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Kick-off meeting for the MEErP preparatory study on Taps and Showers

Barcelona, 27 June 2013

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QUESTIONNAIRE

1st questionnaire on May 2013

Aim:
to revise, update, integrate existing background information

3 sections, 34 questions:
1) "Taps and showers" (scope, market, technology)
2) "Demand of energy in related systems"
3) "Water supply chain and wastewater collection and treatment"

Feedback from 15 stakeholders

Additional information needed for MEErP

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SCOPE

- Classification and definitions
- Standards and methods
- Legislation
- Questions for stakeholders

Complex product group

Feature	Options for taps	Options for shower systems
Type	Pillar / Mixer	Fixed (showerhead) / Movable (handset)
Mixer lever	Single / Double	Single / Double
Mixer used also for bathtub tap	-	Yes/Not
Number of holes	1 to 4	-
Handset holder	-	Fixed / Slide bar
Flow rate	Fixed / Controllable	Fixed / Controllable
Flow control	Manual / Automatic	Manual / Automatic
Temperature	Fixed / Controllable	Fixed / Controllable
Installation	• Kitchen sink • Wash basin • Bathtub • Bidet • Outdoor	• Shower • Bathtub • Outdoor
Additional features	• Pull-out spray • Swivel-neck • Thermostatic mixing valve	• Power shower • Massage outlets

Classification of the product group – EU trade statistics

PRODCOM / CN

- Differentiation between mixing valves (28.14.12.33 / 8481 80 11) and other valves (28.14.12.35 / 8481 80 19)
- No information about the use of the product
- Reference to showers is not explicit (22.23.12.90, 25.99.11.31, 25.99.11.35 and 25.99.11.37 for sanitary ware and parts of sanitary ware made of different materials).

NACE

Still more aggregated

Key importance for market analysis

- Quite aggregated
- Only available classifications
- Pillar taps are not covered

Definitions for the product group

International standards (e.g. EN 200, EN 1112, EN 13904, BS 6100-7)

Labelling systems (e.g. EU Ecolabel for sanitary tapware)

- **Main function:** to deliver water that is of a quality that is fit for human consumption and that has a desired temperature.
- "Use" instead of "consumption"
- Quality, **flow rate** (and temperature) control, **comfort** (I)
- **Safety** (II)
- No common differentiation between I and II functional parameters

Definitions for the product group

- **Definitions** provided for "tap", "shower", "showerhead"
- Clear and comprehensive
- "shower system" instead of "shower" and "shower" instead of "showerhead"?
- Difference between mixing valves and thermostatic valves?

Scope of the study

- **Initial scope of this study:** all urban applications for both domestic and non-domestic uses.
- **Preliminarily out of the scope**: bathtub taps and applications which need unrestricted water flow (e.g. laboratory safety taps and showers).

- **Relevant to analyse (?):**
  - Instant hot water dispensers and electric shower heads
  - Household Food Waste Disposers installed in sinks
  - Shower heat exchanger
- **Examples of niche products:**
  - Industrial kitchens taps and pre-rinse shower units
  - Shower panels

Measurement methods and standards

Focus on:

a) Functional performance parameters
b) Resources use
c) Water abstraction, treatment and supply
d) Waste production
e) Emission measurement:
f) Safety
g) Noise and vibrations
h) Waste-water collection, treatment and discharge

For:

- International and European Community;
- Member State;
- Third-Country.

Additional standards of potential interest:

- EN 806-1; -2; -3; -4; -5 on "Specifications for installations inside buildings conveying water for human consumption"
- EN 12056-1;-2;-3;-4;-5 on "Gravity drainage systems inside buildings"
- EN 15091:2007-03 on "Sanitary tapware - Electronic opening and closing sanitary tapware"
- EN 16145:2012 on "Extractable outlets for sink and basin mixers — General technical specification"
- EN 16146:2013 on "Extractable shower hoses for sanitary tapware for supply systems type 1 and type 2 — General technical specification"
- DIN 1988-100;-200;-300;-8;-500;-600;-7

a) Functional performance parameters

- Most of the functional performance parameters are covered by **product-specific standards**
- There is **no EU harmonised standard yet** concerning the fitness for contact with drinking water and for rinsing effectiveness of showers

b) Resources use (energy, water and other materials)

- EN 15804:2012 "Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products"
- EN 27842:1991-11 on Automatic steam traps; determination of discharge capacity; test methods
- DIN 1988-300:2012-05 on Codes of practice for drinking water installations-Part 300: Pipe Sizing

c) Water abstraction, treatment and supply:

- ask to EUREAU (at European level), FP2E (France), Water UK, the UK Environment Agency, Ofwat (UK) and water undertakers across Europe.

d) waste production:

- Country-specific legislation, ask to Defra and/or WRAP (UK)

e) emission measurement:

- EN 1717 on Protection against pollution of potable water in water installations and general requirements of devices to prevent pollution by backflow
- ask to DECC (UK)

f) safety

- EN 1287 "Sanitary tapware – Low pressure thermostatic mixing valves; general technical specification"
- EN 15092 "Building valves – Inline hot water supply tempering valves – Tests and requirements

g) noise and vibrations

- EN 200: 2008-10 "Sanitary tapware – Single taps and combination taps for water supply systems of type 1 and type 2 – General technical specification"
- EN 1112:2008-06 "Sanitary tapware – Shower outlets for sanitary tapware for water supply systems of type 1 and type 2-Gneral technical specification"
- EN ISO 3822 on noise emission from appliances and equipment used in water supply

h) waste-water collection, treatment and discharge

- EN 12056 and DIN 1986-30;-100
- Ask to EUREAU

Legislation

Focus on:

- Regulatory instruments (mandatory and voluntary)
- Labelling systems
- Voluntary agreements

For:

- International and European Community;
- Member State;
- Third-Country.

Ecodesing and Energy labelling

- EU mandatory legislation involving some WuP but not taps and showers.
- Additional information (e.g. water consumption, noise) can be included into the Commission's energy label.

Ecolabel

- EU Ecolabel criteria for sanitary tapware positively voted in November 2012.

EU Ecolabel criteria for sanitary tapware consider:

1. Water consumption and related energy saving
2. Materials in contact with drinking water
3. Excluded or limited substances and mixtures
4. Product quality and longevity
5. Packaging
6. User information
7. Information appearing on the EU Ecolabel

On water consumption and related energy savings:

- Maximum and lowest maximum available water **flow rates**
- Presence of a **temperature management device** / technical solution (where water supply is not temperature controlled)
- Guidelines on **time control** for taps and showers with time control devices

Product sub-group		Lowest maximum available flow rate (L/min)	Maximum available water flow rate (L/min)
Kitchen taps	without flow limiting device	2.0	6.0
	with flow limiting device[1]	2.0	8.0
Basin taps	without flow limiting device	2.0	6.0
	with flow limiting device[1]	2.0	8.0
Showerheads and showers[2]		4.5	8.0
Electric showers and low pressure showers		3.0	-

[1] The flow limiting device must allow for setting the default water flow rate (water-saving setting) at the value of max of 6 L/min. The maximum available water flow rate shall not exceed 8 L/min.

[2] Showerheads and showers with more than one spray pattern shall fulfil the requirement for the setting with the highest water flow.

Global overview for taps and showers:

- **Mandatory measures** are generally applied at regional or municipal level and in accordance with the national building code
- Several **ecolabel schemes** around the World
- Labelling based on **pass-fail criteria** or on **water efficiency rating systems**;
- Other voluntary measures: **codes or guidelines for sustainable buildings**;
- **Mandatory** only **in some extra-EU countries** (water efficiency labelling schemes, requirements due to building codes)
- **Harmonisation** between regulatory instruments and labels desired

Regulatory instruments of potential relevance:

- Schemes for the market approval of water using products (e.g. Austria – ÖVGW; Belgium – Belaqua; DK – VA approval and the new water drop; "approved for drinking water"; Germany- DVGW approval; Norway – Sintef; Switzerland – SVGW; UK - WRAS approval)
- The National Building Code of Finland
- French regulation on energy performance of buildings
- National regulations concerning products in contact with drinking water, such as the German Drinking Water Regulation
- The UK Water Technology List and, more in general, the UK Regulations for Water and Building.

Labelling of potential interest:

- The French "Marque NF".
- Voluntary environmental labelling for buildings such as LEED(USA), BREEAM (GB), DNGB (Germany) and HQE (France)
- Quality schemes (DVGW, NF, KIWA…)

a) Functional performance parameters

- National Building Code of Finland
- Water Supply (Water Fittings) Regulations in the UK.
- New legislation in Denmark – ' Godkendt til Drikkevand' would require specific marking and testing for taps

b) resources use (energy, water and other materials)

- National Building Code of Finland
- Water Supply (Water Fittings) Regulations in the UK

c) water abstraction, treatment and supply of water:

- asked to EUREAU (at European level), FP2E (France), Water UK, the UK Environment Agency, Ofwat (UK) and water undertakers across Europe.

d) waste production :

- ask to Defra and/or WRAP (UK)

e) emission measurement:

- ask to DECC (UK)

f) safety:

- French regulation
- Building regulations in the UK and delivery of hot water in healthcare premises (e.g. Model NHS engineering Specification D 08).

g) noise and vibrations

- no indications

h) waste-water collection, treatment and discharge

- The Building Regulations – Sustainable Drainage Requirements - controls this in the UK.

Questions

Classification and scope definition:

1) Recommendations on **specific products** to be included / excluded within the scope of the study? (rationale and definition to be provided)

- *Instant hot water dispensers and electric shower heads*
- *Household Food Waste Disposers installed in sinks*
- *Shower heat exchanger*
- *Industrial kitchens taps and pre-rinse shower units*
- *Shower panels*
- *(Others)*

Methods and standards:

2) Last updated information provided by stakeholders, any **additional recommendations?**

a) Functional performance parameters
b) resources use (energy, water and other materials)
c) water abstraction, treatment and supply of water
d) waste production
e) emission measurement
f) safety
g) noise and vibrations
h) waste-water collection, treatment and discharge

3) Any **new standards** being planned to be developed or mandates for the European Standards Organisation?

4) Any **problems** on accuracy (tolerances), reproducibility and representativeness?

Regulatory instruments, labels and voluntary agreements

5) Last updated information provided by stakeholders, any **additional recommendations?**

a) Functional performance parameters
b) resources use (energy, water and other materials)
c) water abstraction, treatment and supply of water
d) waste production
e) emission measurement
f) safety
g) noise and vibrations
h) waste-water collection, treatment and discharge

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MARKET ANALYSIS

- EU production and trade volume
- Market and stock data
- Consumer expenditure base data
- Questions for stakeholders

Generic economic data

- Production in EU-27 (Prodcom, EUR/**kg**)
- Imports/exports from/to third countries (ComExt, EUR/**units**)
- Sales and trade in EU-27 = Production in EU-27 + imports – exports (EUR/**units**)

Prodcom and CN codes considered in the study on sanitary tapware for the EU Ecolabel

Code		Description
Prodcom	**28.14.12.33**	Mixing valves for sinks, wash basins, bidets, water cisterns etc excluding valves for pressure-reducing or oleohydraulic/pneumatic power transmissions, check valves, safety/relief valves
CN	**8481 80 11**	Mixing valves for sinks, washbasins, bidets, water cisterns, baths and similar fixtures
Prodcom	**28.14.12.35**	Taps, cocks and valves for sinks, wash basins, bidets, water cisterns etc excluding valves for pressure-reducing/oleohydraulic transmissions, check, safety, relief and mixing valves
CN	**8481 80 19**	Taps, cocks and valves for sinks, washbasins, bidets, water cisterns, baths and similar fixtures (excl. Mixing valves)

EU Production

Mixing valves (28.14.12.33) ⇨ 133 kt and 2.7 billion€ (in 2008)

- Italy and Germany largest producers in terms of mass of product followed by Portugal and Spain.
- Germany and Italy leading in terms of product value

Other valves (28.14.12.35) ⇨ 218 kt and 2.4 billion€ (in 2008)

- Italy, France and Spain largest producers.
- Italy and France leading in terms of product value

Pillar taps?

Showers?

Production in terms of units

- Split between the different products

Product	(%)
Taps	**75**
Showers	**25**

- Average weight

Product	Average weight (kg)
Kitchen taps	2.2
Bathroom basin taps	1.8
Average for taps	**2.0**
Shower heads	**0.4**

Estimated production: **164.6 millions of taps and 54.9 millions of showers**

EU Trade

Total value of EU Trade

Mixing Valves (CN 8481 8011)

- largest importers: Germany, France, Italy and the UK
- largest exporters: Germany, Italy, Portugal and Bulgaria

Other Valves (CN 8481 8019)

- largest importers: UK, Germany, Italy and Spain.
- largest exporter: Italy, Germany, Spain and the UK (in mass) – Italy, Germany, France and Spain (in value).

Estimated trade

- **Import:** 101 millions of taps and 33.8 millions of showers
- **Export:** 80.5 millions of taps and 26.8 millions of showers

EU sales and trade

EU-27 sales and trade = production in EU-27 + imports to EU-27 – export from EU-27

Apparent consumption for both taps and showers

- Italy (21.6% of the total)
- Germany (9.7%)
- France (8.4%)

Basic market data for EU-27 or specific Member States

France

- 8 millions of units of taps sold (also considering imports?) for domestic use in 2009
- 1.85 millions of units of taps sold for non-domestic use in 2009
- 2.5% growth rate in value in 2012 according to MSI study . Volume in units was however stable.

UK

- 7 million of taps sold in 2012, sales could decrease by 28% (when?)
- 2.3 million of showers (or showerheads?)
- sold in 2012, sales could decrease by 28%

Information provided also from 2 producers (market share?)

Market composition in terms of companies' turnover and number of employees

Company	Taps (%)	Showers (%)	Showerheads (%)
SME(*)	50%, (trend to 0%) 100% for industrial kitchen taps in Germany		
Large	50% (trend to 100%)		
Key Players	For industrial kitchen taps in Germany: Echtermann, Knauss, KWC Germany		
(*) number of employees < 250 and annual turnover < 50 M€, and/or annual balance sheet < 43 M€			

Market and stock data

Model developed for the EU Ecolabel and GPP criteria for sanitary tapware

Stock in 2007

- domestic sector: **taps** > 1 billion units installed; **showers** > 248.5 million units installed
- non-domestic sector: **taps** are 7% of the domestic sector (11-20%); **showers** are 11% of the domestic sector (4-10%)

Forecasts to 2020

- domestic sector: annual growth rate for **taps and showers** about 13%
- non-domestic sector: annual growth rate for **taps** is 36% and for **showers** is 33%

Sales

- domestic sector: **taps** from 63.5 million units in 2007 to >72 million in 2020; **showers** from 25 million units to >28.5 million units.
- non-domestic sector: **taps** from 7 million units in 2007 to >9.5 million in 2020; **showers** from 4 million units to >5.3 million units.

Consumers expenditure base data

Typical prices for taps (units)

Type of Tap	Bathroom tap		Kitchen tap	
	Range (Min – Max) (€)	Average (Median) (€)	Range (Min – Max) (€)	Average (Median) (€)
2 hole mixer			42.62 – 157.08	100
3 hole mixer	125 – 379	252		
Monobloc mixer	8.00 – 475	241	7.90 – 355	181
Pillar Taps (pair)	18.27 – 158.30	88	18.27 – 59.67	38.97

- **Factory price for taps:** 25-30 € (average)
- **End user price for taps:** 52€ (average in France)
- **Min end user price for taps, showers and showerheads:** 15€

Typical prices for non-domestic products (units)

Type of Tap/ Showerhead	Range (Min – Max) (€)	Average (Median) (€)
Infra Red Mixer Tap	269.48 – 480.75	375.12
Lever Taps (Pair)	43.84 – 74.28	59.06
Single Lever Mixer Tap	89.20 – 624.68	356.94
Self closing single taps	27.73 – 316.60	172.17
Showerheads (Wall mounted/swivel design)	33.49 – 132.33	82.91

Typical prices for showers (units)

Showers	
Range (Min – Max) (€)	Average (Median) (€)
1.50 – 82.80	42.15

Installation, repair and maintenance costs

Installation – maintenance and repair cost

	Installation cost (€)	Maintenance (€)	Repair (€)
Domestic			
Bathroom taps	30 - 100	0 to 50	20-100
Showerheads	20 - 60	0 to 15	20 -100
Kitchen taps	30 - 100	0 to 50	0 to 50
Outdoor taps	100		0 to 50
Other taps			
Non-domestic			
Bathroom taps			
Showerheads	60		
Kitchen taps	150	75	75
Outdoor taps			
Other taps			

Indicative cost of spare parts (UK)

Spare Part	Price (£)	Euro (conversion)
Washers	Box of mixed washers for taps (approx 80) £6.83	8.32
O Rings	Box of mixed o rings for taps (approx 115) £6.83	8.32
Valves: • **Ceramic disc valve** • **Compression tap valve**	20-30 (pair) 4 (single)	24.35 – 36.53 (pair) 4.87 (single)
Ceramic Disc Cartridges (single lever taps)	15 (single)	18.27 (single)
Tap heads	8.50 - 30	10.35 – 36.53
Aerators	5-6	6.09 – 7.31

Disposal Tariffs

- No information were found. However, it seems that this products are usually recycled.

Gas and Electricity Prices

- Reference to Eurostat/MEErP

Water Prices

- Task 2 report for Ecodesing of Washing Machines considered an average price of 3.7 Euro/m^3 for household water supply and sewage in Europe
- Alternatively, reference to Eurostat/MEErP

Interest and Inflation Rates

- Reference to Eurostat/MEErP

Questions

Production and trade

1) No further classification systems identified, which **Prodcom/CN codes** are representative for this product group and how much?

- **Mixing valves** (28.14.12.33/8481 80 11)
- **Other valves** (28.14.12.35/8481 80 19)
- **Showers and showerheads?** (22.23.12.90, 25.99.11.31, 25.99.11.35 and 25.99.11.37 for sanitary ware and parts of sanitary ware made of different materials)

2) How to take into account for **pillar taps**?

3) What could be the **ratio of taps/showers** installed? Can 3:1 be correct for the EU-27?

4a) The **average weight** for taps was considered equal to 2.0 kg (range: 1.8-2.2).

- Is the average weight correct? Can you provide weight distribution range?
- Can a tap weight 0.8 kg?

4b) The **average weight** for showerheads was considered equal to 0.4 kg

- Is the average weight correct? Can you provide weight distribution range?
- Can you provide values for showers?

5) Some **data on production, sales, trade and stock** have been reported for France, the UK and for 2 companies. Do you have additional information at EU-27/Country level?

6) Which is the share of overall taps and showers installed in non-domestic premises?

- Taps: 7% (stock-model) or 11-20%
- Showers: 11% (stock-model) or 4-10%

7) Which are the main **market channels**, the **market structure** and the **major players** (associations, large companies, share SMEs, employment)?

8) Can you revise/provide **average costs/prices and range**, possibly at regional level, for:

a) Factory prices
b) End consumer prices
c) Installation, maintenance and repair
d) Consumables
e) Disposal tariffs.

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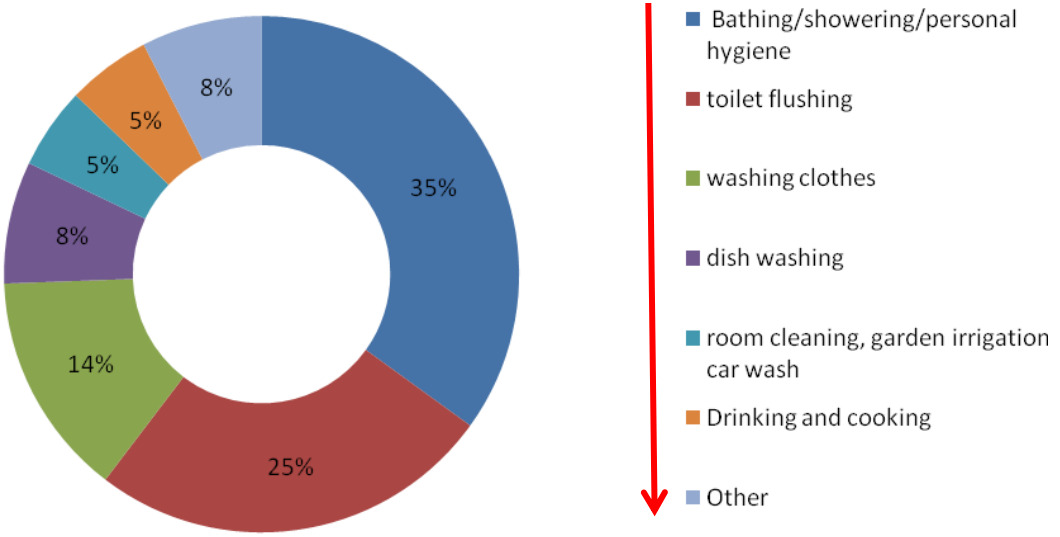
USERS AND SYSTEM ASPECTS

- Water consumption and user behaviour
- Use, maintenance and End-of-Life
- Water supply and waste water treatment
- Affected energy system(s)
- Questions for stakeholders

Water consumption

Domestic water consumption in EU-27*:*



In average:

- **173 L/person/day**
- **75 L/person/day for taps and showers**

Non-domestic water consumption: very little information is available

Aggregated data on water and energy consumption for taps and showers across the EU-27

Data (average and range)	Total	Taps	Showers
	Member State(s)	Member State(s)	Member State(s)
Water consumption (m^3/year)	Portugal: 570 millions	Portugal: 90 millions	Portugal: 210 millions
Water consumption (L x person^{-1} x day^{-1})	France: 200 Germany: 121 Lithuania: 97 Portugal: 150 Spain: 265 UK: 148	Portugal: 24	Portugal: 56
Water consumption (m^3 x buildings^{-1} x year^{-1})	Portugal: 150	Portugal: 24	Portugal: 55

User behaviours

Calculation of total water use in taps & showers

domestic applications:

- 2.5 persons per household (Eco-design EuP Boilers Study)
- 76% of water used for taps and 24% for showers (Anglian100 project)
- 5 taps and 1.25 showers per household
- **10,402 litres per tap per year**
- **13,140 litres per shower per year**

non-domestic applications (IPTS Scoping Document, Feb 2010)

- Basin and kitchen taps: 3.6 billion m^3/year
- For bathtub/showers: 0.7 billion m^3/year
- Units of showerheads : units of bathtubs = 1:1
- **51,783 litres per tap per year**
- **12,953 litres per shower per year**

Calculation of hot water use

for taps:

- Hot and cold water ratio is 56/44 (Anglian100 project)
- Both for domestic and non-domestic use
- **Domestic: 5,825 L per tap per year**
- **Non-domestic: 28,999 L per tap per year**

for showers:

- A mixer shower, 70% boiler efficiency
- Hot and cold water mix ratio is 70/30
- **Domestic: 9,198 L per shower per year**
- **Non-domestic: 9,067 L per showerhead per year**

Water and energy consumption of products on the market

Product	Water flow (L/min)	Hot water av. cons. (% of tot)	Average temp. of hot water (ºC)
Kitchen tap			
Bathroom tap (water efficient)	4.3-13 L/min at 3 bar		Inlet water: 71.5ºC at 3 bar Outlet water: • 56-71.5ºC • 14.6-45.8ºC (central position)
Showers (water efficient)	4.2-18.3 L/min at 3 bar		• Inlet water: 36ºC at 0.1 bar; Outlet water: 34.6-37ºC • Inlet water: 42ºC at 0.1 bar; Outlet water: 40.8-42ºC
Sink, pot or kettle filling tap	30-100 L/min	25%	60° C
Pre-rinse spray unit	12-15 L/min	75%	60° C
Additional sources of information: Standard figures are extractable from charts in EN 806 and DIN 1988 **No information** on: • **water consumption (L/person/day)** • **electricity consumption (kWh/L)**			

Description of user behaviour practices

Product	Daily frequency of use per person (nr. use/person)	Average time for each single use (min)	Water wasted due to wrong user behaviour practices (% of water used)	Water wasted due to inherent characteristics of the system (e.g. waiting for hot-water) (% of water used)
Kitchen tap	?	?	?	
Bathroom tap (*)	**6**	**1**	**50%**	
Showers (*)	**1**	**10**	**50%**	
Sink, pot or kettle filling tap	3–4 times a day to cook a meal	5- 10 min per kettle filling	n/a	n/a
Pre-rinse spray unit	10 times a day up to permanent use	1 min per batch for the dish washing machine	n/a	n/a
(*) estimations, no aggregated data for Portugal, Spain, Italy and Belgium				

Positive influence of user guidance and water saving technologies without reducing comfort

Examples of studies concerning user behaviour

- **Finnish Environment Institute, HINKU report**, Helsinki, 22 October 2012, showing that decrease of water consumption associated with **electronic touchless faucets.**

- Reports from **Defra, Watwerwise, Environment Agency, WRc and Energy Saving Trust** (UK)

Lifetime

	Real Lifetime (years)	
	Domestic (average)	non-domestic (average)
Kitchen taps	5-20 (16)	5-20 (10)
Bathroom taps	5-20 (16)	5-20 (10)
Outdoor taps	10-30 (16)	5-20 (10)
Showers and showerheads	5-15 (10)	5-10 (7)

Water supply and wastewater treatment

- **Problem of water scarcity in:** South of Europe (Cyprus, Greece, Italy, Portugal, Spain); the UK.
- **Water availability not an issue in:** Austria, Germany and Switzerland
- **Pipeline design, addition of water** to eventually compensate reduced water flow (where needed)
- **Water distribution systems (Portugal)**

  End user: 150 L/person/day

  Water supply efficiency: 75% (200L/person/day)

  Wastewater to the treatment plant: 120 L/person/day (20% losses)
- **Water purification (Portugal, small/medium cities)**

  Capacity: 95% population; 185 L/person/day
- **Municipal wastewater treatment (Portugal, small/medium cities)**

  Capacity: 80% population; 150 L/person/day

Affected energy system(s)

Energy for **water heating** with **electric boilers**:

- Inlet temperature: 60ºC, temperature increase: 55ºC
- 70% boiler efficiency
- 0.092 kWh/L
- Taps: 71ºC at 3 bar
- Showers: 36-42 ºC at 0.1 bar

Parameter	Domestic Tap	Non Domestic Tap	Domestic Showerhead	Non Domestic Showerhead
Electricity consumption (kWh/year) (1)	536 (222-986)	2668	846 (350-1557)	834
Water consumption (m^3/year) (1)	10.4 (4.30-19.14)	51.8	13.14 (5.43-24.18)	12.95
(1) Range reported within brackets				

- Reference to **Ecodesing of water heaters** (VHK, 2007)
- Heating 1 m^3 of water = 1.1€ (solar panel) to 8€ (piped propane boiler)

Related system in which energy is demanded

Sub-system	Heat consumption (MJ/L)	Electricity consumption (kWh/L)
a) Water abstraction, impoundment, storage, treatment and distribution	232(1)	
b) Water supply at the user		
c) Water heating		0.03(1)
d) Waste-water collection and treatment	227(1)	

References:

(1) SILVA-AFONSO, A.; RODRIGUES, F.; PIMENTEL-RODRIGUES, C. – "Water efficiency in buildings: Assessment of its impact on energy efficiency and reducing GHG emissions" – Recent Researches in Energy & Environment (6th IASME/WSEAS International Conference on Energy & Environment – EE'11). Cambridge: WSEAS Press, 2011. ISSN 1792-8230. ISBN 978-960-474-274-5. pp. 191-195.

Questions

Water consumption

1) How the use of water is split between **taps and showers**? Can **76/24** be representative for both domestic and non-domestic premises?

2) How the use of water is split between **hot and cold**?

- **Taps**, domestic/non: **56/44**?
- **Showers**, domestic/non: **70/30**?

3) Which is the inlet temperature for taps and showers?

- **Taps**, domestic/non: 60 or 71ºC (at 3 bar)?
- **Showers**, domestic/non: 60 or 36-42 ºC (at 0.1 bar)?

4) Which is the outlet temperature for taps and showers?

- **Taps**, domestic/non: 56-71.5ºC (at 3 bar)?
- **Showers**, domestic/non: 34.6-37 / 40.8-42 ºC (at 0.1 bar)?

User behaviour

5) Which are **daily frequency of use, average time for single use and waste of water** for the following applications?

- **Kitchen taps?**
- **Bathroom taps**: 6 use per person per day for 1 minute, 50% water wasted?
- **Showers**: 1 use per person per day for 10 minute, 50% water wasted?

6) Do you have any comments and/or additional information on the **use of water in different products**? (e.g. water flow, energy consumption)

7) Do you have any additional references on studies on the **influence of user behaviour**?

Lifetime

8) Which are technical and real lifetime for taps and showers in domestic and non-domestic premises?

Real lifetime:

- Taps domestic: average 16 years (range 5-30)?
- Taps non-domestic: 10 years (5-20)?
- Showers and showerheads domestic: 10 years (5-15)?
- Showers and showerheads non-domestic: 7 years (5-10)?
- Showers?
- Showerheads?

Technical lifetime declared?

Water supply and waste water treatment

9) Do you have comments and/or information representative for other countries than Portugal?

10) Do you have additional information on energy demand and costs associated?

Water heating systems

11) Which heating systems are typically installed in different MSs?

12) Is it reference to VHK appropriate for boilers?

13) Do you have information on costs associated with heating? 1.1-8 €/m^3 (solar panel - propane boiler)

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ANALYSIS OF TECHNOLOGIES

- Information on conventional products
- Water/energy saving technologies
- Production, use, end-of-life
- Questions for stakeholders

Information on conventional products

- Variety of designs, materials and functionality for taps and showers
- Taps designed for the pressure system they are to be used with
- Spindle vs. Ceramic disc taps
- Shower systems = showerhead + valve
- Design of new product lines every 2 years for domestic appliances
- Increasing number of water/energy-efficient taps and showers

Segmentation and expected trends in terms of water control devices

- **Single lever, single outlet**

62% in France, market penetration increasing

25% in the UK , +3% expected over next five years

- **Double lever, single outlet**

10% in France, market penetration decreasing

43% in the UK , -2% expected over next five years

- **Double outlet**

0% in France, market penetration decreasing

30% in the UK , -2% expected over next five years

- **Infrared sensors**

1.8% in France, market penetration increasing

- **Push button and non-manual controls**

8% in France, market stable

Water/Energy saving technologies

List of technologies/features for recent years so far identified:

1. Aerators
2. Flow regulators
3. Eco-buttons
4. Water brakes
5. Energy saving taps (cold water in middle position, hot-water limiters, hot-water brakes, thermostatic valves)
6. Aeration systems in showerheads
7. Spray patterns in showerheads
8. Sensor taps
9. Automatic shut-off taps (Push taps)

Flow rate: variable

Saving potential: 40-70% for water, 40-50% for energy

Payback time << lifetime for the product

Identification of water and energy savings technologies

Degree of diffusion	Taps	Showers	Showerheads
Commonly used	• **Aerators** (100% in France and for 1 global retailer; 75% for industrial kitchen in Germany) • **Automatic shut-off taps** (8% France) • **Sensor taps** (1.8% in France) • **Water brake** (100% for 1 global retailer, 80% for 1 producer)	• **Flow regulators** • **Thermostatic taps for bath and showers** (18-26% in France, increasing)	• **Aerators** • **Flow regulators**
Innovative but not widely spread yet	• **Aerators with flow switch option**. • **Cold water in middle position** • **Hot water brake** (100% for 1 global retailer, 80% for 1 producer) • **Thermostatic taps for basin or kitchen** (10% for industrial kitchen in Germany)	• **Flow limiters** (between showerhead and hose or between hose and bath tap)	• **Flow switch**
Still in pilot stage	• **Electronic controlled kettle filling taps**		

Segmentation and expected trends in terms of water flow rate

Key information but limited and diverging information

Number of products registered in the BMAs labelling scheme (updated at Sep 2011)

Flow Rate (L/min)	Taps (kitchen taps excluded)	Showers
1.7	3	
3	3	
3.5	2	
4	21	
4.7	35	
5	67	
6	36	2
8	19	
9	2	5
12	N/A	1

Water flow in L/min	Taps (%)	Showers (%)
Lowest maximum flow rate	• 2-6 L/min	• 4.5-6 L/min
Highest flow rate	• 12-30 L/min • 110 L/min in industrial kitchen taps	• > 30 L/min

Expected trends and innovations:

- Mixer taps over pillar taps
- Materials for ensuring hygiene quality standards
- Presence of more electronics (e.g. water saving programs or data gathering)
- Increasing number of automatic taps and faucets in private households
- Using a shower as a wellness application
- Influence on aerator change and cleaning

Production

Taps:

- Most of taps mainly made of **brass (95-99%) with a chrome plating finish** (Hexavalent chromium vs. Trivalent chromium). Unlikely to change.
- Use of **stainless steel taps (0.8-5%)**, increasing.
- **Plastic taps (0-0.2%), other materials?**

Material	Weight			
	Brass Tap			Stainless Steel Tap
Brass (Body)	74.1%	80%	70%	
Stainless Steel (Body, including handle)			10%	89.3%
Nickel Chrome Plating	0.2%			0.2%
Plastic	5.5%	1%	8%	7.8%
Ceramic	1.8%			2.6%
Zinc	18.4%	19%	12%	
Total (g)	1137	-	-	806

Showers and showerheads

- A range of **plastic and metals** can be used for showers and showerheads
- The use of plastic is increasing.
- 100% of **showers** mainly made of **brass** in Germany (?)
- 5% of **showerheads** mainly made of **brass** and 95% of **stainless steel** in Germany (?)

Material	Weight			
	Plastic Showerhead		Metal Shower	
Brass (Body)			82.8%	80%
Nickel Chrome Plating	1.1%		0.1%	
Plastic	98.9%	100%	17.1%	20%
Total (g)	179	-	2297	-

Product distribution

Limited information available on packaging and volume of the product

Default packaging dimensions/volume for purchased products are:

- Length: 38.5 cm;
- Width: 18 cm;
- Height: 13 cm;
- Volume: 9.009 L.

Taps and showers are predominately supplied in cardboard with smaller amounts of plastic (e.g. LDPE bags).

Installation and Maintenance

- **Product specific**
- Influence on the **durability** of the products.

Examples on installation:

- Place of installation and cleaning cycles of kitchens have a big influence on the durability of industrial taps.
- Parameters as temperature, hardness and velocity of water can have a great influence on the installation.

Examples on maintenance:

- Aerator cleaning is usually made by the user
- Seals/Valve /Diverter/Thermostatic cartridge change done by the plumber
- Engineering services provided that repairs products as soon as these present a problem.
- Some producers provide spare parts for repairing.

End-of-life practices

- Taps and showers are usually collected by installers and recycled, due to the value of their metal content.
- Increasing amount of waste separation at the source when disposed by the user
- Metals and alloys can be extensively recycled. Indicatively, 90-95% of brass-based products are recycled
- Few barriers: recycling of nickel-containing stainless steels and lead and nickel containing copper alloys
- Landfill (or recycling?) is the most probable end-of-life scenario for plastic showerheads

Questions

Technical product description (information on performance, price, resources/emissions impact)

1) Is the list of **technologies** comprehensive or there are other technologies to include? **water/energy saving, electronics, …**

2) Do you have information on **technical specifications** for those technologies (e.g. technical description, water flow, saving potential, costs, payback time)?

3) Do you have information on **barriers and opportunities** associated with them?

4) Do you have information on their **market penetration and trends**?

5) Do you have information on the distribution of products in terms of **water flow**?

6) What is the typical **design cycle** for this product group? 2 years?

Technology	Flow rate	Indications on investment and payback time (PBT)
Integrated aerators (with/without flow regulators)	Variable (Typically 2 to 9 L/min at 3 bar)	Cost: 160-450 € for the example products (integrated aerators and flow regulators) PBT: Between 7 and 20 months (integrated aerators and flow regulators)
Flow regulators	Variable (Typically 1-25 L/min at 3 bar)	Cost: < 5.5 € PBT: Zero to a couple of months
Eco-buttons	Water saving position: 5-7 L/min for taps and 8-10 L/min for showers	Cost: Approximately 25 € for the example product PBT: dependent on how often the user employs the water saving position
Taps with water brakes	5-7 L/min in water brake position	Cost: Approximately 210 € for the example product PBT: Zero to 6 months
Water and energy saving tap	As for other water saving taps	Cost: Approximately 750 € for the example product PBT: Approximately 8.8 years for a small household.
Aeration systems in showerheads	6–14 L/min if fitted with a flow regulator	Cost: Approximately 20-120 € for the example products BPBT: between 1 and 6 months
Spray patterns/mechanisms in showerheads	9-14 L/min	Cost: Approximately 60–220 € for the example products PBT: few months for the example products
Sensor taps	Adjustable flow rates (Typically 3-6 L/min)	Cost: Average price of 375 € for an infrared mixer tap PBT: Between 3-6 months
Automatic shut off taps (push taps)	Adjustable flow rates (Typically 5-10 L/min)	Cost: Approximately 35-50 € for the example product range PBT: 7 and 3.2 months for cold and hot push taps, respectively, based on a product price of approximately 26 €.

- **Aerators with flow switch option.**
- **Energy saving cartridges (hot water brake?)**
- **Electronic controlled kettle filling taps**
- **Thermostatic taps**
- **Others?**

Production

7) Which is the **market share** of **taps/showers/showerheads** in terms of **main construction materials** (brass, stainless steel, Zinc-Al alloys, plastics)?

8) Which are **average weights and compositions** of **taps/showers/showerheads**?

9) Can you provide **BoM for example products**, including products with installed water/energy saving technologies?

10) Which **plastics** are used?

11) Which is the **primary scrap production** during sheet metal manufacturing?

12) What is the amount of **energy demanded** and the amount of **waste produced** during the product manufacturing?

Distribution

13) Which materials are used for **packaging** and how much? Which is the **dimension** of the packed product?

14) Which **means of transport** are employed in shipment of components, sub-assemblies and finished products? For how long on average?

Installation/Maintenance

15) How installation and maintenance can affect **durability**?

16) Which product **components and spare parts** need to be replaced or fixed before the end-of-life and how? Which are the **costs** associated?

End of Life

17) Which **end-of-life scenarios (%)** for taps, showers and showerheads?

18) Costs associated and incomes from recycling?

19) Which **barriers to recycling** and how these can be solved?

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ENVIRONMENTAL AND ECONOMIC ASSESSMENT OF DESIGN OPTIONS

- EU Ecolabel case studies
- MEEuP key results
- Identification of scenarios
- Next steps according to MEErP
- Questions for stakeholders

EU Ecolabel case studies

Taps:

- Chrome-plated brass (most common product)
- Stainless steel (alternative option)

Showerheads:

- Metal
- Metal/Plastic

Domestic vs. Non-domestic applications

UK context

Examples still relevant but to be extended

Results for brass tap (domestic use)

Parameter	Units	Production % of total	Distribution % of total	Use % of total	End of Life % of total	Total % of total
Total Energy (GER)	MJ	0.06%	0.07%	99.86%	0.01%	100.00%
of which, electricity (in primary MJ)	MJ	0.01%	0.00%	99.99%	0.00%	100.00%
Water (process)	ltr	0.00%	0.00%	100.00%	0.00%	100.00%
Water (cooling)	ltr	0.01%	0.00%	99.99%	0.00%	100.00%
Waste, non-haz./ landfill	g	2.79%	0.05%	97.09%	0.07%	100.00%
Waste, hazardous/ incinerated	g	0.05%	0.05%	96.96%	2.90%	100.00%
Emissions (Air)						
Greenhouse Gases in GWP100	kg CO2 eq.	0.08%	0.13%	99.80%	0.00%	100.00%
Ozone Depletion, emissions	mg R-11 eq.					neg
Acidification, emissions	g SO2 eq.	0.16%	0.06%	99.78%	0.00%	100.00%
Volatile Organic Compounds (VOC)	g	0.00%	0.00%	100.00%	0.00%	100.00%
Persistent Organic Pollutants (POP)	ng i-Teq	5.74%	0.00%	94.26%	0.00%	100.00%
Heavy Metals	mg Ni eq.	5.37%	0.18%	94.33%	0.12%	100.00%
PAHs	Mg Ni eq.	1.63%	1.63%	96.20%	0.00%	100.00%
Particulate Matter (PM, dust)	g	0.37%	5.75%	91.84%	2.04%	100.00%
Emissions (Water)						
Heavy Metals	mg Hg/20	1.36%	0.00%	98.64%	0.17%	100.00%
Eutrophication	g PO4	0.00%	0.00%	100.00%	0.00%	100.00%
Persistent Organic Pollutants (POP)	ng i-Teq	neg	neg	neg	neg	neg

Results for plastic showerheads (domestic use)

Parameter	Units	Production	Distribution	Use	End of Life	Total
		% of total	% of total	% of total	% of total	% of total
Total Energy (GER)	MJ	0.03%	0.07%	99.89%	0.00%	100.00%
of which, electricity (in primary MJ)	MJ	0.01%	0.00%	99.99%	0.00%	100.00%
Water (process)	ltr	0.00%	0.00%	100.00%	0.00%	100.00%
Water (cooling)	ltr	0.01%	0.00%	99.99%	0.00%	100.00%
Waste, non-haz./ landfill	g	0.08%	0.06%	99.86%	0.01%	100.00%
Waste, hazardous/ incinerated	g	0.09%	0.04%	92.00%	7.87%	100.00%
Emissions (Air)						
Greenhouse Gases in GWP100	kg CO2 eq.	0.03%	0.13%	99.85%	0.00%	100.00%
Ozone Depletion, emissions	mg R-11 eq.					neg
Acidification, emissions	g SO2 eq.	0.03%	0.06%	99.90%	0.00%	100.00%
Volatile Organic Compounds (VOC)	g	0.00%	0.00%	97.06%	0.00%	100.00%
Persistent Organic Pollutants (POP)	ng i-Teq	0.17%	0.00%	99.83%	0.00%	100.00%
Heavy Metals	mg Ni eq.	2.49%	0.19%	97.13%	0.19%	100.00%
PAHs	mg Ni eq.	0.00%	1.69%	98.31%	0.00%	100.00%
Particulate Matter (PM, dust)	g	0.19%	5.77%	91.06%	2.98%	100.00%
Emissions (Water)						
Heavy Metals	mg Hg/20	0.17%	0.00%	99.65%	0.17%	100.00%
Eutrophication	g PO4	0.00%	0.00%	100.00%	0.00%	100.00%
Persistent Organic Pollutants (POP)	ng i-Teq	neg	neg	neg	neg	neg

- Ecoreport tool updated from MEEuP to MEErP
- Hot-spot = use phase
- Except water consumption, 90-100% energy
- LCC (not shown here): 244-1193 € per product can be saved over its lifetime with only water saving measures
- Key importance of product technologies and user practices
- Other parameters: boiler types and efficiency and product lifetime, weight and composition

Identification of scenarios of analysis

Evaluation scenarios likely to be considered:

- **Product systems** available on the market (taps, showers and showerheads);
- Alternative **design and technology options**;
- Alternative **use-phase scenarios** (e.g. geographical area, user behaviour, technical system implemented for water supply and water heating, influence of durability);
- Analysis of the environmental and monetary effects due to changes in the **durability** of the product.

Additional data needed (e.g. Bill of Materials, water and energy consumption data, costs, life time)

Questions

Definition of base cases and design/scenarios options

1. Which products proposed to evaluate as base cases?
2. Which technology/design options proposed to evaluate?
3. Which scenarios of analysis proposed to evaluate? (e.g. heating systems)

European Commission

Kick-off meeting for the MEErP preparatory study on Taps and Showers

THANKS FOR YOUR ATTENTION

Barcelona, 27 June 2013

Joint Research Centre