps and showers to inform about the performance of their products and expressed its interest in a Voluntary Agreement with the Commission as an alternative to the adoption of an energy label.

Table 1: Comparison at EU level of results obtained for BAU and other policy scenarios in the preparatory study for taps and showers (Cordella et al. 2014): Water Abstraction and Primary Energy Demand at product system level

POLICY SCENARIO	WATER ABSTRACTION (Gm^3/year)					PRIMARY ENERGY DEMAND (PJ/year)				
	2015	2020	2025	2030	Cum.	2015	2020	2025	2030	Cum.
BAU [1]										
- absolute result	25.0	24.4	23.4	22.0	356.2	3212	2793	2345	1886	38437
(% var. 2015-2030)				(-12%)					(-41%)	
Mandatory Label										
- absolute result	25.0	23.2	21.5	21.3	339.1	3212	2619	2094	1825	36159
(% var. 2015-2030)				(-15%)					(-43%)	
- difference from BAU	0.0	-1.2	-1.9	-0.7	-17.1	0	-174	-251	-61	-2278
(% var)					(-5%)					(-6%)
Specific ED measure on water flow restrictions										
- absolute result (% var. 2015-2030)	25.0	23.4	23.2	22.0	350.1	3212	2654	2334	1886	37865
(% var. 2015-2030)				(-12%)					(-41%)	
- difference from BAU	0.0	-1.0	-0.2	0.0	-6.0	0	-139	-11	0	-752
(% var)					(-2%)					(-2%)
Generic ED measure on technical devices										
- absolute result (% var. 2015-2030)	25.0	24.1	23.0	21.6	351.9	3212	2747	2297	1848	37875
(% var. 2015-2030)				(-13%)					(-42%)	
- difference from BAU	0.0	-0.3	-0.4	-0.3	-4.3	0	-46	-48	-38	-562
(% var)					(-1%)					(-1%)

Note:
(1) Effectiveness of voluntary initiatives: 40% in 2020, 60% in 2025, 80% in 2030. However, considering that the market could drive a broader and earlier spread of voluntary initiatives, a sensitivity analysis on this assumption is provided in the preparatory study for taps and showers. This is also reflected in the update of the assessment reported in Section 3 of this report.

1.2 Follow-up and structure of the report

As a follow-up to the preparatory study and Ecodesign Working Plan (European Commission 2016a), additional information on taps and showers has been gathered with the aim of evaluating which strategy should be followed for this product group.

In particular, a questionnaire was developed to collect updated information on this product group. The questionnaire, which was shared with the stakeholders of this product group on 21 July 2017, covered four main thematic areas:

1. Updated information on voluntary labelling schemes for Taps and Showers;
2. Indications on the scope of a potential energy label for Taps and Showers;
3. Relevant standardisation work and methods for assessing the performance of Taps and Showers;
4. Updated information on current products performance and expected developments and trends.

32 replies were received: 23 from industry members (72%), 7 from governments or national institutes (22%), 2 from NGO (6%). Geographical representativeness of the respondents is shown in figure 1.

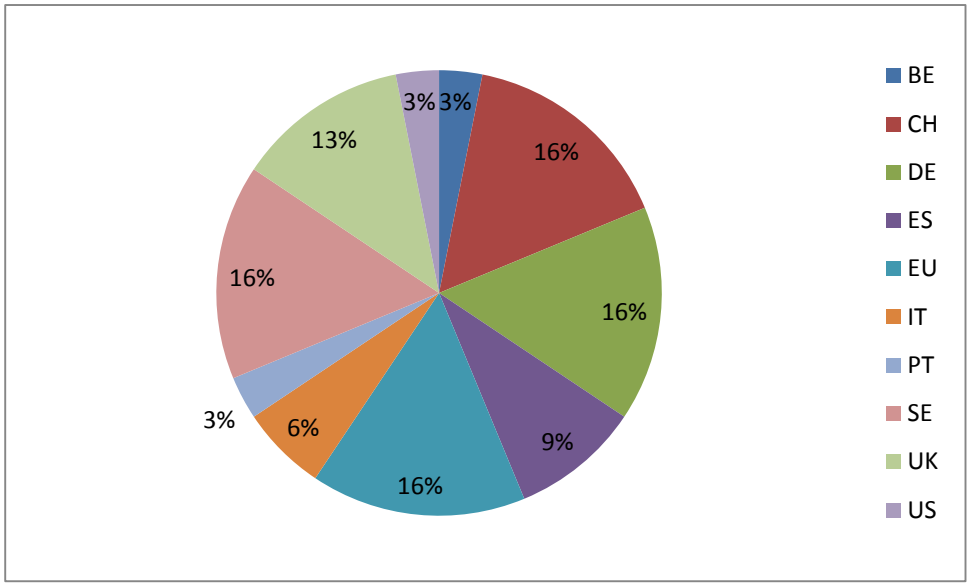

Figure 1: Geographical distribution of the respondents to the 21 July 2017 consultation on taps and showers

Furthermore, a workshop was organised on 26 April 2018 to discuss about testing and standardisation issues for taps and showers. A broader meeting was organised on 25 October 2018 to discuss with stakeholders on the available updated information on taps and showers, with a view to get preliminary views on possible policy options.

Information gathered through the consultation of stakeholders and additional analyses has been integrated in the present document, which is structured in the following sections:

- Labelling and standardisation, providing an update on the labelling and standardisation contexts and on the possible labelling strategies for taps and showers;

- Market and saving potential: providing an update on the market of taps and showers and on the saving potential which could be achievable for this product group;
- Conclusions, providing recommendations based on the follow-up research performed.

2 LABELLING AND STANDARDISATION

2.1 Labelling context

The main European labels for taps and showers include:

- The ANQIP label[1];
- The Swedish Energy Efficiency Labelling[2];
- The Swiss Energy Label for Sanitary Fittings[3];
- The Water Efficiency Label[4];
- The Water Label[5].

Other schemes of possible relevance for the product group, as pointed out by stakeholders, are:

- Energy Efficiency Obligation[6] (EU): Under the Energy Efficiency Directive, EU countries must set up an energy efficiency obligation scheme. The scheme requires them to generate a certain number of "Energy Efficiency Certificates" through a list of approved energy efficiency measures. For instance, the installation of water saving taps and showerheads is included among the energy efficiency measures allowing the issuing of "Titoli di Efficienza Energetica"[7] in Italy. Similar measures are considered in France and Portugal for the generation of "Certificats d'Economies d'Energie"[8] and "Certificado de Eficiência Energética"[9].
- Distintiu de garantía de qualitat ambiental[10] (Spain): environmental label for awarding products and services, among which systems that favour the saving of water (maximum water flows from taps and shower elements included).
- Watersense (USA)[11]: environmental label for awarding water-efficient products based on their water flow. It also includes standardised test procedures for testing the "comfort level" of showerheads based on i) the spatial distribution of the shower jet, and ii) the force exerted by the shower jet.

[1] http://www.anqip.pt/ (accessed on 4 February 2019)
[2] http://services.1kiwa.com/sweden/product-certification/energy-efficiency-labelling (accessed on 4 February 2019)
[3] http://www.bfe.admin.ch/energieetikette/04901/index.html?lang=en (accessed on 4 February 2019)
[4] http://www.well-online.eu/ (accessed on 4 February 2019)
[5] http://www.europeanwaterlabel.eu/ (accessed on 4 February 2019)
[6] https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-efficiency-directive/obligation-schemes-and-alternative-measures (accessed on 4 February 2019)
[7] http://www.mercatoelettrico.org/It/Mercati/TEE/CosaSonoTee.aspx (accessed on 4 February 2019)
[8] https://www.ecologique-solidaire.gouv.fr/dispositif-des-certificats-deconomies-denergie (accessed on 4 February 2019)
[9] Portuguese Regulatory Order n.º 15793-I/2013 ("Despacho n.º 15793-I/2013") (accessed on 4 February 2019)
[10] http://mediambient.gencat.cat/ca/05_ambits_dactuacio/empresa_i_produccio_sostenible/ecoproductes_i_ecoserveis/etiquetatge_ecologic_i_declaracions_ambientals_de_producte/distintiu_de_garantia_de_qualitat_ambiental/ (accessed on 4 February 2019)
[11] https://www.epa.gov/watersense/watersense-products (accessed on 4 February 2019)

- Water Efficiency Labelling and Standards (Australia and New Zealand)[12]: water efficiency labelling and minimum performance standards for household water-using products, including taps and showers. Testing of taps and showers is based on the standards AS/NZS 3718 and AS/NZS 3662[13], which assess water flow rates and, in case of showers, "comfort tests": (a) determination of mean spray spread angle and spray force; (b) measurement of temperature drop and (c) endurance test for flow controllers used in showers (if incorporated in showers or being components of showers). Based on this approach, the International Standards Organisation has been taking forward a new international standard for water efficient products[14].

Concerning the market relevance of the schemes, it appears that the Water Label has the widest coverage in Europe. It has been reported by stakeholders that in 2015 there were 8000 products form 90 brands registered to the scheme. Registrations have increased to 10900 products from 141 brands in 2018. According to the Water Label's board, applications to the label would represent about 60% of the market of taps, showers and shower handsets (in terms of units).

More local markets are instead covered by the ANQIP label in Portugal, the Swiss Energy Label in Switzerland (2880 products registered in September 2017), and the Swedish Energy Efficiency Labelling scheme in Scandinavia (about 300 registrations in April 2018, mainly as B2B label in new buildings).

It is now widely understood that parallel schemes on the market may cause confusion. Main European manufacturers have pushed to join forces on a new platform, the European Bathroom Forum (EBF)[15], to develop a unified label based on a "best of all" approach. The majority of industry stakeholders agree that a single label that covers water and energy aspects is the best option for the European market. In March 2018, the EBF managed to reach an agreement with representatives from ANQIP, Swedish Energy Efficiency Labelling, and Swiss Energy Label in order to work towards the development of a single label.

[12] https://www.mfe.govt.nz/sites/default/files/suppliers-guide-nz-water-efficiency-labelling-scheme_0.pdf. (accessed on 4 February 2019)
[13] https://www.saiglobal.com/product-certification/fact-sheets/GuideToWELSAndTheRelationshipWithWaterMark.pdf (accessed on 4 February 2019)
[14] https://standardsdevelopment.bsigroup.com/projects/9017-01063 (accessed on 4 February 2019)
[15] http://www.europeanwaterlabel.eu/ (accessed on 4 February 2019)

2.2 Testing and standardisation context

The preparatory study for taps and showers (Cordella et al. 2014) provided an overview of standards and test methods available for this product group. The consultation with stakeholders from July 2017 confirmed that no major change occurred in the last years.

A set of standards is available at EU level to assess technical specifications of products:

- EN 200 on "Sanitary tapware. Single taps and combination taps for water supply systems of type 1 and type 2. General technical specification";
- EN 816 "Sanitary tapware – Automatic shut-off valves PN 10";
- EN 817 "Mechanical mixing valves (PN 10) - General technical specifications";
- EN 1111 "Sanitary tapware – Thermostatic mixing valves (PN 10) – General technical specification";
- EN 1112 on "Sanitary tapware. Shower outlets for sanitary tapware for water supply systems of type 1 and type 2 – General technical specification";
- EN 1113 on "Sanitary tapware – Shower hoses for sanitary tapware for water supply systems of type 1 and type 2 – General technical specification", including a method to test the resistance to flexing of the hose;
- EN 1287 on "Sanitary tapware. Low pressure thermostatic mixing valves. General technical specifications";
- EN 15091 "Sanitary tapware – Electronic opening and closing sanitary tapware".

The energy use associated with water flow rates is not considered in EN standards. It should be noted that the main function of taps and showers is to deliver water, which is then associated to the consumption of energy, and not vice versa. Water flow rates can be related to the theoretical energy needed to heat-up water (i.e. without considering heat loss and other system aspects) through physics considerations, after setting the temperature difference between inlet and outlet. The annual demand for energy at the point of use could be calculated by setting default inlet and outlet temperatures and average usage patterns. This would decouple the calculation from systems for the production, supply and conversion of energy across Europe. The inclusion of other system aspects (e.g. water supply and wastewater collection and treatment) would be still more difficult considering the variability of scenarios.

Higher water flow rates and higher temperatures would generally result in increased use of energy. Manufacturers can provide products with physical means for preventing the use of maximum water flow rates and/or higher temperature conditions when not necessary. However, user behaviour and specific activities involving the use of taps and showers can also have an important influence. For instance, a reduced flow of water may indeed extend the time of use in some cases.

No international standard is so far available to assess functional performance aspects such as rinsing efficiency or comfort in an objective and satisfactory way. From a technical point of view, the efficiency of products could be considered a function of water flow rate, temperature and design characteristics, with water flow rate being the main factor of influence, at least for some functions. To date, water flow rate is the only information which can be measured adequately through methods compliant with European or international standards and easily communicated. This is also a central parameter for national buildings regulations.

Nevertheless, some attempts for a more comprehensive testing of the functionality of taps and showers have been made:

- The standards SS 820000 "Sanitary tapware – Method for determination of energy efficiency of mechanical basin and sink mixing valves", complying with EN 817, and SS 820001 "Sanitary tapware – Method for determination of energy efficiency of thermostatic mixing valves with shower", complying with EN 1111, have been developed in Sweden for measuring rinsing efficiency, water and energy use, and temperature and flow distribution based on the assessment of series of activities reproducing the use of taps and showers under different conditions of use (e.g. water pressure, flow rate, the control setting). The main goal of these standards, which are used in the Swedish Energy Label, is to support the development and commercialisation of products presenting a reduced use of hot water without compromising functionality and consumer comfort, as for instance by: a) Influencing the user not to use hot water by default and to avoid wasting water and energy when not needed, b) creating efficient configurations of water beams formed of droplets mixed with air in order to fulfil a certain function with less use of water. However, the Swedish Standards, which are currently under revision[16], are not considered in general suitable by European manufacturers (outside Sweden) because:

  a) The activities defined in this testing procedure are not fairly representative for the full variety of products on the market (e.g. two-handle mixers, automatic taps, and single components of showers);

  b) Their representativeness of real use is considered questionable since

  - requiring the definition of activities reproducing functions which include comfort issues and which are very subjective for these products due to differences among product uses, users and their sensorial perceptions;

  - normal conditions of use of products are not reflected in the tests (e.g. the rinsing performance on a textile cloth is tested while products are also designed for comfort purposes, and typically used to wash body parts with the support of hands, soap and other tools);

  c) Their accuracy and repeatability could be affected by the lack of standardisation for key features (e.g. textile cloth, food colouring, support sheet, wire mesh) and imprecise evaluation by visual check[17];

  d) They are considered to be excessively complicated and demanding in terms of resources since many tests are required for each product (it has been reported that the number of tests in the revised standards is halved to 8 activities and 10 repetitions for rinse tests).

  e) The main factor influencing the efficiency of products is the water flow, and lab tests indicate that taps/mixers with low flow rates can match the top energy efficiency classes, calling for a simplification of the testing by focusing on the measurement of water flow rates and the further estimation of energy consumption levels.

  f) The A-G rating is based on many interdependent criteria which can come at the expense of transparency and interpretation of the information provided.

[16] Round Robin Tests have been conducted to assess the repeatability of the testing methods

[17] This aspect is being addressed in the standard revision process

- BS 6340-4, AUS/NZ 3662 and EPA Water Sense provide test methods for measuring flow distribution and spray force in showers. Although used as proxy for functional testing, these parameters may not be representative of all aspects of rinsing efficiency comfort for all users. ISO has started a standardisation initiative for the voluntary classification of water efficient products based on the experience of WELS (AU/NZ)[18].
- ASTM F2324-03 describes a method for assessing the rinsing efficiency of pre-rinse spray units of professional kitchens (which differ from products typically used by consumers in their dwellings).
- CEIR, the European association for the taps and valve industry, has been also working on the development of a method for assessing the rinsing efficiency of showers for many years. However, no method was found that provides representative test conditions since the product performance is subject to the individual consumer experience and comfort in actual use.

To sum up the status of standardisation at January 2019:

- Water flow rate of products appears the only aspect which can be satisfactorily measured by means of internationally standardised methods. The maximum flow rate is considered the only objective indicator which can be used, at least for the moment, to measure the product performance.
- In addition, for showers, spread of water is a parameter that could cover, up to a certain extent, functionality aspects as rinsing efficiency and comfort of users. A spray distribution test with annular rings has been proposed by the European Bathroom Forum for the Water Label following the example of the EPA Water Sense. For taps, testing of rinsing efficiency, user activities and comfort seems more difficult and subjective. A change in the testing conditions could alter significantly the assessment and rating of a product, potentially making it not representative.
- Update of existing EN standards for taps and showers is possible within CEN/TC 164. Industry representatives consider that new testing methods can be developed in a relatively easy way in the framework of the unified label proposed, and then integrated into CEN standards as maintenance activities.
- A new mandate to CEN/CENELEC could require at least 3-4 years (including adoption of the mandate and standardization of activities per se) before new testing methods are available. The development of a CEN standard could run in parallel with other initiatives such as a Voluntary Agreement.

[18] https://standardsdevelopment.bsigroup.com/projects/9017-01063 (accessed on 4 February 2019)

2.3 Options for the labelling of taps and showers in the EU

Based on the information gathered, four main strategies[19] could be foreseen for the labelling of taps and showers at EU level:

1. Business as Usual;
2. Mandatory Energy Label at EU level based on testing of functionalities;
3. Voluntary Agreement between EC and industry including an industry-led unified label;
4. Industry-led unified label without a formal Voluntary Agreement with the EC[20].

In general, independently from the strategy considered, the actual savings in water and energy achievable with labelling of taps and showers depend on: penetration of the label on the market, public understanding of the label, renovation of households and consumer behaviour.

It should be noted that the development of new or revised standards on the functional performance of taps and showers (triggered by industry or requested by the Commission) may take place under any of the strategies highlighted above.

[19] The list of options does not prevent Member States from taking additional actions
[20] This would be equivalent to an improved Business as Usual scenario

2.3.1 Business as Usual

The Business as Usual strategy implies that no policy intervention will alter the regulation and labelling of taps and showers. In terms of labelling, this would mean that the labelling context described in section 2.1 would continue to co-exist and self-evolve. An evolution towards more efficient products could be still expected due to the public awareness on water and energy saving (as quantified in Section 3). However, such transition could be slower than for the other strategies.

Moreover, the existence of different voluntary labelling options and industry claims on the market could imply:

1. The absence of a common evaluation ground, which can ultimately confuse and mislead consumers (see for example Table 2);
2. Additional costs for manufacturers which sell in different countries and uncertain impacts in terms of market penetration and water saving.

With the exception of the Swedish label, all existing labels are based mainly on the communication of water flow rates. However, there is the risk that taps and showers with a low water flow can deliver poor performance, if badly designed. Some of these labels include additional technical features or comfort ratings, which do not relate directly to rinsing or cleaning performance.

Table 2: Illustrative comparison of the classification used in some labelling schemes for taps and showers

Product category	Classes (based on max. water flow in L/min)							Ref.
	I	II	III	IV	V	VI	VII	
Showers, shower valves and shower systems, without water/energy-saving devices	< 5	<7.2	7.2-9	9-15	15-30	>30	-	(a)
	<6	6-8	8-10	10-13	>13	-	-	(b)
	4-6	6-9	9-12	12-15	>15	-	-	(c)
	4.5-8 (high pressure); 3-8 (low pressure)	-	-	-	-	-	-	(d)
Washbasin taps, without water/energy-saving devices	<2	2-4	4-6	6-8	>8	-	-	(a)
	<6	6-8	8-10	10-13	>13	-	-	(b)
	4-6	6-8	8-10	10-12	>12	-	-	(c)
	2-6	-	-	-	-	-	-	(d)
Kitchen taps, without water/energy-saving devices	<4	4-6	6-8	8-10	>10	-	-	(a)
	<6	6-8	8-10	10-13	>13	-	-	(b)
	4-9	9-12	12-15	15-18	>18	-	-	(c)
	2-6	-	-	-	-	-	-	(d)

(a) Adapted from ANQIP
(b) Adapted from European Water Label
(c) Adapted from Swiss label
(d) Adapted from EU Ecolabel

2.3.2 Mandatory Energy Label at EU level

Under the condition that is technically feasible and implementable in satisfactory conditions, a mandatory Energy Label on taps and showers according to the new label Regulation 2017/1369 (European Commission 2017) would:

1. Provide harmonised information to consumers, who would be able to compare the performance of products without the risk of being confused by different claims;
2. Create a robust level playing field for companies placing water- and energy-saving products on the European market (assuming the correct functioning of Market Surveillance Authorities);
3. Stimulate innovation and competitiveness and boost the market shift towards water- and energy-saving technology options.

Moreover, according to stakeholders the label should report information on water and energy consumption, be cost-effective, and kept as simple as possible because too many rules could complicate compliance and confuse consumers.

A mandatory label would rely on national market surveillance authorities to verify the conformity of products on the market, whereas a voluntary label would require the setting out of third-party certification and/or include audit systems.

On the other hand, a mandatory label on taps and showers would:

1. Not be able to adapt to changing market and technology conditions in different countries as quickly as voluntary schemes would do;
2. Have a potential impact on the existing labelling schemes, which could risk undermining the investments and the work done by other organisations across Europe in the same (or even broader) area;
3. Have some possible difficulties to see 1-2 empty top classes filled in the future, as required by the new label regulation, since there are functional limits to the saving of water and energy, which can be already achieved by products on the market. For example, the EU Ecolabel[21] sets minimum nominal flow rates of 2 L/min for taps, 4.5 L/min for showerheads and showers, 3 L/min for electric showers and low-pressure showers.
4. Need to be based on standard methods to assess product functionality that would need to be developed (therefore requiring longer time for implementation than for the other options).

2.3.2.1 Indications about the scope

During the development of the preparatory study on taps and showers (Cordella et al. 2014) and in the following consultations with stakeholders, indications have been provided which could be used to shape a potential label for this product group.

A mandatory label on taps and showers could potentially apply to almost all products used in domestic and non-domestic applications. Excluded products could be:

- Devices which are used to fill volumes (e.g. bathtub taps, 3/4" taps and kettle filling taps), to provide quick cleaning results (e.g. pre-rinse spray units used in professional

[21] The Ecolabel for sanitary tapware expired in May 2017

kitchens) or to deliver a certain amount of water (e.g. garden taps, drinking fountains), for which the implementation of water-saving technologies would result in taking longer times for carrying out the required operation satisfactorily. In case of professional applications, low water flows can also result in hygiene issues (which could require chemical disinfection and cleaning), or in temperature decrease to compensate with additional heating. Moreover, an unambiguous definition of domestic taps may be challenging so they could be maintained in the scope indicating whether the main purpose of the product is to provide water quickly or not;

- Safety and medical devices;
- Valves that are integrated in water filters, water heaters or water using products;
- Valves intended to shut off water supply sections and split water to multiple delivery points (e.g. connections to washing machines, dish washers, faucets, metered inlet valve);
- Electric showers, since being included in the scope of Regulation 812/2013 (European Commission 2013a) and Regulation 814/2013 (European Commission 2013b) establishing ecodesign and energy labelling requirements for hot water storage tanks and for water heaters. However, the label currently covering electric showers does not provide information on the performance and comfort of the shower.

Product categories to consider can include:

1. Showers, shower valves and shower systems with/without water/energy-saving devices;
2. Washbasin taps with/without water/energy-saving devices;
3. Kitchen taps with/without water/energy-saving devices;
4. Flow regulators;
5. Self-closing taps.

In terms of information carried by the label, the following elements could be shown:

- Nominal water flow rate(s), as this is a universal metric measurable according to the EN standards reported in Section 2.2. Moreover, it impacts the functionality of the product, and the thermal energy content associated to the water flow rate(s)[22]. According to some stakeholders, energy consumption does not provide as much useful information for consumer as water consumption does. Information about energy moreover relies to the heat production and distribution system.
- A-G rating of energy and water efficiency, with top classes achieving a satisfactory ambition level;
- Average energy and water consumption per year.

Additional information that could be potentially provided includes:

- Functioning of the products (minimum and maximum flow, minimum and maximum water pressure conditions, spray pattern and force),

- Presence of additional economy setting features (e.g. aerators, cold starts, flow and temperature controllers, timers),

[22] This can be calculated through physical considerations, as described in section 3 of the preparatory study

- Time needed to fill volumes (e.g. for kitchen taps),

- Warning messages (e.g. about the possibility of increasing the risk of scalding or prolonged use with lower flow rates),

- System aspects (e.g. compatibility with different systems of water heaters or with drainage system conditions).

However, too much or incorrect information could confuse and mislead consumers. A user survey would allow understanding the relevance of any additional information to be included on the label and how it should be shaped. It would be also necessary to ensure that there is no dissatisfaction of consumers, which could otherwise undermine the entire label. This can be ensured only if functional characteristics of the product group can be tested objectively (including rinsing efficiency and comfort), which is not the case at least for the moment (as described in Section 2.2).

With respect to the possible regulation of material efficiency aspects, the preparatory study on taps and showers (Cordella et al. 2014) concluded that they are not a priority for this product group because:

1) The contribution of material efficiency aspects to the environmental impacts of taps and showers is low compared to the consumption of energy and water[23].

2) The average lifetime of taps and showers is above 10 year, which is typically longer than the bathroom renovation cycle[24].

3) Replacement of malfunctioning/broken parts is seldom during the lifetime of taps and showers, and not entailing excessive costs from a life cycle perspective[25];

4) Taps and showers are often changed before they fail, due to personal preferences and fashion reasons[26].

5) Taps and showers are typically recycled at the end of life, also because of the value embedded in metals[27].

2.3.2.2 Measuring water and energy efficiency

A trade-off can occur between water/energy saving, and performance and comfort. A mandatory label according to new energy labelling Regulation 2017/1369 (European Commission 2017) has to be designed in a way that ensures the fitness-for-use of products (especially those with a good rating, for which a lower flow rate can be in general expected), so avoiding consumer dissatisfaction.

A mandatory label could be exposed to critics for not assessing functionality correctly. A mandatory label cannot be based on the mere testing of water flow rating, or the calculation of the associated energy consumption. The label has to include the testing of different function(s) of taps and showers (e.g. delivery of water, rinsing performance) in order to stimulate the development of more efficient products that provide the same function(s) with less use of energy and water and without affecting the comfort of the users.

[23] See section 7.3.2.5 of the preparatory study
[24] See section 4.4.3 of the preparatory study
[25] See section 3.7 and 5.4 of the preparatory study
[26] See section 3.7 of the preparatory study
[27] See section 3.7 of the preparatory study

An Energy Efficiency Indicator (EEI)[28] could be based on the following equation:

$EEI = E_P / E_B \cdot 100$

Where:

- E_P is the energy consumption in a cycle of tests representing the satisfactory use of the product[29];
- E_B is the energy consumption in a cycle of tests representing the satisfactory use of a benchmark product.

Similarly, a Water Efficiency Indicator could be calculated.

This approach would require the presence of standardised and widely agreed procedures for testing, measuring and calculating the water and/or energy efficiency of functions provided by taps and showers, rinsing efficiency in particular.

Examples of initiatives in this area are the Swedish Standards 820000 (mechanical basin and sink mixing valves) and 820001 (thermostatic mixing valves with shower) and the pre-normative activities of industry for defining methods for measuring the rinsing efficiency of showers. However, no standard providing satisfactory testing methods is available at European level (see Section 2.2).

If this way is followed, a mandate should be issued to the European standardisation organisation in order to develop standard methods for functionality testing. However, harmonisation at EU level would require time, or even be very difficult, considering that the definition of functional performance requirements and related testing methods is not univocal and strongly depend on parameters that go beyond the equipment and that can vary significantly across Europe:

1. Type of application, difference in user habits, body characteristics and sensorial perception (e.g. bald vs. long-haired persons);
2. Subjective comfort expectations (e.g. the shower experience differs from person to person);
3. Water hardness.

A mandatory label would not be fully implementable until harmonised standards become available. In the meantime, the development of transitional methods based on the Swedish Standards 82000 and 82001 does not seem a viable option. The available Swedish Standards have been criticised, mostly by the European industry (with the exception of some Swedish companies), and the standard 82000 is currently under revision to improve its accuracy and repeatability and reduce the number of measurements and costs.

Alternatively, the fulfilment of some performance requirements could be checked to ensure the acceptance of products:

- Minimum nominal flow rates, in particular in low pressure conditions, as done for instance in the EU Ecolabel (2 L/minute for taps, 4.5 L/minute for showerheads and showers, 3 L/minute for electric showers and low-pressure showers), in the Swiss Energy Label and in the EPA Water Sense Specifications.

[28] Efficiency Indicators could also be calculated based on the nominal water flow rate only. However, this is not viable for this option since it does not take product functionality into account.

[29] The cycle of tests should also include the testing of rinsing efficiency and ensuring the comfort of the product.

- Spread area and strength of water drops, as done for instance in the EPA's Water Sense Specifications and under discussion in the EBF. However, some stakeholders considers that these parameters would provide only an indirect indication of the performance and comfort of products and that the ranking of products is very sensitive to slight changes in these parameters.

Moreover, performance requirements could be feasible only as complement to the label through implementing measures, as regulated by the Ecodesign Directive 2009/125/EC (European Commission 2009).

2.3.2.3 Additional aspects

Some additional aspects to handle in the potential labelling of taps and showers have been listed in the followings:

- In the event that products allow multiple water flow rates/modes, indications should be provided for all the possible positions;
- Bonus saving factors could be assigned to some technologies which would allow improved management of water flow rate and temperature. However, according to some stakeholders, "bonus points" should be avoided because arbitrary or impossible to prove;
- Default shut off times for taps are already used in product standards. However, setting mandatory default times for automatic devices could damage the acceptability of these products;
- There is a need to provide operating manuals and free access websites to consumers where the optimum use of products is described.

2.3.3 Industry-led unified label

An alternative way to regulate taps and showers could be explored in case industry achieves an agreement on how to label this product group at EU level.

According to a broad group of stakeholders (mainly from industry) advantages of this option would be that:

1. Labelling schemes focusing on water flow rates are already popular in Europe and can be used as a basis for the development of a unified label following the same approaches;
2. It would be simpler to enforce and easy-to-understand, especially if communicating water flow rates;
3. It would be more flexible for modifications and adaptations, if needed.

Audit systems can be implemented to check conformity of labelled products. Manufacturer reported that generally they have no incentive to list products that will not satisfy users.

However, other stakeholders pointed out that:

1. Consideration of performance requirements is important also for this option;
2. The development and implementation of an industry-led unified label could not be faster and more cost-effective than for a EU mandatory label;
3. There could be low market penetration and the risk of poor compliance and transparency.

2.3.3.1 Voluntary Agreement

The Ecodesign Directive 2009/125/EC (European Commission 2009) mentions that Voluntary Agreements "are expected to achieve the policy objectives more quickly or at lesser expense than mandatory requirements".

A formal Voluntary Agreement would mean that manufacturers agree to self-regulate their products under the supervision of the EC. This could include a mandatory requirement for the provision of information about the performance of taps and showers, for example via a label sufficiently different from the Energy Label. The information provided could focus on the water flow rates under nominal conditions of use, and the associated energy consumption.

However, rating approaches based on the measurement of water flows do not take product functionality into full account. A mere reduction of flow rates could in fact have an impact on users and lead to increased time of use, potential dissatisfactions and lower savings than expected (e.g. more time to shower, more time to fill pots). This means that complementary requirements are needed in case of Voluntary Agreement, as described for the mandatory label, to avoid that a good rating (i.e. a low flow rate) comes at the expense of a poor performance or the comfort of users.

A Voluntary Agreement may be taken into consideration as a possible alternative to a mandatory label if the following conditions are met, according to the Commission Recommendation (EU)2016/2015 of 30 November 2015:

1. The market coverage is significant (i.e. above 80%);
2. Similar effects can be achieved;
3. The performance of products and the comfort of users are not compromised.

The European Bathroom Forum is working to converge towards an industry-led unified labelling system, which could be the basis of a Voluntary Agreement. Although a satisfactory agreement between different parties is still to be achieved, it has been reported by representatives of EBF that this process could be speeded up if backed by the European Commission.

2.3.3.2 EC-independent label

In case a formal Voluntary Agreement was not feasible and no mandatory Energy Label were developed, industry could still have the possibility to continue working towards a single, unified label, in an independent way. Being decoupled from the official regulatory context, industry would be the only responsible for the scope, ambition, and credibility of the label and have full liability for the correct labelling and functioning of products on the market. This option would be equivalent to an improved Business as Usual scenario.

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2.3.4 Summary overview

Possible strategies for labelling taps and showers are summarised in Table 3. On the basis of the last consultation held with stakeholders, their view can be summarised as follows:

- A mandatory Energy Label seems the preferred options for some of the stakeholders representing Member States and NGOs. Existing standards should be taken as a starting point. However, no international standard method is so far available for assessing functional performance aspects as rinsing efficiency or comfort in a satisfactory way (see Section 2.2). A mandate to CEN/CENELEC would be needed but the development of such type of standard methods is considered complicated and the Swedish standards are not considered as a possible reference by the majority of the European industry;
- An industry-led unified label would be the preferred option by most industry representatives. This option is also backed by some non-industry representatives (e.g. from energy agencies and non-profit organisations). This may be done in the framework of a formal Voluntary Agreement if the specific conditions set out under Ecodesign are met (European Commission 2009, 2016b);
- The development of a CEN standard could run in parallel with a Voluntary Agreement or an independent industry-led unified label, especially if the Voluntary Agreement includes a commitment to apply such standard when applicable;
- No specific-option but the need of harmonising the labelling framework is instead highlighted by other stakeholders.

Table 3: summary view on possible strategies for labelling taps and showers

Option	Pros	Cons
BAU	• No interference on existing schemes and no re-allocation of resources	• Risk of having limited information at the point of sale or confusing consumers • More limited and uncertain possibility to exploit the water and saving potential associated with the product group (see section 3)
Mandatory Energy Label based on testing of functionality	• Full market coverage, which would make more likely to exploit the saving potential associated to the product group • Conceptually more coherent to assess the efficiency of products	• Developing representative and widely agreed definitions and standard methods to calculate the energy efficiency of products taking into account their functionality appears very challenging • Risk of undermining the credibility of the label in case of consumers dissatisfactions

Voluntary Agreement between EC and industry including a unified label	• Potentially easier to implement since industry would be proactively working for the promotion of common rules to save water and energy from this product group • More flexibility in terms of scope, rules and methods (including those ensuring the functionality of products), and their update	• More uncertainty about the market coverage • More limited control by the European Commission on rules and methods
Industry-led unified label without a formal Voluntary Agreement with the EC	• Easier to implement since industry would be proactively working for the promotion of common rules to save water and energy from this product group with less legislative constraints • Faster to enforce and modify to adapt to market conditions • Industry self-ensuring that products on the market meet consumer needs without dissatisfactions.	• Still more uncertainty about the market coverage than in case of Voluntary Agreement • No control by the European Commission on rules and methods (it could not fully address the functionality of products and result in products being promoted, which have excellent rating but bad performance)

3 MARKET AND SAVING POTENTIAL

3.1 Market

The preparatory study on taps and showers (Cordella et al. 2014) provided indications about the market of this product group in the EU (UK included) in 2012:

- 82 million units of taps sold;
- 27 million units of shower valves sold;
- 43 million units of shower outlets sold.

A slight increase of sales is estimated (1% to 2015, 2% to 2020), as shown in Figure 2, according to extrapolations based on statistics and forecasts for the population of the EU.

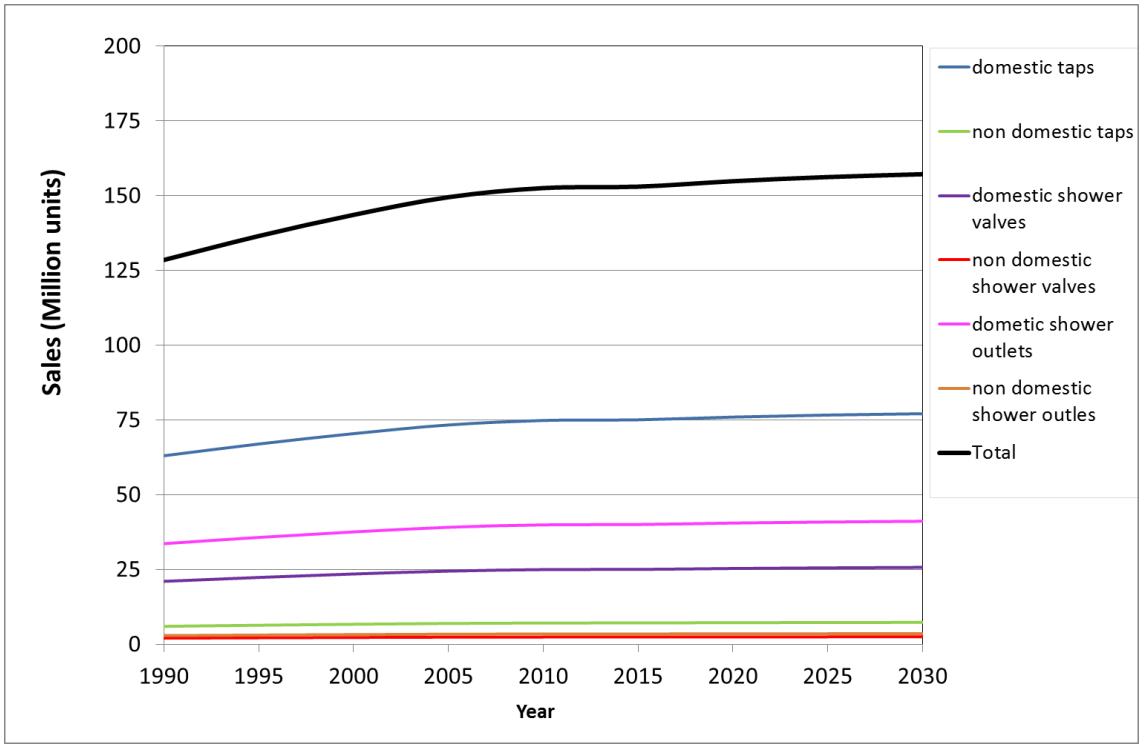

Figure 2: Estimation of the EU annual sales of taps and showers for the period 1990-2030 (Cordella et al. 2014)

An alternative and more recent estimation based on market intelligence data and received from the European Bathroom Forum indicates an overall market of about 49 million units sold in 2015 in 25 countries of the EU (Cyprus, Luxembourg and Malta excluded). The split between different categories of product is on average:

- 18.6 million units of washbasin taps sold (38%);
- 11.3 million units of kitchen taps sold (23%);
- 9.8 million units of showers sold (20%, no indications about shower outlets).

The balance relate to bath taps (16%) and bidets (3%). Projection of sales in 2020 is 55 million units (+12%).

As an order of magnitude, this estimation would correspond to:

- About 30 million units of taps sold;
- About 10 million units of showers sold;

- About 16 million units of shower outlets sold (if the ratio between shower valves and outlets were the same as calculated in the preparatory study).

These correspond approximately to 37% of that provided in the preparatory study, which are based on the assumptions made in the elaboration of EU statistics and on the weight of products.

3.2 Distribution of products based on water flows

In terms of distribution of products on the market based on their water flows, the best available information was that coming from the European Water Label scheme. The comparison of the number of taps and showers registered in the scheme in 2014 and 2017 (see Table 4) makes possible to observe that the proportion of products with lower flow has increased significantly, at expenses of middle-rating products. Based on such statistics, the average flow rates, calculated for products with a nominal flow rate below 13 L/min, appear to decrease:

- From 7.3 L/min to 6.5 L/min (-10%) for taps;
- From 8.7 L/min to 7.5 L/min (-13%) for showers.

The comparison of the 2 scenarios could provide some indications on the evolution of products on the market in terms of water flow rates. The increased number of registered products could be interpreted as an improvement of products' efficiency across Europe. However, it cannot be excluded that some products were already on the market. Moreover, it is more likely that producers started to register voluntarily the most efficient products first. Therefore, this could be not representative for the entire EU since referring to two different shares of the market. Registration of more efficient products can be in general observed also in other schemes addressing local markets.

Table 4: Number of taps and showers registered under the European Water Label scheme

Flow rate (L/min)	Taps				Showers			
	(Jun 2014)		(Oct 2017)		(Jun 2014)		(Oct 2017)	
	nr.	%	nr.	%	nr.	%	nr.	%
< 6	592	30%	1715	54%	75	5%	462	23%
6-8	315	16%	297	10%	258	18%	267	13%
8-10	714	35%	559	18%	280	19%	252	13%
10-13	20	1%	115	4%	247	17%	213	11%
> 13	365	18%	437	14%	608	41%	801	40%
Tot.	2006		3123		1468		1995	

3.3 Stock

The preparatory study on taps and showers (Cordella et al. 2014) provided indications about the stock of products installed in the domestic and non-domestic sector in the EU (UK included) in 2012:

- 1268 million units of taps installed (average lifetime of 15.5 years);
- 423 million units of shower valves (average lifetime of 15.7 years);
- 423 million units of shower outlets (average lifetime of 9.8 years).

Approximately 90% of the stock can be considered to consist of products used in the domestic sector, for which it was assumed that 4.5 taps and 1.5 shower systems per apartment (60% of all dwellings) and 5.5 taps and 1.83 shower systems per house (40% of all dwellings) are installed on average in the EU.

A slight increase of the stock of installed products is estimated in future years (1% to 2015, 2% to 2020), as shown in figure 3, according to extrapolations based on statistics and forecasts for the population of the EU.

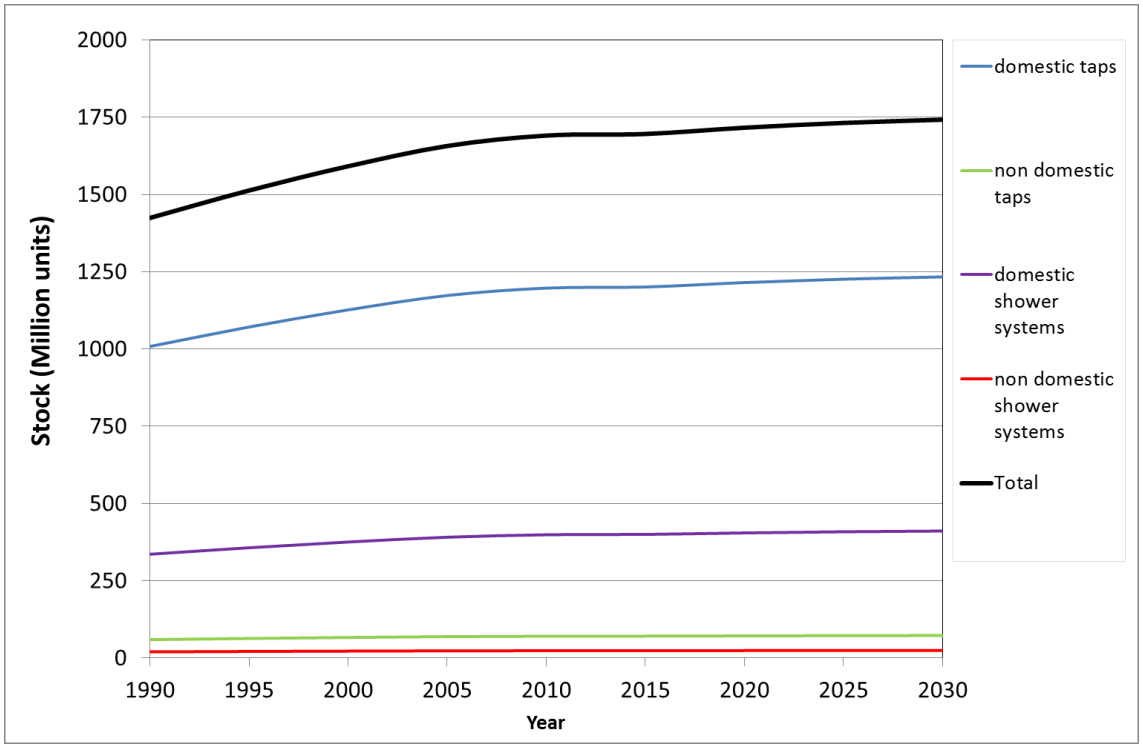

Figure 3: Estimation of the EU stock of taps and showers for the period 1990-2030 (Cordella et al. 2014)

According to information from the European Bathroom Forum, the housing stock in 25 countries of the EU (Cyprus, Luxembourg and Malta excluded) reaches over 247.5 million dwellings. The average household size in the EU is 2.3 persons and over 36.6 million homes are either second homes or remain vacant. Moreover, the RMI of buildings (Refurbishment, Maintenance, and Improvement) is in general the primary market. The new build and commercial markets are secondary.

A new estimation of the stock of taps and showers installed in the EU could be calculated by considering the information provided and some additional assumptions:

- 247.5 million of dwellings in the EU, 15% of which being second home or vacant;
- The housing stock is composed for 60% of apartments having 4.5 taps and 1.5 shower systems installed, and for 40% of houses having 5.5 taps and 1.8 showers systems installed;
- The domestic sector makes the 90% of the overall stock of taps and showers.

The results of the recalculation would be 6% higher than in the estimation made in the preparatory study on taps and showers (Cordella et al. 2014):

- 1348 million units of taps installed (182 million units of which used in second or vacant homes);
- 449 million units of shower valves (61 million units of which used in second or vacant homes);

- 449 million units of shower outlets (61 million units of which used in second or vacant homes).

3.4 Water and energy savings

An estimation of water and energy savings achievable in the EU through the labelling of taps and showers has been calculated in the preparatory study (Cordella et al. 2014) considering different levels of market penetration and savings which could be achieved with potential labelling strategies.

The modelling has been refined in this report to take into account the technical evolution of the market in the last years and how this could affect the stock of installed products.

Based on data about water consumption per person from taps and showers and energy used for water heating, as provided in the preparatory study (Cordella et al. 2014), the following parameters have been calculated:

1. The overall EU consumption of water in 2015 from taps and showers, including a water loss of 24% in the water supply system;
2. The primary energy demand associated with the heating of such amount of water.

The overall consumption of water in the EU is estimated to be about 13.40 Gm^3/year from taps and 11.50 Gm^3/year from showers. In terms of primary energy associated with the heating of water (including supply, conversion and transmission of energy), this would correspond to 629 PJ/year for taps and 1960 PJ/year for showers. The higher value is associated to showers because of a higher demand of hot water. An annual increase of 0.1% is considered to reflect demography of the EU.

The calculation is independent from stock and sales, which are however important for estimating the penetration of more efficient products.

Average saving potentials for years after 2015 have been calculated by:

- Estimating average flow rates of products on the market in the alternative scenarios, and
- Taking into account user behaviour aspects and the improvement in the efficiency of heating systems (also as a consequence of the existing regulations), as described in the preparatory study (Cordella et al. 2014).

The following scenarios have been modelled:

1. Business As Usual (BAU), in which the effectiveness of product labelling has been kept limited. In this scenario, the average water flow rate of products on the market decreases from 2015 (11.36 L/min for taps, 13.3 L/min for showers) until 2020 (9.80 L/min for taps, 12.50 L/min for showers) meaning an increased efficiency of 14% for taps and 6% for showers. No further reduction of water flow rates are accounted for new products sold on the market after 2020, although they continue to replace the stock of installed products progressively.
2. Moderate harmonisation of labelling, in which average water flow rates of products on the market are further reduced after 2020 (to 9.47 L/min in 2025 and 9.33 L/min in 2030 for taps, and to 12.39 L/min in 2025 and 12.35 L/min in 2030 for showers), corresponding to an increased efficiency of 17% for taps and 7% for showers in 2025, and to a saving of 18% for taps and 7% for showers in 2030. This could represent a

scenario in which the label is unified by industry independently from the Voluntary Agreement/ Energy Label discussion: compared to the BAU, the market evolution towards more efficient products continues to be stimulated (but without exploiting the full potentialities for this product group). 80% has been indicatively considered as the maximum market coverage that is possible in 2030, against the 60% considered for 2020[30].

3. Satisfactory harmonisation of labelling (but not for the entire market), in which the saving potential of taps and showers is exploited to a larger extent because of a larger coverage of the market: 80% in 2020, up to an indicative limit of 90% in 2030. Efficiency of products on the market is higher after 2020: 22% for taps and 8% for showers in 2025 (corresponding to average water flow rates of 8.89 L/min for taps and 12.24 L/min for showers), 23% for taps and 8% for showers in 2030 (corresponding to average water flow rates of 8.69 L/min for taps and 12.20 L/min for showers). This could represent a scenario in which a significant harmonisation of labels is achieved, for example as a consequence of a formal Voluntary Agreement. In this scenario, savings could take place earlier.
4. Full harmonisation of labelling, in which a label is applied to all taps and showers on the market. Efficiency of products on the market is still higher after 2020: 25% for taps and 9% for showers in 2025 (corresponding to average water flow rates of 8.50 L/min for taps and 12.06 L/min for showers), 35% for taps and 11% for showers in 2030 (corresponding to average water flow rates of 7.35 L/min for taps and 11.77 L/min for showers). This could simulate the effect of a mandatory label, or even of a unified label (no matter if through a Voluntary Agreement or through independent initiative) in case of full absorption by the market.
5. Maximum saving potential, in which average flow rates of products on the market are reduced after 2020 to values closer to their functional limits (set to 5.30 L/min for taps and to 8.00 L/min for showers) (Cordella et al. 2014). This is a virtual scenario simulating the effect of a massive purchase of water and energy saving products by consumers.

In analogy with the preparatory study (Cordella et al. 2014), water flow rates and savings reported above have been reduced by the application of correction factors which take into account that:

- Taps and showers are not always used at their nominal flow rate. It is considered that products are on average used at 85% of their nominal flow rate.
- A reduction of water flow does not always result in saving of water/energy, for example in case of taps used to fill volumes. For taps only it is considered that savings can be achieved in 35% of the uses, in terms of total delivery of water.

Additionally, the primary energy needed to heat up a cubic meter of water has been estimated to decrease by 10% in 2020, by 20% in 2025 and by 30% in 2030 (Cordella et al. 2014). This

[30] However, if an independent labelling harmonisation initiative is able to cover a broad share of the market, the more ambitious conditions set in Scenarios 3 and 4 could be achieved.

means that heating systems are more efficient and therefore they allow a higher saving of energy.

Stock and sales figures estimated in the preparatory study on taps and showers have been considered (Cordella et al. 2014). Based on this assumption, about 6% of the stock of installed taps and 10% of the stock of installed showers are replaced annually by new products. This affects the penetration of new product on the market in the stock and is necessary to contextualise the saving potential that could be theoretically achieved over time.

Results are shown in Table 6.

For the BAU strategy, from 2015 to 2030:

- Consumption of water from taps and showers is estimated to decrease from 24.9 to 23.2 Gm3/year (-7%), as a consequence of the gradual penetration of water saving devices.
- The primary energy associated to the consumption of hot water is estimated to decrease from 2580 to 1670 PJ/year (-35%). This is due to the penetration of water saving devices and, to a larger extent, to improved efficiency for the production of thermal energy, as assessed in the modelling.

In case a label was able to cover the entire EU market it has been estimated that in the period 2015-2030 the annual consumption of water and primary energy could be potentially reduced by 8% and 37%, respectively. These correspond to saving additional 0.4 Gm3 of water per year (-2%) and 40 PJ of energy per year in 2030 (-2%), compared to the BAU scenario.

The maximum saving potential in 2030 was assessed to be 17% for water and 45% for primary energy. These correspond to 2.5 Gm3 (-11%) and 250 PJ (-15%). However, this would imply a radical switch towards water and energy saving products, which would be unlikely in reality.

The labelling harmonisation could be more moderate if led by industry:

- In case the market coverage increases from 60% in 2020 to 80% in 2030, it is estimated that the annual consumption of water and primary energy could be reduced by 7% and 36%, respectively. These correspond to saving additional 0.1 Gm3 of water per year (~0%) and 10 PJ of energy per year in 2030 (~0%). Additional savings would become more relevant after 2030.
- In case the market coverage increases from 80% in 2020 to 90% in 2030, it is estimated that the annual consumption of water and primary energy could be reduced by 8% and 36%, respectively. These correspond to saving additional 0.3 Gm3 of water per year (-1%) and 20 PJ of energy per year in 2030 (-1%).

Saving figures in 2030 depend on the rate with which more efficient products penetrate into the market and are subsequently installed. This is limited by the fact that the period of use of taps and showers is typically long (i.e. about 10-15 years and above). An annual renovation of 2% of the installed stock of taps and showers has been estimated with the data provided by EBF, which would result in a temporal delay of the calculated savings and, thus, less difference between scenarios in terms of effects.

Savings would be slightly more attractive in 2050, closer to exploit the full saving potential for this product group, when the stock of installed products would be renewed, to a major extent, by water and energy saving products put on the market. However, long-term estimations come with a significant level of uncertainty so that they can only provide rough indications on possible trends.

The average water flow rate is a parameter that is sensitive to the variation of market shares and water flow rates of the classes of products considered for its calculation. When using lower flow rates as reference in the BAU scenario (not shown here: 8.39 L/min in 2015 and 7.49 L/min in 2020 for taps; 10.64 L/min and 9.90 L/min for showers), saving potentials resulted to be slightly reduced. However, outcomes of the assessment remain unchanged from a qualitative point of view.

Results show that savings of water and energy could be occurring also in the current market and policy context as a consequence of existing regulation on heating systems and of the "natural" technical evolution of products. However, some additional savings could be achieved in future in case of further harmonisation of labelling. With this respect, a mandatory label, a Voluntary Agreement and an industry-led unified label could produce similar benefits, under the condition of being able:

1. To enter soon into the market (condition favourable for an industry-led label, and to some extent also for a Voluntary Agreement),
2. To cover a significant portion of it (condition favourable for a mandatory label, and potentially also for a unified label).

Due to the typical lifespan of taps and showers, in fact, the effective replacement of the installed stock by water saving products may require decades.

As a final remark, alternative estimations have been provided by some stakeholders:

- The savings in Germany due to the introduction of a mandatory label could be 19.8-40.3 PJ/year in 2025 and 32.4-43.9 PJ/year in 2035. Taking the average value for 2030 (26.1-42.1 PJ/year) and extrapolating the results to the EU, that would result in 161.3-260.3 PJ/year, which is compatible as order of magnitude with the estimations provided above.
- The savings in the EU corresponding to the introduction of a mandatory label based on the Swedish Energy Efficiency Labelling scheme could be 90 PJ/year.
- 25-30% energy saving potential according to estimations made in Sweden and Portugal.

These figures support that saving of water and energy could be pursued for taps and showers, although its quantification is characterised by some level of uncertainty.

Table 5: Comparison at EU level of results obtained for alternative labelling scenarios: overall Water Consumption (including water loss in the water supply system) and Primary Energy Demand for water heating

LABELLING SCENARIO	WATER CONSUMPTION (Gm^3/year)			PRIMARY ENERGY DEMAND FOR WATER HEATING (PJ/year)		
	2015	2030	2050	2015	2030	2050
1) Business As Usual (BAU) - absolute result (% var. 2015-2030)	24.9	23.2 (-7%)	22.6 (-9%)	2580	1670 (-35%)	1620 (-37%)
2) Moderate harmonisation of labelling - absolute result (% var. 2015-2030) Saving compared to the reference (% var. with reference)	24.9 0.0 (0%)	23.1 (-7%) 0.1 (0%)	22.3 (-10%) 0.3 (-1%)	2580 0 (0%)	1660 (-36%) 10 (0%)	1610 (-38%) 10 (-1%)
3) Satisfactory harmonisation of labelling - absolute result (% var. 2015-2030) Saving compared to the reference (% var. with reference)	24.9 0.0 (0%)	22.9 (-8%) 0.3 (-1%)	22.0 (-11%) 0.6 (-3%)	2580 0 (0%)	1650 (-36%) 20 (-1%)	1580 (-39%) 40 (-2%)
4) Full harmonisation of labelling - absolute result (% var. 2015-2030) Saving compared to the reference (% var. with reference)	24.9 0.0 (0%)	22.8 (-8%) 0.4 (-2%)	21.3 (-14%) 1.3 (-6%)	2580 0 (0%)	1630 (-37%) 40 (-2%)	1530 (-41%) 90 (-6%)
5) Maximum saving potential - absolute result (% var. 2015-2030) Saving compared to the reference (% var. with reference)	24.9 0.0 (0%)	20.7 (-17%) 2.5 (-11%)	17.7 (-29%) 4.9 (-22%)	2580 0 (0%)	1420 (-45%) 250 (-15%)	1160 (-55%) 460 (-28%)

4 CONCLUSIONS

As a follow-up of the preparatory study on taps and showers, this report aimed to provide updated information, which can be used to support the definition of a policy strategy for this products group. Compared to the situation existing in 2014:

- The standardisation context has not changed significantly. No international standard is available for assessing objectively the functionality and comfort of taps and showers, and its development may be challenging. So far, only the measurement of water flow rates, and few technical parameters indirectly related to the functional performance of taps and showers (spread area and spray force from showers) could be satisfactory and used as possible basis for an EU-wide labelling of taps and showers;
- The labelling context in Europe is still quite heterogeneous, although the European Bathroom Forum has managed to cluster an important portion of the market (about 60% in October 2018 according to the information provided by the Forum). The possible harmonisation of labelling by industry will depend also on the engagement of various schemes and on the strategy followed by the European Commission;
- The market of taps and showers is apparently moving slowly towards more efficient products, as registration of products in labelling schemes seems to indicate.

Estimations carried out in this report and by other organisations coincide on pointing out that water and energy saving potential exists for taps and showers. This could be exploited through a mandatory label but also an industry-led label – either as part of a Voluntary Agreement with the EC or on an independent basis - could be effective in achieving potentially slightly lower savings but possibly quicker, especially in case of broad adoption by the market in the short term. Both market coverage and implementation time are key factors to take into account.

It should also be noted that water and energy saving is already happening (at least partly) as a consequence of existing regulation on heating systems and technical evolution of products on the market. Apart from an EU label or a Voluntary Agreement, this could be boosted by complementary schemes and mechanisms adopted by the Member States, such as incentives and/or requirements for the selection of water and energy efficient taps and showers in new construction buildings and building retrofit. The growing energy renovation of buildings in the EU Member States will be fostered by the new Directive on Energy Efficiency and Energy Performance of Buildings (long term strategies for buildings renovation), for which water and energy saving devices can be considered an energy efficiency measure.

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