Development of European Ecolabel and Green Public Procurement Criteria for Sanitary Tapware - Taps and Showerheads

BACKGROUND REPORT
INCLUDING DRAFT CRITERIA PROPOSAL
Working Document

for

FIRST AHWG-MEETING FOR THE DEVELOPMENT OF ECOLOGICAL CRITERIA FOR SANITARY TAPWARE – TAPS AND SHOWERHEADS

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Development of European Ecolabel and Green Public Procurement Criteria for Sanitary Tapware - Taps and Showerheads

Background report including draft criteria proposal Working Document

for the 1st AHWG Meeting

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Sustainable Production and Consumption Unit
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Abbreviations

ANQIP	– Portuguese National Association for Quality in Building Installations
AS	– Australian Standard
ASME	– American Society of Mechanical Engineers
BMA	– Bathroom Manufacturers Association in the United Kingdom
CEN TC	– European Committee for Standardization Technical Committee
CLP	– Classification, Labelling and Packaging of substances and mixtures
CSA	– Canadian Standards Association
dBa	– A-weighted decibel (sound pressure level)
EPA	– United States Environmental Protection Agency
GPP	– Green Public Procurement
kWh	– Kilowatt hour
l/min	– Litres per minute
LDPE	– Low-density polyethylene
MS	– Member State
NZS	– New Zealand Standard
psi	– Pounds per square inch
WELL	– Water Efficiency Label
WELPS	– Water Efficient Product Labelling Scheme
WELS	– Water Efficiency Labelling and Standards Scheme

Introduction

The European Ecolabel[1] is an element of the European Commission's action plan on Sustainable Consumption and Production and Sustainable Industrial Policy[2] adopted on 16 July 2008. This is a voluntary scheme established to encourage manufacturers to produce goods and services that are more environmentally friendly. The EU Ecolabel flower logo should also facilitate consumers and organizations (i.e. public and private purchasers) recognizing the best performing in this respect products and making environmentally conscious choices more easily. The EU Ecolabel covers a wide range of products and services, and its scope is constantly being widened. The process of establishing the criteria proceeds at the European level following consultation with experts and all interested parties. A product or a service awarded with this label must meet high environmental and performance standards.

Green Public Procurement (GPP), defined in the Commission Communication "Public procurement for a better environment"[3] as "a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured." This is also a voluntary instrument, which public authorities can use to provide industry with incentives for developing and marketing more environmentally sound products[4].

The primary goal of establishing the criteria for sanitary tapware is the increase of water-efficiency of taps and showerheads, as the use phase has been identified to contribute most to the environmental impacts caused by this product group. Further, also other aspects related to the life cycle of this product, which improvement can bring environmental benefits, are considered.

Establishing the ecological criteria for water-using products and appropriate promotion of the products awarded with the flower symbol (EU Ecolabel mark), if accepted by a wider range of producers and users, will contribute to more environmentally friendly products which shall reduce the consumption of water and energy (mainly for water heating, but also for pumping and wastewater treatment). Further, this should also result in other environmental benefits,

[1] EU Ecolabel website http://ec.europa.eu/environment/ecolabel/about_ecolabel/what_is_ecolabel_en.htm.
[2] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – on the Sustainable Consumption and Production and Sustainable Industrial Policy Action Plan, COM (2008) 397, available online: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0397:FIN:en:PDF
[3] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – Public procurement for a better environment, COM (2008) 400, available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0400:FIN:EN:PDF

as lower emissions related to energy production and use, lower resource consumption, potentially higher resource efficiency management (in respect to the issue of recycling and recyclability), etc. Finally, the ecolabelled products should also bring private and public customers direct cost savings (expressed as lower expenses for water and related energy bills).

[4] GPP website http://ec.europa.eu/environment/gpp/what_en.htm

1. PROJECT BACKGROUND

The European Commission's Directorate General for the Environment has initiated a project directed towards developing a joint evidence base for the EU policy making in the area of water using products. This study is being carried out by the Joint Research Centre's Institute for Prospective Technological Studies (JRC-IPTS) and the AEA consultancy, in cooperation with all interested parties.

The purpose of this pilot project is to develop the EU Ecolabel and Green Public Procurement criteria for sanitary tapware – taps and showerheads. In addition, the evidence base will gather information and data to assist the potential future development of other environmental policy instruments such as Implementing Measures under the Ecodesign Directive. However, Implementing Measures for taps and showerheads will not be developed as part of this project now but might be introduced in the future.

The preliminary results of the study are available at the project's website (http://susproc.jrc.ec.europa.eu/ecotapware/) and the proposals for the future criteria, which can be feasible for the product group under study, are presented in the current working document. This document has been prepared as a starting point for discussing the potential criteria during the 1st ad-Hoc Working Group meeting.

One of the objectives of this meeting is the presentation of the results of preliminary studies conducted in the frame of this project and a following discussion on them with all interested parties. The following tasks have been concluded so far: Task 1: Product definition, Task 2: Economic and market analysis, Task 3: Use behaviour, Task 4: Base case assessment. All above mentioned task reports can be downloaded from the project's website: http://susproc.jrc.ec.europa.eu/ecotapware/. Nevertheless, the main goal of this meeting is focused on discussing the ecological criteria development for taps and showerheads. It is intended to present the aspects related to life cycle of taps and showerheads which could be considered for the criteria development and to discuss the potential criteria with the stakeholders.

The preliminary results of the study show that main environmental impacts related to taps and showerheads are related to their use phase i.e. the consumption of water and energy (for water heating). Establishing ecolabel criteria to award the most water efficient products is expected to result in environmental benefits of water and energy savings, and consequently reducing environmental impacts caused particularly by energy production and use, wastewater treatment, etc.

It is in general recognised that the taps and showerheads are "end of pipe" products in the process of drinking water supply and as such have only a limited influence on the overall water consumption in both domestic and non-domestic sectors. Provision of cold and hot water depends on the design of the pipeline systems and its features, among others its tightness, energy efficiency of water heating systems, length of the so called "dead leg", and other.

Apart from the design of this system, the user behaviour is a crucial aspect affecting the water (and related energy) consumption; which must be without doubt emphasised. The analysis conducted in Task 3[5] (see the report uploaded at the website) showed how the water consumption differs among different countries of the European Union. Also the consumption between citizens of one country can differ very significantly. There is a wide variety of issues which play a role. Besides the regional differences, which can be to a certain extent connected with the climatic conditions, also the cultural aspects are of importance. Furthermore, the habits vary among users, some prefer e.g. taking a shower which, on average, results in lower water use than a bath, preferred by other users. Consumer behaviour is also connected with their environmental consciousness. This is though a very complex matter and in the frame of the study assumptions had to be made, which need to be taken into account analysing the project's results.

Another issue connected to water use is related to ensuring the appropriate drinking water quality. One of the aspects which should be taken into account in this respect refers to the temperature of hot water. Lower temperature is desirable from the environmental viewpoint; however a given temperature of hot water is required in order to protect from undesirable effects like e.g. growth of Legionella[6].

[5] Draft Task 3 Report: Economic and market analysis, available to download at the project website: http://susproc.jrc.ec.europa.eu/ecotapware/stakeholders.html

[6] Klümper T., Technische Regeln für Trinkwasser-Installationen – Europäische Normung auf dem Gebiet der Trinkwasser-Installationen and Auswirkung auf die nationale Normung, Energie / Wasser-Praxis 10/2009, available online at: http://www.dvgw.de/wasser/trinkwasser-installation/, accessed February 2011

2. PRODUCT DEFINITION AND SCOPE

After the online consultation with the stakeholders (using the Questionnaire1) the preliminary definitions concerning the product group under study (given in the report of Task 1[7]) has been revised. The current versions are as follows:

Tap "a small diameter directly or indirectly manually operated valve from which water is drawn".

Showerhead either a "fixed overhead or side shower outlet (or body jet or a similar device), which may be adjustable, and which directs water onto the user" or a "moveable hand held shower outlet which is connected to the sanitary tapware via a shower hose and can be hung directly on the tapware or on the wall with the aid of an appropriate support (also known as a shower handset)".

Scope – inclusion and exclusion of certain products

The scope of the sanitary tapware considered for Ecolabel and GPP criteria development in the current project covers kitchen and bath products used normally in domestic premises. It is however not restricted to the products for domestic use only. Products applied for similar but non-domestic uses e.g. in schools, sport centres, etc. are also included in the scope.

Nevertheless, due to different functions fulfilled by some of the products, it has been decided to exclude bathtub taps and non-domestic special purpose taps and showerheads (which need unrestricted water flow to fulfil the intended function e.g. laboratory safety taps and showers) from the scope of the current criteria development for sanitary tapware.

[7] Draft Task 1 Report: Product definition, available to download at the project website: http://susproc.jrc.ec.europa.eu/ecotapware/stakeholders.html

3. ECOLABELLING OF SANITARY TAPWARE – CRITERIA IN OTHER ECOLABELLING SCHEMES

The EU Ecolabel Regulation[8] advices to take into consideration *"criteria established for other environmental labels, particularly officially recognised, nationally or regionally, EN ISO 14024 type I environmental labels, where they exist for that product group so as to enhance synergies"*.

As the development of the EU ecolabel criteria aims at harmonising the existing schemes, an analysis of the main national and international schemes covering the product group under study has been conducted in order to see which aspects are currently included in them. This work constitutes a basis for further consideration of the EU ecolabel criteria development process[9].

In general it can be said that the key issue covered in all analysed schemes is the water flow rate. In most ecolabels a maximum flow rate values in litters pro minute are set, sometimes different for various applications (types of products). The maximum flow rates set in various labelling schemes (including those for tourist accommodation and services) are presented in Table 1 for taps and in Table 2 for showerheads. Additionally, in the WELL and WaterSense labelling schemes also minimum flow rates are set (it is described more in detail in the sections 3.1 and 3.4).

Not the maximum, but the average flow rate is defined in the EU ecolabels for tourist accommodations[10] and camp sites[11]. It should not exceed 9 l/min for both – taps (excluding kitchen and bathtub taps) and showerheads. Additionally showers in staff facilities, outdoor and common areas shall have a timing/proximity device.

Apart from the criteria of the flow rate, in some ecolabels the use of certain limiting devices is recommended.

[8] Regulation (EC) No 66/2010 of the European Parliament and of the Council of 25 November 2009 on the EU Ecolabel

[9] Additional information concerning the criteria for sanitary tapware included also the ecolabelling schemes for tourists' accommodation and services has been collected and is contained in the report of Task 1: Product definition, available at: http://susproc.jrc.ec.europa.eu/ecotapware/stakeholders.html

[10] Commission Decision of 9 July 2009 establishing the ecological criteria for the award of the Community ecolabel for tourist accommodation service (2009/578/EC)

[11] Commission Decision of 9 July 2009 establishing the ecological criteria for the award of the Community ecolabel for campsite service (2009/564/EC)

Table 1 Maximum flow rates set for taps in EU Member States schemes and legal regulations

	max flow rate bathroom/toilet taps	max flow rate kitchen taps
Austrian Ecolabel for water efficient sanitary tapware	6 l/min	9 l/min
Portuguese ANQIP water efficiency labeling scheme	classes A++ to E	
Building regulations of Avigliana (Piedmont region)[12]	8-12 l/min	8-12 l/min
Regulation in the city of Sassari in Sardinia[13]	8 l/min	
Latvian Green Certificate for tourist accommodation services	8 l/min	8 l/min
Luxembourgian Ecolabel for tourist accommodation services	10 l/min	10 l/min
Dutch Ecolabel for campsites	8.5 l/min	9 l/min
Nordic Swan Ecolabel for hotels and youth hostels[14]	8 l/min	8 l/min
Slovak Ecolabel for accommodation services	12 l/min	12 l/min
Catalan Ecolabel	8 l/min (1-3 bar), 9 l/min (3-5 bar)	

* for further information and references, please see the report Task 1, chapter 1.4[15]

Table 2 Maximum flow rates set for showerheads in EU Member States schemes and legal regulations

	max flow rate
Austrian Ecolabel for water efficient sanitary tapware	12 l/min
Portuguese ANQIP water efficiency labeling scheme	classes A++ to E
Building regulations of Avigliana (Piedmont region)[12]	8-12 l/min
Latvian Green Certificate for tourist accommodation services	10 l/min
Luxembourgian Ecolabel for tourist accommodation services	12 l/min
Dutch Ecolabel for campsites	8.5 l/min
Nordic Swan Ecolabel for hotels and youth hostels[14]	10 l/min
Slovak Ecolabel for accommodation services	12 l/min
Catalan Ecolabel	10 l/min (1-3 bar), 12 l/min (3-5 bar)

* for further information and references, please see the report Task 1, chapter 1.4[15]

A brief description of the European and non-European ecolabel schemes, which refer explicitly to the product group of sanitary tapware, considered as most relevant in the current criteria development process, is presented below. Among them are WELL – Water Efficiency Label, recently developed by the EUnited – The European Valve Manufacturers Association, WELPS - Water Efficient Product Labelling Scheme operated by the Bathroom Manufacturers Association in the United Kingdom, the Austrian Ecolabel (Österreichisches

[12] Applicable for new and renovated buildings
[13] Requirement to install aerators in all taps, except of bathtub taps
[14] 90% of mixer taps for wash basins should fulfil this requirement. Additionally for guests rooms 90% of the showerheads should be consistent with this criteria and 90% of the taps should be single-lever taps or sensor equipped.
[15] Available at http://susproc.jrc.ec.europa.eu/ecotapware/stakeholders.html

Umweltzeichen), United States Environmental Protection Agency WaterSense label and the Australian WELS - Water Efficiency Labelling Scheme.

Apart from these labels also several other schemes covering the product group under study exist, like e.g. the Catalonian Ecolabel - 'Distintiu de Garantia de Qualitat Ambiental' (covering the sanitary products since 2001) or the Portuguese water efficiency scheme operated by the National Association for Quality in Building Installations (available since 2008). Outside the EU there are among other the Japanese 'Eco-Mark', the WELS schemes in Singapore or the Swiss energy label.

The following section does not give a comprehensive overview of all existing scheme models, but presents different approaches on the basis of a few chosen examples, in order to support the discussion on the criteria which could potentially be considered for the EU ecolabel. For further information concerning other schemes and respective legal regulations for the European and non-European countries please consult the Task 1 report of the ECOTAPWARE project (see chapter 1.4)[16].

3.1 WELL – Water Efficiency Label[17]

A new system of classification (rating) of sanitary products – Water Efficiency Label (WELL) – has just recently been developed by the EUnited Valves - The European Valve Manufacturers Association. The label is intended to be awarded EU-wide. Among others the criteria for wash basin and kitchen valves, shower valves and showerheads are included; while bath filling valves are excluded from its scope. Pressure-dependant and pressure-independent restrictive solutions are considered in this scheme. Three evaluation criteria constitute the basis of this classification: volume (flow limit), time (only for non-domestic products) and temperature. For each criterion a product can be awarded with a maximum of 2 stars. In total a maximum of 6 stars can be achieved for non-domestic products and 4 stars for domestic appliances. Depending on the total number of stars a product is assigned to one of six, respectively four – in the domestic products sector, classes.

The single criteria are briefly described below.

[16] Draft Task 1 Report: Product definition, available at the project website: http://susproc.jrc.ec.europa.eu/ecotapware/stakeholders.html

[17] For details see the website of WELL http://www.well-online.eu/ and the document: WELL - Water Efficiency Labelling - Classification scheme for sanitary valves, accessed February 2011

Volume (flow limit)

For wash basin valves – a maximum flow rate of 9 l/min at 3 bar flow pressure and a minimum flow of 6 l/min at 3 bar must be achieved for pressure-dependent solutions in order a product is given 1 star. For pressure-independent solutions a maximum flow rate of 6 l/min with a minimum flow of 4 l/min at 3 bar flow pressure should be achieved in order to obtain 2 stars.

For kitchen valves – a maximum flow rate of 12 l/min at 3 bar and a minimum flow of 9 l/min at 3 bar flow pressure should be achieved for pressure-dependent solutions to be given 1 star. For pressure-independent limiting devices – a maximum flow rate of 9 l/min 2 stars with a minimum flow of 6 l/min at 3 bar flow pressure should be fulfilled by the product to obtain 2 stars.

For shower valves and showerheads – a maximum flow rate of 12 l/min at 2 bar flow pressure and a minimum flow of 9 l/min at 3 bar flow pressure must be achieved for pressure-dependant devices to obtain 1 star; while for pressure independent - the maximum flow is 9 l/min at 3 bar flow pressure and the minimum flow is 4.5 l/min to obtain 2 stars.

Among the devices which can be used are spray regulators, regulating angle valves, valves with an economy button and cartridges with a water economy position. In the last two the economy setting must be the default setting; if a higher flow is required it can be achieved, but must require conscious user intervention.

Time (for non-domestic premises)

This criterion refers to the use of time-controlled self-closing valves with or without sensor activation with the flow time below 10 seconds for kitchen and bath valves and below 20 seconds for showerheads if the product should be given 1 star. In order to receive 2 stars the valve has to be equipped with a sensor with use-dependant on/off function.

Temperature

This criterion covers the solutions with the flow-independent temperature setting for 1 star product rating (achieved e.g. through the use of thermostat valves or single lever valves). 2 star rating can be given for solutions based on devices which limit draw-off temperatures (thermostat valves with by-passable or permanently set hot water stop, single lever valves and other mixers equipped with devices limiting the admixture of hot water (e.g. manual devices limiting the opening angle of the operating element); as well as to cold water valves.

3.2 WELPS - The Water Efficient Product Labelling Scheme[18]

Another European ecolabelling scheme is the WELPS - the Water Efficient Product Labelling Scheme, supported by United Kingdom Bathroom Manufacturing Association's (BMA). This is a voluntary scheme open to companies manufacturing and selling their products in the UK. It was established in September 2007. Currently, over 600 products are registered across the five categories covered by it; among others taps and combination tap assemblies for use with wash basins and bidets, shower controls and shower handsets.

Like WELL, this is a rating scheme, which distinguishes it from the planned EU Ecolabel scheme (which is a pass/fail system). A water efficiency rating system across all covered product categories is set with water flow ranges. The flow rate is the only criteria set in this scheme, assuming that the products have to fulfil all respective UK regulatory requirements.

In reference to taps (including self closing and electronic taps) and combination tap assemblies five classes for flow rates are defined (however, four qualify the product for being eligible to be awarded the label): below 4 l/min, below 6 l/min, below 8 l/min, below 10 l/min and greater than this value. The recorded flow should not exceed the value of 10 l/min to receive the WELPS label. An exact flow value can be also shown on the label.

For shower controls, including bath shower mixers, and shower handsets a nominal flow rate of not more than 13 litres per minute is set. A similar rating like for taps is proposed, with the following maximum values: 6 l/min, 8 l/min, 10 l/min, 13 l/min and the flow rates above 13 l/min.

3.3 Austrian ecolabel

The Austrian Ecolabel[19] (Umweltzeichen) has been established for water efficient sanitary tapware, covering single-lever mixer taps, thermostatic wall mixers and water saving equipment (e.g. aerators, water saving valves). The ecolabel criteria include general specifications on **maximum flow rates**, criteria related to **quality and longevity** (the tapware has to fulfil the requirements contained in the respective standards[20],[21],[22]) and additionally the **noise level** of water saving equipment is set (it should not exceed 15 dBa at a pressure of 3 bar).

[18] The Water Efficient Product Labelling Scheme, for more information please see http://www.water-efficiencylabel.org.uk/
[19] http://www.umweltzeichen.at/
[20] ÖNORM EN 817:2008. Sanitary tapware – Mechanical mixing valves (PN 10). General technical specifications. European Committee for Standardization, Brussels 2008
[21] ÖNORM EN 1111:1998. Sanitary tapware – Thermostatic mixing valves (PN 10) – General technical specification. European Committee for Standardization, Brussels 1998
[22] ÖNORM EN 246:2003. Sanitary tapware – General specifications for flow rate regulators. European

The maximum flow rates set in the scheme are as follows:

- 6 l/min for bathroom/toilet taps,
- 9 l/min for kitchen taps,
- 12 l/min for bathtub taps and showerheads.

Additionally, for single-lever mixer taps, it should be possible to limit the flow rate to 60 % of the maximum flow rate through e.g. a built-in resistance the users have to overcome when they want to use higher than the devised maximum flow.

Thermostatic wall mixers must be equipped with a flow limiter preset at 60 % of the maximum flow rate or lower, which a user has to actively overcome (e.g. using a push button) in order to be able to use higher flow rate.

Both single-lever mixers and thermostatic wall mixers should also be equipped with a device which limits the intake of hot water (so called hot water barrier).

Nevertheless, it should be added that no product has been awarded with this label so far.

3.4 WaterSense[23]

The WaterSense labelling scheme for high efficiency lavatory faucets and showerheads was released in 2007 and is supported by the United States Environmental Protection Agency. In reference to taps it covers products installed in private use (residences, but also restrooms in hotels and hospitals); however, it does not apply to the products in public use and in residential kitchens.

The system is based on water-efficiency criteria and performance criteria. The following criteria are included in the scheme: **a maximum flow rate, a minimum flow, non-adjustability criteria** and **criteria concerning the flow marking**. For showerheads two additional criteria, called the performance criteria are established as a result of customer testing conducted by WaterSense. The first is defined as **spray force**, the second as **spray coverage**. The procedures for testing of these criteria are described in detail in Appendices A and B, respectively, contained in the WaterSense Specification for Showerheads[24].

The maximum flow rate set for lavatory faucets is 5.7 l/min at pressure of around 4.1 bars at the inlet (60 psi); while the minimum flow rate is set at 3 l/min at the pressure of 1.4 bars. A tap equipped with a device allowing fulfilling these requirements (e.g. flow restrictor, flow

Committee for Standardization, Brussels 2003

[23] US EPA WaterSense – High-Efficiency Lavatory Faucet Specification, available at: http://www.epa.gov/WaterSense/docs/faucet_spec508.pdf, accessed February 2011

[24] For detailed procedure see US EPA WaterSense – Specification for Showerheads http://www.epa.gov/WaterSense/docs/showerheads_finalspec508.pdf

regulator, aerator) also meets this ecolabel criterion. The flow rate is controlled in accordance with the procedure contained in a respective ASME/CSA standard.

In reference to the showerheads, the maximum flow rate must be equal to or less than 7.6 l/min, while the minimum flow rate shall not be less than 60% of the maximum flow rate (measured at the pressure of 1.4 bars). For multimode showerheads all modes must meet this maximum flow rate value and at least one of the modes must meet all requirements set in the criteria specification (maximum and minimum flow rates, spray force and coverage).

Furthermore, information on the product's packaging, marking, or instructions provided with it should support the consumers in using the products appropriately, i.e. not to exceed the maximum flow rate. Also the maintenance instruction shall explain how to return the product to its intended maximum flow rate after cleaning or exchanging the faucet accessories.

3.5 WELS – the Water Efficiency Labelling and Standards scheme[25]

The Water Efficiency Labelling and Standards scheme is an example of a mandatory scheme (valid from 1 July 2006), which sets the criteria "for rating the water efficiency and/or performance" of certain products covered by the Australian and New Zealand Standard AS/NZS 6400:2005 Water-efficient products – Rating and labelling. It replaced the voluntary water saving rating label, established by the Water Services Association of Australia.

WELS is also a ranking scheme, in which the classes are displayed in the form of stars and additionally the flow is displayed on the label. The more stars are displayed on the label (max of six) and the lower the number (which indicates the **water flow**), the better the water efficiency of a given product.

WELS covers among others tap equipment, showers and (optionally) flow controllers. The flow rate requirements for the Australian WELS for the product group under study are presented in Table 3 below.

[25] For more information please see the website of the Water Efficiency Labelling and Standards (WELS) Scheme http://www.waterrating.gov.au/about/index.html, accessed February 2011

Table 3 Rating specification of the WELS scheme[26] - flow rates [l/min]

Labelling class	Tap equipment, flow controllers	Showers
0 Stars	> 16 or failing the performance requirements	> 16 or failing the performance requirements
1 stars	> 12 but not > 16	> 12 but not > 16
2 stars	> 9 but not > 12	> 9 but not > 12
3 stars	> 7.5 but not > 9	> 7.5 but not > 9
4 stars	> 6 but not > 7.5	not currently available
5 stars	> 4.5 but not > 6	not currently available
6 stars	< 4.5	not currently available

The testing of the products is conducted by a National Association of Testing Authorities accredited laboratory in accordance with the respective national standards (AS/NZS 3718:2005[27] for tap equipment and AS/NZS 3662:2005[28] for showers).

3.6 Conclusions

The EU Ecolabel EC 66/2010 states that the label criteria shall be determined on a scientific basis considering the whole life cycle of products. In the frame of the project three base-cases have been defined and a preliminary environmental evaluation of various stages of the product life has been completed. Due to scarcity of data, concerning particularly the product material composition, the results should be treated as approximate. Nevertheless, the analysis allowed for identifying the main issues contributing to the environmental impacts. Detailed results are presented in the Task 4 report[29].

Based on the analysis conducted in the frame of the study and on the analysis of the European and non-European labelling schemes the key issues to be considered in the process of EU Ecolabel and GPP criteria development are proposed and presented in the following section. They are divided into three parts:

a) Criteria related to water efficiency: water flow rate, cold/hot water management (design for water management), temperature and time limit/volume limit (for non-domestic products),

[26] Australian/New Zealand Standard – Water efficient products – Rating and labelling AS/NZS 6400:2005
[27] AS/NZS 3718:2005 Water Supply – Tap Ware. Standards Australia & Standards New Zealand, Sydney/Wellington 2005
[28] AS/NZS 3662:2005 Performance of showers for bathing, Standards Australia & Standards New Zealand, Sydney/Wellington 2005
[29] Draft Task 4 Report: Base-case assessment, available at the project website: http://susproc.jrc.ec.europa.eu/ecotapware/stakeholders.html

b) Criteria related to material composition, recycling and maintenance: material composition/release of hazardous substances during use-phase, recycled material content, design for recycling, design for repair/warranty and spare parts,

c) Corporate criteria: packaging, consumer information/user instructions, information appearing on the ecolabel.

4. PROPOSED CRITERIA AREAS FOR A DISCUSSION

The following section is intended as a starting point for a discussion which criteria should be covered by the EU ecolabel for sanitary tapware – taps and showerheads. In this working paper no values are proposed for the criteria areas. Discussing the values is foreseen during the 1st AHWG meeting in Seville followed by the written comments and the 2nd AHWG meeting, which is planned to take place in October this year in Brussels. Stakeholders should feel free to comment on every issue they consider relevant and send us their remarks and further proposals for consideration for the 1st AHWG.

4.1 Criteria related to water efficiency

The assessment conducted in the frame of the project showed that the highest environmental benefit, which can be achieved in reference to the product group of sanitary tapware, is related to saving of water and consequently also to reduction of energy use for water heating. This reduction results in resource saving, in decrease of environmental impacts related to water supply and wastewater treatment, in reducing primary resource use for energy production and emissions related to energy generation and use. It can also bring economic benefits for the users reducing their expenses for water use and energy bills.

Improvement potential

There are various solutions which can be applied to improve the water efficiency of sanitary tapware. Among them there are: aerators, devices which deliver water at a restricted flow rate in the form of a spray, water-saving brake features used for single lever mixer taps (in case a higher flow is needed, the lever can be pushed past this stop, however the economy option should be a default position), flow restrictors and regulators, products equipped with sensor, timer control operated taps and showerheads, or thermostatic mixing valves[30].

Due to the complexity of the analysis of user behaviour and the variety of water using habits it is not easy to calculate exactly the savings which can be achieved due to application of the water saving solutions and water-efficient products. Various values can be found in literature

[30] For more information see Draft Task 2&3 Report: Market and economic analysis & User behavior (section 2.3.2 and 2.3.3), available at projects website: http://susproc.jrc.ec.europa.eu/ecotapware/stakeholders.html

sources. The study "EU Water saving potential"[31] coordinated by the Institute for International and European Environmental Policy – Ecologic for the European Commission indicates that the application of taps with aerators allows for approximate reduction of 50%, similarly the taps with thermostats allow for 50% reduction of water and energy use. Even higher reduction of above 70% is related to the use of taps with infrared sensors; while devices limiting the flow in showers can bring around 10-40% of water use saving. The US EPA WaterSense estimated that its labelled faucets and faucet accessories can help saving approximately 30% or more water "without sacrificing performance"[32]. In a study conducted for the DG Environment in 2009, concerning water efficiency standards[33] the values of 20-30% are given for water saving due to installation of new water efficient taps or aerators. A project conducted at the Liverpool John Moores University[34] on the example of 18 chosen households showed that installing the aerated showerheads and flow regulators resulted in reducing the flow rate by 28%; nevertheless the first option (the use of aerators) gained much higher users acceptance.

Preliminary calculation of the improvement potential based on the results of the study

Based on the calculations conducted in the frame of the project and the necessary assumptions made[35], the potential to save water and related energy for water heating have been estimated. The average combined (i.e. hot and cold) EU 27 domestic water consumption from taps and showerheads is around 75 litres per person per day; the water use from taps accounts for 76% thereof. On average, the respective water consumption by a statistical EU 27 household amounts to approximately 190 litres. Nevertheless, it should be remembered that very high regional and national differences exist.

In accordance with the calculations conducted the domestic water consumption per tap per year is 10 400 litres and per showerhead per year is 13 140 litres. In the non-domestic sector the calculated water consumption per year per tap and per showerhead is 51 780 litres and 12 950 litres, respectively.

[31] Dworak T. et al., EU Water saving potential, Ecologic – Institute for International and European Environmental Policy, 2007, available at: http://ecologic.eu/download/projekte/900-949/917/917_water_saving_1.pdf, accessed February 2011

[32] For details see WaterSense website: http://www.epa.gov/watersense/products/bathroom_sink_faucets.html

[33] Mudgal S., Benito P., Jean-Baptiste V., Dias D., Kong M.A., Inman D., Muro M., Study on water efficiency standards, BIO Intelligence Service & Cranfield university, Report for European Commission (DG Environment) 2009

[34] Critchley R., Philipps D., Water and Energy Efficient Showers: Project Report, United Utilities, 2007, available online at: http://www.unitedutilities.com/Documents/UULJMUwaterenergyefficientshowerFinalreport23rdMay2007.pdf, accessed February 2011

[35] For details and all references see the Draft Task 4 report: Base-case assessment, available at: http://susproc.jrc.ec.europa.eu/ecotapware/stakeholders.html

The assumed temperature of hot water used by the customers is 39˚C (which consists of a mix of cold water, i.e. at 5˚C and hot water, i.e. at 60˚C). The amount of hot water needed has been calculated assuming the split of 44% of cold water and 56% of hot water use by taps. The cold water to hot water ratio for showers is assumed 30:70. The calculated amount of hot water use (i.e. of 39˚C) for taps in domestic and non domestic sectors is as follows:

- domestic sector: 5 825 litres per tap per year,
- non-domestic sector: 29 000 litres per tap per year.

The respective values for showerheads amount:

- domestic sector: 9 200 litres per showerhead per year,
- non-domestic sector: 9 070 per showerhead per year.

The calculated amount of energy needed to heat the needed amount of water is approximately 350 kWh per tap per year in the domestic sector and 1 730 kWh per tap per year in the non-domestic sector. For showerheads the respective values are as follows: 550 kWh per domestic shower per year and 540 kWh for non-domestic[36].

The total EU 27 water and energy consumption related to the product group under study, calculated with use of abovementioned values and the stock values estimated in the frame of Task 2[37] is presented in the following Tables.

Table 4 Domestic and non-domestic water consumption in EU 27

Water use [Mio. m^3]			
Taps		Showerheads	
Domestic	Non-domestic	Domestic	Non-domestic
10 560	3 610	3 270	360

Table 5 Domestic and non-domestic energy consumption for water heating in EU 27

Energy Use [TWh]			
Taps		Showerheads	
Domestic	Non-domestic	Domestic	Non-domestic
350	120	140	15

Based on the review of the literature information concerning the saving potential due to installation of water-efficient products (presented before), it was consequently assumed that their installation would result in 20% saving of water and energy needed for water heating.

[36] Energy use per litre is 0.092 kWh. This is based on the following: 4200 (J/deg C/litre) * temperature increase (deg C) / energy efficiency / 3,600,000 (the temperature increase is 55 deg C, i.e. from 5 to 60 ˚C (required to protect from growth of legionella), boiler efficiency is assumed as 70%. The assumed temperature of hot water used by the customers is 39˚C (constituting a mix of cold, i.e. at 5˚C and hot, i.e. at 60˚C, water).

This assumption is rather conservative, as in the literature values of 30% and even above can be found. It should however only demonstrate the environmental benefits of applying water-efficient products at the European market. The results of the saving potential are shown in the following Table.

Table 6 Water and energy saving potential in EU 27

	Taps		Showerheads	
	Domestic	Non-domestic	Domestic	Non-domestic
Water [Mio. m^3]	2 100	720	650	70
Energy [TWh]	70	24	27	3

Installation of water-saving products would bring a statistical household saving of approximately 10 000 litres of water from taps and nearly 3300 litres from showerheads. Additionally, the energy saving would amount to approximately 350 kWh and 140 kWh, respectively.

It should be added that no reliable data exist for the stock of taps and showerheads, thus estimations based on available information had to be made in the course of the study[37]. If even a more conservative assumption were made, i.e. the stock of taps and showerheads would be calculated by multiplying the number of households in the EU 27[38] (150 Mio.) by the average estimated number of taps and showerheads per household (i.e. 5 and 1.25, respectively) the value of domestic stocks would amount: 750 Mio. of taps and 190 Mio. of showerheads. These stock values are lower than the stock values obtained in the estimations conducted in the frame of the project (for details see the Task 3 report, section 2.2.2) and used in the above calculation. Nevertheless, with the lower stock values the saving of energy for water heating in the domestic sector would still be high – amounting to 52 TWh for taps and 21 TWh for showerheads.

It should be taken into account that the values obtained are based on the preliminary study and that high number of assumptions had to be made (explained in detail in the task reports); thus the results should be treated as approximate and not as very exact values. However, the approximate calculation arrives at values which clearly emphasize the importance of the water and energy saving potential. This is very well illustrated by the energy saving potential to be achieved by the Ecodesign Implementing Measures[39]. The estimated energy savings due to the first ecodesign measures on 9 product groups (see table 7) should amount to 12%

[37] For de details on stock calculation please see Draft Task 2 Report: Market and economic analysis, available at projects website: http://susproc.jrc.ec.europa.eu/ecotapware/stakeholders.html

[38] EUROSTAT, Statistics in focus, Trends in households in the European Union: 1995-2025, available at: http://www.eds-destatis.de/en/downloads/sif/nk_03_24.pdf

of the electricity consumption of the EU 27 in the year 2007 (compared to a 'business as usual' scenario). The joint energy saving potential of taps and showerheads is estimated higher than most of other energy using products listed in Table 7.

Table 7 Estimated savings from the first nine Ecodesign measures[39]

Ecodesign Measure	Adoption	Estimated savings (annual by 2020)
Standby	December 2008	35 TWh
Simple set top boxes	February 2009	6 TWh
Street & Office Lighting	March 2009	38 TWh
Domestic Lighting	March 2009	37 TWh
External power supplies	April 2009	9 TWh
Electric motors	July 2009	140 TWh
Circulators	July 2009	27 TWh
Domestic refrigeration	July 2009	6 TWh
Televisions	July 2009	43 TWh
Total		**341 TWh**

It should also be added that the calculated energy saving potential covers only the energy which is consumed for heating the water neither the energy for pumping nor needed for wastewater treatment were taken into account in the calculations.

Based on the above written (and the assessment results obtained in the frame of Task 4 – Base-case assessment), the first and most important group of criteria refers to improving the water efficiency of taps and showerheads through influencing the flow rate, improving cold/hot water management and limiting the time or volume of water discharged (for non-domestic sector).

4.1.1 Water flow rate

- **Maximum flow rate**
- **Minimum flow rate (for consideration)**

The first proposed ecological criterion refers to the water flow rate of a tap or a showerhead. It is the most commonly used criterion in the existing ecolabelling schemes referring to this product group; in some of them (especially in ecolabels devised for the tourists accommodation and services) – the only. The research conducted in the frame of the study

[39] DG Enterprise and Industry, Ecodesign Your Future - How Ecodesign can help the environment by making products smarter, available online at: http://ec.europa.eu/enterprise/policies/sustainable-business/ecodesign/files/brochure_ecodesign_en.pdf, accessed February 2011

showed that the reduction of flow rate can lead to significant savings in form of both water and energy consumption; thus also in reduction of environmental impacts related to this consumption (resource saving, reduction of wastewater, decrease of emissions for energy production for water heating, etc.), without necessarily reducing the performance.

In most of the ecolabel schemes only the maximum flow value, sometimes given together with pressure values, is set. However, in some schemes, e.g. in WaterSense or in WELL, there is also a requirement of a minimum water flow rate at given pressure (in WaterSense for upper, mid and lower range). There are several reasons for considering the minimum flow rate. On the one hand, in some systems, it is necessary to maintain a given minimum flow rate in order to ensure protection against the risk of scalding. On the other hand, its aim is to ensure that the ecolabelled products do fulfil respective quality standards. Also the hygienic and water quality aspects are mentioned in this respect.

One concern, repeatedly expressed by stakeholders, is the issue that establishing too low flow rates could negatively influence the quality of products they manufacture, and thus also the attractiveness of the products to end consumers. Therefore, a rational balance between the flow rate and the consumer's acceptance has to be achieved as it is indispensible for a market success of the ecolabelled products.

Taps in domestic sector are primarily used for personal hygiene, cooking, drinking and dishwashing. Nevertheless, due to different functionality of the taps it is reasonable to consider where restricting the flow can bring environmental benefit without impeding the users' acceptance, and where the higher flow rates should not be restricted. In the frame of the previous tasks and, as already mentioned in chapter 2, bathtub taps and special purpose taps have been excluded from the scope. Some stakeholders mentioned also there should be no restrictions for kitchen taps, due to their function of filling vessels with water quickly or keeping their high pressure rinsing function. The last product group has not been excluded from the scope of criteria development; nevertheless all these considerations should be taken into account. It might be worth considering in such cases, whether solutions, which allow overriding the default set flow rate (called sometimes an economy setting) could be a reasonable way forward.

The research conducted in the frame of establishing the US ecolabel scheme (WaterSense[40]) concluded that, though a reduction of water flow rate results in longer waiting times to fill the basin or to get hot water, "the potential water savings outweigh any related potential inconvenience and should not lead to decrease of overall user satisfaction". Nevertheless, WaterSense excludes kitchen taps due to their different functions (rinsing the

dishes, filling pots). It is mentioned also that there is an "emerging area of research and development in multi-position control lever faucet technologies that offer users "high" and "low" settings for different activities". Nevertheless, as the performance data is not yet available the applicability of developing a labelling scheme for such kitchen products is considered to be conducted in the future by the EPA.

One stakeholder submitted a position on the Ecolabel criteria development and proposed the following flow rates: 6 l/min for kitchen and bathroom taps (excluding commercial kitchen and bathtub taps) and 9 l/min for showerheads. It is mentioned that there are showerheads with lower maximum flow rates (7.5 of 8 l/min) available on the market, however higher rates would be required, in their opinion, by high class and wellness hotels. Lower flow rates than these proposed above (6 and 9 l/min for taps and showerheads, respectively) could cause a discomfort for consumers and in consequence do not meet their expectations and acceptance.

In this respect we would like to invite the experts to comment on differences in values necessary for different types/applications of products, which will allow for water saving, though not impeding at the same time user's needs and satisfaction.

Some schemes indicate in their specifications appliances which can be used to reduce the water flow in order to meet the required flow values. For example WELL label mentions among permitted restrictive solutions: regulating angle valves, volume and spray regulators (installed as retrofitted components). Additionally, if the products are equipped with an option to activate a higher flow, the scheme requires that the water-saving setting must be set as a default state and a user must consciously activate the increased flow. Afterwards the default setting should be again the water-saving setting. Detailed feedback received by one stakeholder suggests that all taps and showerheads should be factory-provided with aerators according to the flow rates specified in the Ecolabel criteria specification. Moreover, these flow rates should be pressure independent (a tolerance of ±10% should be given). To prove fulfilling this criterion the manufacturers applying for the label should deliver flow rate diagrams.

In this point we would like to invite the stakeholders to comment on the best ways of achieving water efficiency restricting the water flow rate/installing solutions like aerators, etc. and all the aspects which should be taken into consideration in this respect.

Another issue, which we would like to bring into discussion with the experts, is the relation between the flow rate and the pressure and the applicability of different more water efficient

[40] US EPA WaterSense – High-Efficiency Lavatory Faucet Specification, available at: http://www.epa.gov/WaterSense/docs/faucet_spec508.pdf, accessed February 2011

solutions in various systems. The newly established WELL scheme distinguishes between criteria related to pressure-independent and pressure-dependent solutions[41]. Also the methods of measuring the flow rates in various schemes differ in this respect, including typically specified limitations on the supply pressures (see the next section for examples). We would like to ask the experts to comment on the issue of establishing common EU 27 criteria for the product group of taps and showerheads considering the regional and national differences in water supply systems (e.g. various pressures).

Testing methods

In order to verify whether a given product meets the criterion of the maximal water flow set in the scheme, laboratory tests have to be conducted. The following EN standards contain descriptions of test methods for measuring the flow rate of sanitary tapware:

- EN 200:2008 for Sanitary Tapware – Single taps and combination of taps for water supply systems of type 1 and type 2 – General technical specification,
- EN 816:1997 for Single and mixer taps with automatic shut-off valves,
- EN 817:2008 for Mechanical mixing valves (PN 10) - General technical specifications,
- EN 1111:1998 for Sanitary tapware – Thermostatic mixing valves (PN 10) – General technical specification,
- EN 1112:2008 for Sanitary tapware. Shower outlets for sanitary tapware for water supply systems type 1 and type 2– General technical specification.

Some labelling schemes require only submitting by a producer's a declaration of conformity, while other demand results from internal or external (certified third party) laboratory tests. In the analysed ecolabelling schemes test criteria for the flow rate measurement typically refer to the existing, valid at the national level, legal regulations or standards. Additionally, differences to these procedures, set by the schemes, are described in detail in the specification documents. Two examples of the WELL and WELPS schemes' test procedures are briefly described below in order to show, how this issue is solved in them and which differences exist in these cases.

[41] WELL http://www.well-online.eu/ and the document: WELL - Water Efficiency Labelling - Classification scheme for sanitary valves, accessed 05.01.2011

WELL label - Test criteria[42]

WELL sets as a precondition that the products fulfil the requirement set in the relevant EN norms. In reference to the flow rate measurements only the pressure values are additionally mentioned: For wash basin and kitchen valves for pressure-dependent solutions the measurement is conducted at pressure of 3 bar (nominal value), while for pressure-independent solutions: at 1.5, 3.0 and 4.5 bar (measured rising). The average of the 3 measurements is taken and the permissible discrepancies from the minimum to maximum value should be below 2.0 l/min.

For shower valves and showerheads the test criteria are the same as above described, with the exception that for the pressure-dependant solutions the test is conducted at 2 bar.

WELPS label – Procedure for testing[43]

The second example, the testing procedure set in the WELPS scheme, is described in more detail. It also mentions as precondition that taps and combination tap assemblies, shower controls and shower handsets registered in the BMA WELPS scheme must primarily fulfil all UK Regulatory requirements. Other testing under the scheme is limited to verifying whether the flow rate declared by the manufacturers meets the criteria set by the scheme:

In the test for taps and taps assemblies, cold water has to be conducted at a dynamic pressure of 5 + 0/-0.05 bar for the duration of the test. The procedure follows the method described in point 10.2.3 of the previously mentioned EN 200[44] standard; with the exceptions that the dynamic pressure shall be 5 + 0/-0.05 bar. The pressure shall be applied gradually and the flow rates are recorded under stable and continuous flow conditions.

A similar procedure is applied for shower controls; however, there are three kinds of tests:

1) tests for 'shower controls not limited to low pressure applications only and with flow limiting devices located either in the inlets or in the outlet' shall be conducted with an ‘open outlet’ (i.e. there is no hose or shower outlet attached),

2) in tests for 'shower controls not limited to low pressure applications only and with a flow limiting device located in the shower hose or outlet or handset - or in the case of Electric Showers' there shall be a shower hose and a shower outlet attached,

[42] For details see the website of WELL http://www.well-online.eu/ and the document: WELL - Water Efficiency Labelling - Classification scheme for sanitary valves, accessed 05.01.2011

[43] The Water Efficient Product Labelling Scheme, for more information please see http://www.water-efficiencylabel.org.uk/

[44] EN 200:2008 Sanitary tapware. Single taps and combination taps for water supply systems of type 1 and type 2. General technical specification

3) for 'shower controls for low pressure applications only' the shower hose/outlet shall be attached and the maximum pressure (as specified by the manufacturer) shall be applied. The pressure of 5 ± 0.05 bar shall be applied to hot and the cold inlets. The mixed water temperature shall be 42 ± 1°C. Pressure loss should be adjusted to 1 ± 0.05 bar. The mixed water flow rate shall be measured under steady and constant flow conditions.

In reference to the shower handsets the procedure described in point 11.2.3 of EN 1112:2008[45] is applied; with the exception that cold water has to be delivered at dynamic pressure of 5 + 0/-0.05 bar for the duration of the test. The dynamic pressure is applied gradually and consequently the flow rate is measured under stable and continuous water flow conditions.

These are only two examples of testing procedures, based on the existing standards; however with pressure conditions set in them. Using these two cases, we would like to initiate the discussion on how the flow rate should be best controlled for the EU ecolabel.

As it was also already mentioned, some ecolabelling schemes require third party testing and a certification process, which covers independent measurements in certified laboratories; while other rely just on the producers' declaration of conformity with the required criteria (supporting it sometimes with the testing results). Third party testing is required for example in the WELL label and in the WaterSense and WELS scheme, while the BMA WELPS label requires that companies submit a 'Declaration of Conformity' signed and dated by authorised personnel. Both of these approaches have their advantages and disadvantages. Usually, external certification is considered as more reliable, ensuring the high quality of the tests conducted; nevertheless they are more costly, which can constitute a potential barrier for SMEs in applying for a label.

Thus, we would also like to ask the stakeholders to comment on the methods which are most feasible for the evaluation of fulfilling the criteria of water efficiency (i.e. the water flow rate of a product) and which could be applied to verify the product's conformity with this potential future Ecolabel criterion.

Summarised questions to the stakeholders:

Which methods in the stakeholder's opinion can suit best for measuring the maximum flow rate of a tap and a showerhead?

[45] EN 1112:2008 – Sanitary tapware. Shower outlets for sanitary tapware for water supply systems type 1 and type 2. General technical specification

Do you consider it necessary that the testing is conducted by a third party or do you rather recommend producers 'Declaration of Compliance' supported by the results of tests conducted within the company?

4.1.2 Cold/hot water management/Design for water management/Temperature setting

One of the parameters influencing the use of water is the time necessary to establish the desired temperature when the consumer wants to use hot or warm water. If the required temperature is principally set independently of the flow (with potential minimal adjustment time) the higher energy efficiency can be obtained[46]. Single lever valves and thermostat valves allow this; while double-handle products require additional adjustment by mixing of cold and hot water. This activity causes increase of water volume used and consequently higher energy consumption. The single-lever valves allow for temperature setting by moving the lever without increasing the flow output, while on thermostat valves, a scale is used to set the desired temperature. In this way, the water losses can easily be reduced. Thus, is it worth considering whether all kinds of valves should be covered by the ecolabel or whether to exclude double-lever products. This recommendation has been sent by one of the stakeholders, who suggests covering with the Ecolabel only single-lever products.

Stakeholders' comments on this matter are highly appreciated.

Recently, some consideration is also given to the issue which can be defined as "design for water management" or "cold/hot water management". According to the stakeholders' feedback, one of the most effective ways to reduce waste of energy for heating water is to design the one-lever taps in the way that the mid-position will not allow the flow of warm water. As the majority of tap use durations are very short (below one minute[47]) "even in a well designed plumbing system the dead leg volume means that hot water does not actually reach the tap, then the use of the hot tap water is a wastage"[48]. The abovementioned design is expected to result in a substantial reduction of energy wasted due to heating up the water in case of only short usage of a tap, e.g. for washing hands.

[46] Information on WELL scheme, available online at: http://www.well-online.eu/en/klassifizierung/duscharmaturen_brausen_brauseschlaeuche.aspx?master=Print, accessed February 2011

[47] Market Transformation Programme, BNDW Taps. Briefing note relating to projections of internal tap water consumption. 2008

[48] Clarke A., Grant N., Thornton J., Quantifying the energy and carbon effects of water saving, Final report, 2009, available online at: http://www.environment-agency.gov.uk/static/documents/Business/EA_EST_Water_Report_Full.pdf, accessed February 2011

This function is already included e.g. in the new Swiss Energy-Label for sanitary Tapware (EnergieEtikette)[49].

Due to lack of data concerning energy lost in the abovementioned use situation it was not possible to evaluate the potential savings of the proposed middle-position solution. Nevertheless, we would like to invite the stakeholders to comment on the design of cold/hot water management.

Summarised questions to the stakeholders: We would like to ask the stakeholders for their opinion on this issue. Do you have any information what is the current share of the products designed in the abovementioned way? Is there a trend to design taps in this manner?

4.1.3 Time limit/Volume limit (for non-domestic products)

Water consumption in the non-domestic sector in the EU 27 through using faucets is estimated to exceed 3 600 Mio. cubic meters, for showerheads it exceeds 360 Mio. cubic meters[50]. One of the solutions which could contribute to the increase of water saving in non-domestic premises is the limitation of the time of single water usage (i.e. the volume of water used) through equipping the taps and showerheads with devices which stop the water flow after certain time if they are not used or after certain time of use (after a set volume was used). This devices group covers e.g. timers or sensor controls. This approach would not only contribute to more 'regulated' water use but would also avoid the risk that a tap is left opened (water flow continues) although its further use is not intended.

Stakeholders' feedback emphasizes that for electronic taps with sensors the quality aspects are important. Their proposal concerning the criteria development for sanitary tapware distinguishes between taps with sensor for public utility rooms, e.g. toilets (where no temperature control is needed and no very fine sensor-control is necessary) and for private and hotel rooms. In this later case the proposed water flow time shall last between 30 and 120 seconds. The response time of a sensor device should be also very short, e.g. below 0.35 second.

[49] Meile O., Swiss Federal Office of Energy, Presentation: Die neue EnergieEtikette: Kennzeichnung für Duschbrausen, Armaturen und Wassersparer

[50] For details see the Discussion paper: The application of the Ecodesign Directive 2009/125/E to water-using products (WuP) – Identification of a suitable product group; available at: http://susproc.jrc.ec.europa.eu/ecotapware/stakeholders.html

Summarised questions to the stakeholders:

What is the stakeholder's opinion concerning these solutions for the non domestic sanitary tapware?

Which parameters should such devices have in order to fulfil their function and allow for water saving?

4.2 Criteria related to material composition, recycling and maintenance

The second group of criteria refers to the material composition, products durability, easiness of dismantling and recycling issues.

According to information received from the stakeholders, chromium-plated brass is the main material used in manufacturing of sanitary tapware. Recently also the use of stainless steel in this sector is growing; nevertheless, the market share for stainless steel taps and showerheads is in the low one-digit range, as these products belong to the “high end of quality spectrum”. Furthermore, zinc, nickel, electrolytic copper, aluminium and around 40 various plastics are used in production of sanitary tapware. Cover caps of tapware often consist of chromium-plated plastics. One stakeholder stated that currently the majority of showerheads produced are made of plastics, while taps consisting of brass are plated with metals like copper, chromium, nickel. Moreover, there are also available at the market expensive sanitary tapware made of gold-plated brass.

Due to the variety of materials used and the scarcity of information concerning the composition of sanitary tapware a choice of a typical tap and a typical showerhead, conducted in the frame of Task 4, was difficult and the analysis allowed only very rough approximations. The preliminary results obtained in the impact assessment study (see Task 4 report[51]) using the EcoReport tool show that the main environmental impacts are related to the use-phase of taps and showerheads and not to their material composition and production, nor to the distribution or end-of life phase.

Therefore, we would like ask the stakeholders: 1) if they consider necessary a further analysis of different base-cases and if so 2) for their input into 'construction' of a representative base-case or few base-cases for a typical, in their opinion, tap and showerhead, in order to refine the impact assessment analysis.

[51] Draft Task 4 Report: Base-case assessment, available online at project website: http://susproc.jrc.ec.europa.eu/ecotapware/stakeholders.html

4.2.1 Material composition/Release of hazardous substances during use-phase

In this point we would like to mention the issue of presence of hazardous substances in the product group under study, as the Ecolabel Regulation EC 66/2010 states that the 'substitution of hazardous substances by safer substances, as such or via the use of alternative materials or designs, should be considered wherever it is technically feasible'.

In reference to the composition of two materials used for manufacturing of sanitary tapware and related environmental concerns, broad information has been obtained from one stakeholder. The information received refers to the issue of use of hazardous substances contained in chromium-plated brass and in stainless steel. We would like to use this information as a starting point for a discussion on the relevance of the criteria of material composition in the respect to the product group under study.

The result of the environmental assessment conducted showed, that the environmental impacts from the production and manufacturing phase are much lower then the impacts caused by the use phase. This issue is also not considered in any other ecolabelling scheme.

Nevertheless, we would like to invite the stakeholders to comment if they consider the issue of hazardous substances release in the use phase of relevance for criteria development.

In accordance with the information received from stakeholders in reference to the material composition of taps and showerheads one heavy metal, which raises particular concern, is nickel. It is classified as follows in the EU CLP classification[52]:

- H351 (R45): Suspected of causing cancer (Carcinogenic - category 2)
- H317 (R43): May cause an allergic skin reaction (Skin sensitisation – category 1)
- H372 STOT RE 1: Causes damage to organs through prolonged or repeated exposure

It is contained in both: taps made of chromium-plated brass or of stainless steel.

The chromium-plated brass is the most commonly used material in the manufacturing of sanitary tapware. The process of chromium plating consists of several steps. Three layers are applied on the brass surface: a thin layer of copper, then of nickel and finally a thin (0.00005-0.0005 mm) layer of chromium. As this last layer is porous, nickel is to a certain extent exposed. Additionally, due to the so called "throwing power" of nickel extrapolating solutions, nickel can be deposited in the interior of sanitary tapware. This is another source of exposure of drinking water to this heavy metal.

[52] CLP-Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006

Nickel is also contained in stainless steel, which gains importance as material used for manufacturing of sanitary tapware. It is an alloying element in steel. The content of nickel amounts usually 10%, however it can range up to 38%. Even in nickel-free stainless steels it is present as impurity (constituting up to 1%). Nevertheless, based on the stakeholders information submitted, the stainless steel is a special preparation, in which the hazardous properties of nickel are not expressed by stainless steel.

Another heavy metal contained in both above mentioned materials, used for manufacturing of sanitary tapware, is chromium. In the first one a chromium layer is applied on brass in the plating process. In the stainless steel at least 10.5% of chromium is contained to prevent it from corrosion. In the presence of moisture or water and oxygen, a thin chromium (III) oxide passive layer is formed on the surface of the stainless steel. This layer is self-repairing and separates the material from the surrounding. From a regulatory perspective chromium in the stainless steel is not considered as the heavy metal of main concern. This passive layer of chromium (III) oxide is not classified as hazardous.

Lead is another heavy metal considered important in evaluating the quality of drinking water. It is contained in leaded brass, which is typically used for manufacturing of tap bodies, to ensure water-tightness of the manufactured products.

The Drinking Water Directive[53] requires that materials used for drinking water supply/distribution shall not cause harmful effects on human health. This legal regulation sets limits of heavy metal contents (e.g. lead, copper, nickel and other) in water. Sanitary tapware can constitute a source of low emissions of metal substances to drinking water, if inappropriate materials, or of insufficient quality, are used.

Currently efforts on standardising/harmonising the test methods for materials in contact with drinking water are conducted in the CEN TC 164. The following two standards are under development: *prEN 16057 - Influence of metallic materials on water intended for human consumption - Determination of residual surface lead (Pb) - Extraction method* and *prEN 16058 - Influence of metallic materials on water intended for human consumption - Dynamic rig test for assessment of surface coatings with nickel layers - Long-term test method*. However, four MS – Germany, France, the Netherlands and the UK – continue the work on establishing a scheme for mutual acceptance of certificates between these four countries. The scope of this work covers:

- "Specification of the tests to be applied to the various types of materials used in products in contact with drinking water.

[53] Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption, available online: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:1998:330:0032:0054:EN:PDF

- Preparation of Lists of approved substances and materials that can be used with limited further testing.
- Specification of the tests to be applied to products having regard to the risks they pose to drinking water quality."

Also works on development of hygiene standards in drinking water distribution, including hygienic assessment of plastic materials and other non-metallic materials in contact with drinking water especially, are conducted currently. In future, these standards shall be harmonized throughout the EU 27 in the framework of the European Acceptance Scheme for construction products in contact with drinking water.

The work of the four previously mentioned MS should build a basis for draft regulatory guidance to CEN and for a discussion in the Expert Working group. Nevertheless, currently neither in the frame of the Construction Products Directive nor within CEN work on establishing common listings of approved substances and materials at the EU 27 level is undertaken.

In reference to the above written, we would like to invite the stakeholders to comment on the issue of material composition of sanitary tapware and the related use/presence of hazardous substances in them, and additionally the issue of lack of harmonised (across the EU 27) standards concerning the testing methods for materials in contact with drinking water.

We would also like to ask the stakeholders to comment on materials composition used in showerheads manufacturing, which may be of importance for the EU ecolabel criteria development.

4.2.2 Recycled material content

Very little data was identified in the frame of the study on the end-of life of sanitary tapware. In general, there exist good developed systems and markets for recovery of scrap metals. Nevertheless, significant differences are expected between countries with advanced technologies and good developed systems of waste management (sorting facilities, recovery and treatment plants) and countries, where such systems are still under development.

According to the information from European Copper Institute[54], the recovery of copper and brass amounts approximately 42%. Nevertheless, this is only a general value for all copper and copper alloys. No exact data could be identified on the brass recovery from end-of-life sanitary tapware.

[54] European Copper Institute – Press release: There's only one Earth, and Europe doesn't waste it – Europe's copper recycling rates higher then Asia and North America, dated 3 June 2008, available at: http://www.eurocopper.org/copper/2008.html, accessed February 2011

According to information from one stakeholder in every batch of stainless steel produced in the EU approximately 50% of scrap is used. Nevertheless, as there is a high variety of steel grades (more than 200), the share of scrap in different grades varies (depending upon the level of alloying additions).

The question whether the recycled content in ecolabelled products shall be considered in the process of criteria development is directed to the stakeholders for a discussion. The stakeholder feedback indicates that due to the variety of actual contents of scrap in new stainless steel produced it is not meaningful to specify a minimum limit for the recycled content, taking additionally into account that recycled metals are already intensively used in the metal production processes (which contributes to saving of resources and reduction of related emissions and energy consumption for primary metals production).

We appreciate the stakeholders' comments on the issue of the recycled content in the sanitary tapware and its potential definition as an EU ecolabel criterion.

4.2.3 Design for repair/warranty and spare parts

The Ecolabel regulation states that in the process of determining the criteria among others the potential to reduce environmental impacts due to durability and reusability of products shall be considered.

The product group of sanitary ware has relatively long lifetime of approximately 16 years for domestic taps and 10 years for domestic showerheads[55]. In the non-domestic sector, the respective lifespans are shorter due more intensive usage. Materials used in the production of this products group in general ensure their longevity. Some differences exist however, e.g. according to the information received from one stakeholder mixer taps with ceramic parts have usually longer life-time.

Thus, we would like to invite the experts to comment on other aspects, materials, solutions, which can positively influence the durability and appropriate functionality of the product group under study and could be considered in the criteria development process.

Additionally, in order to ensure that product can be appropriately maintained and, if needed, repaired, spare parts for the products should be available for purchase several years after the production of certain models is stopped.

In order to ensure that products not fulfilling set quality requirements (i.e. working improperly) can be repaired or exchanged, the warranty terms should be given and valid for a given amount of years.

[55] Draft Task 2&3 reports: Market and economic analysis & User behavior, available at projects website: http://susproc.jrc.ec.europa.eu/ecotapware/stakeholders.html

4.2.4 Design for recycling

An ecolabelled tap or a showerhead should be designed in a way that it can be dismantled with simple tools in order to recover most of the material, which can be then recycled and used again for production processes. This is consistent with the Ecolabel regulation requirement of considering the product aspects which allow reducing environmental impacts due to reusability of products. As previously mentioned, little evidence exists about the end-of-lie of taps and showerheads. According to the information from the stakeholders the metals are in general recovered (i.e. materials from the end-of-life taps are rather recovered and recycled; however if the quality of the material is low they can also be land-filled); while the waste plastics (used for showerheads manufacturing) are commonly land-filled or incinerated.

More input from the stakeholders would be desirable in order to set requirements for this product group in reference to the easy dismantling and recycling of the currently produced products and the potential environmental issues which should be considered in this respect.

Summarised questions to the stakeholders:
Which aspects of the product design should be particularly considered in this point? Are there any established best practices, which take into account the easy dismantling of products and suitability for recovery?
Do you have any information concerning the abovementioned issues with regard to products consisting (also partially) of plastics?

4.3 Corporate criteria

The last group of criteria refers to the more general issues related to the ecolabelled products: information given to the potential customers, user instructions, the packaging and the information, which should appear on the ecolabel.

4.3.1 Packaging

Basing on the information received from the retail stores in the frame of the project the taps and showerheads are predominately supplied in cardboard packaging. Additionally some smaller amounts of plastic e.g. LDPE bag are used[56].

Due to the fact that the lifetime of this product group is rather long (it was estimated in the study as 16 years for taps and 10 years for showerheads in the domestic sector, while in the

non-domestic sector – 10 and 7 years, respectively; based on the available literature information and stakeholders responses)[57], the packaging does not play a significant role in the overall life cycle of the sanitary tapware.

The general measures concerning the management of packaging and packaging waste to provide a high level of environmental protection are covered by the Directive 94/62/EC[58] on packaging and packaging waste. It is worth considering whether additional requirements should be included in the Ecolabel criteria set for sanitary tapware.

Nevertheless, as this issue is included in many ecolabel criteria sets, we would like to ask the stakeholders for their comments on this issue.

4.3.2 Consumer information/User instructions

Due to the fact that rational water consumption is to a large extent dependant on the user behaviour appropriate consumer information and installation, maintenance and use instruction should be included with the product:

The following issues are proposed to appear on the packaging or a leaflet attached to the product:

- correct installation instruction,
- information on the correct use to minimise water consumption,
- information concerning replacement of washers if taps drip water,
- advice on cleaning taps and showerheads with appropriate materials in order to prevent damaging its surface,
- information concerning appropriate disposal at end-of-life.

The stakeholders are encouraged to propose other issues, which should, in their opinion, be covered by consumer information/user instruction.

4.3.3 Information appearing on the ecolabel

The ecolabel placed on the packaging shall contain information on the advantages related to the purchase and use of the ecolabelled products. The following text is proposed to be placed on the packaging:

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[56] Please see the draft report of Task 4: Base-case assessment, available at: http://susproc.jrc.ec.europa.eu/ecotapware/stakeholders.html

[57] Please see the draft report of Task 2: Market and economic analysis & Task 3: Consumer behavior, available at: http://susproc.jrc.ec.europa.eu/ecotapware/

[58] European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste, available online at: http://europa.eu/legislation_summaries/environment/waste_management/l21207_en.htm

- 'improved water efficiency' or 'potential for water and energy saving'
- 'good performance'

4.4 Other criteria to consider – Performance criteria

Ecolabelled products should not only be recognized as best environmentally performing products, but must also meet customers' expectations in order to be widely accepted. Thus, it is worth considering also "Performance" of "Fitness-for-use" criteria, which the product group under study should fulfil. The general technical requirements are included in respective standards; however, the requirements which the products must fulfil in order to meet the customer's satisfaction constitute a less developed and researched area.

Several studies have been conducted in order to establish indicators, which can be used to measure user satisfaction and thus the quality of showers. The WaterSense ecolabelling scheme covers two performance parameters: **spray force** and **spray coverage**. The development of the procedure to measure these both aspects in laboratories was supported by consumer testing, which allowed for establishing the protocols for these key performance attributes of showerheads and including them in the specification (for details please see WaterSense: Specification for Showerheads and Supporting Statement[59, 60]). The set performance levels define the boundaries for user satisfaction.

Physical performance characteristics of showerheads were also investigated in a study conducted by the Liverpool John Moores University for United Utilities[61]. The key features, besides the flow rate, included **spray pattern (spray distribution)**, **water temperature gradient** and **skin pressure (velocity of spray)**. For details on the laboratory testing of these features please see the chapter 4 of the cited study. The study concludes that the reduction of the water flow will influence the spray pattern, vertical temperature profile and skin pressure; thus could affect negatively the shower experience. The authors suggest that in order to save water from showering more efficiently, adopting of a suitable showerhead design should be considered, rather than to reduce this issue to a simple flow reduction.

No similar performance or consumer satisfaction factors were identified for taps.

[59] WaterSense – Specification for Showerheads, available online at: http://www.epa.gov/WaterSense/docs/showerheads_finalspec508.pdf - accessed February 2011
[60] WaterSense – Specification for Showerheads – Supporting Statement, available online at: http://www.epa.gov/WaterSense/docs/showerheads_finalsuppstat508.pdf - accessed February 2011.
[61] Critchley R., Phipps D., Water and Energy Efficient Showers: Project Report, United Utilities 2007, available: http://www.unitedutilities.com/Documents/UULJMUwaterenergyefficientshowerFinalreport23rdMay2007.pdf, accessed February 2011

We would like to ask the stakeholders on their opinion concerning ensuring the good performance of ecolabelled products and the relevance of incorporating this criterion area into the EU ecolabel criteria set.

Summarised questions to the stakeholders:
Do you consider as an important issue incorporating the performance indicators into the EU Ecolabel criteria for showerheads?
If yes, which features should be considered?

5. SUMMARY

This working document has been prepared for the 1st AHWG meeting on the development of Ecolabel and GPP criteria for sanitary tapware – taps and showerheads. The criteria areas which shall be considered in the criteria development process are presented. They are divided into three groups:

a) Criteria related to water efficiency: water flow rate, cold/hot water management (design for water management), temperature and time limit/volume limit (for non-domestic products),
b) Criteria related to material composition, recycling and maintenance: material composition/release of hazardous substances during use-phase, recycled material content, design for recycling, design for repair/warranty and spare parts,
c) Corporate criteria: packaging, consumer information/user instructions, information appearing on the ecolabel

Apart from the proposal of the criteria areas, selected existing labelling schemes and the aspects they cover are described.

Based on the study conducted so far, increase of water-efficiency of taps and showerheads has been identified as the main reason for establishing the ecological criteria for sanitary tapware, since the use phase has been recognized to contribute most to the environmental impacts caused by the product group of sanitary tapware. Nevertheless, also other aspects related to the life cycle of this product, which improvement can bring environmental benefits, are considered.

The following document is intended as a starting point for a discussion during the AHWG meeting; thus we invite the stakeholders to comment on the issues presented in this background report and also other aspect they find relevant for developing the EU Ecolabel and GPP criteria for the product group under study.