

MEErP preparatory study on taps and showers

2nd TWG meeting – Brussels, 25 March 2014

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Stimulating innovation
Supporting legislation*



Agenda:

1.	Opening and welcome	9:30 – 9:45
2.	Political framework and potential outcomes of the project	9:45 - 10:00
3.	Timeline and status of the study on Taps and Showers	10:00 – 10:15
4.	Task 1 and 2 (Scope and Market)	10:15 – 11:00
	Coffee break	11:00 – 11:15
5.	Task 3 and 4 (User Behavior and Technologies)	11:15 – 12:00
	Lunch break	12:00 – 13:30
6.	Task 5 and 6 (Environmental and economic assessment of base cases and improvement potential)	13:30 – 14:15
7.	Task 7 (Analysis of policy options)	14:15 – 15:15
	Coffee break	15:15 – 15:30
8.	Discussion on potential policy options	15:30 – 16:30
9.	Next steps and planning	16:30 – 16:45
10.	Any other business and conclusion of the meeting	16:45 – 17:00



IET – Petten, The Netherlands
Institute for Energy



IRMM – Geel, Belgium
Institute for Reference Materials and Measurements



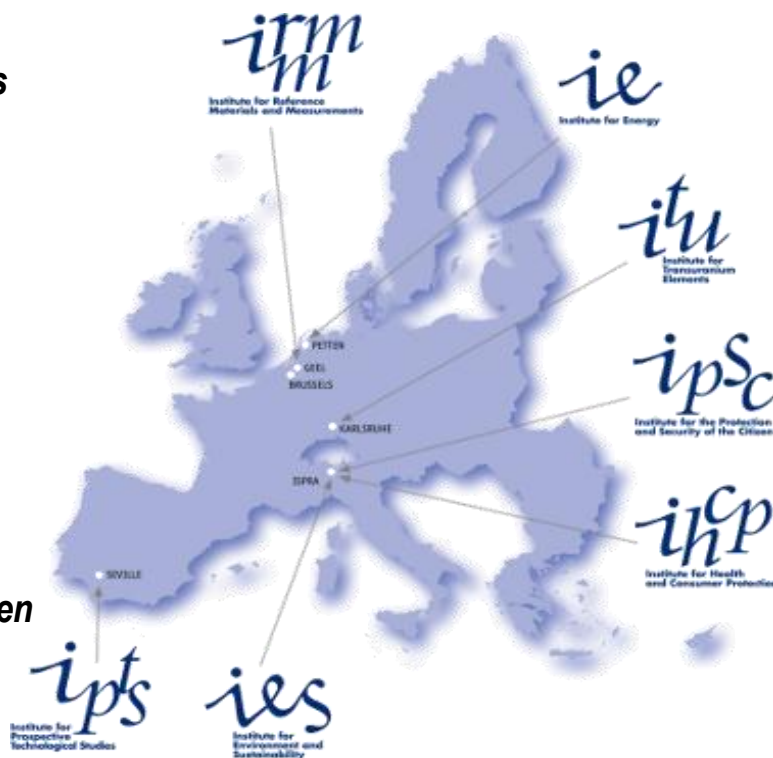
ITU – Karlsruhe, Germany
Institute for Transuranium Elements



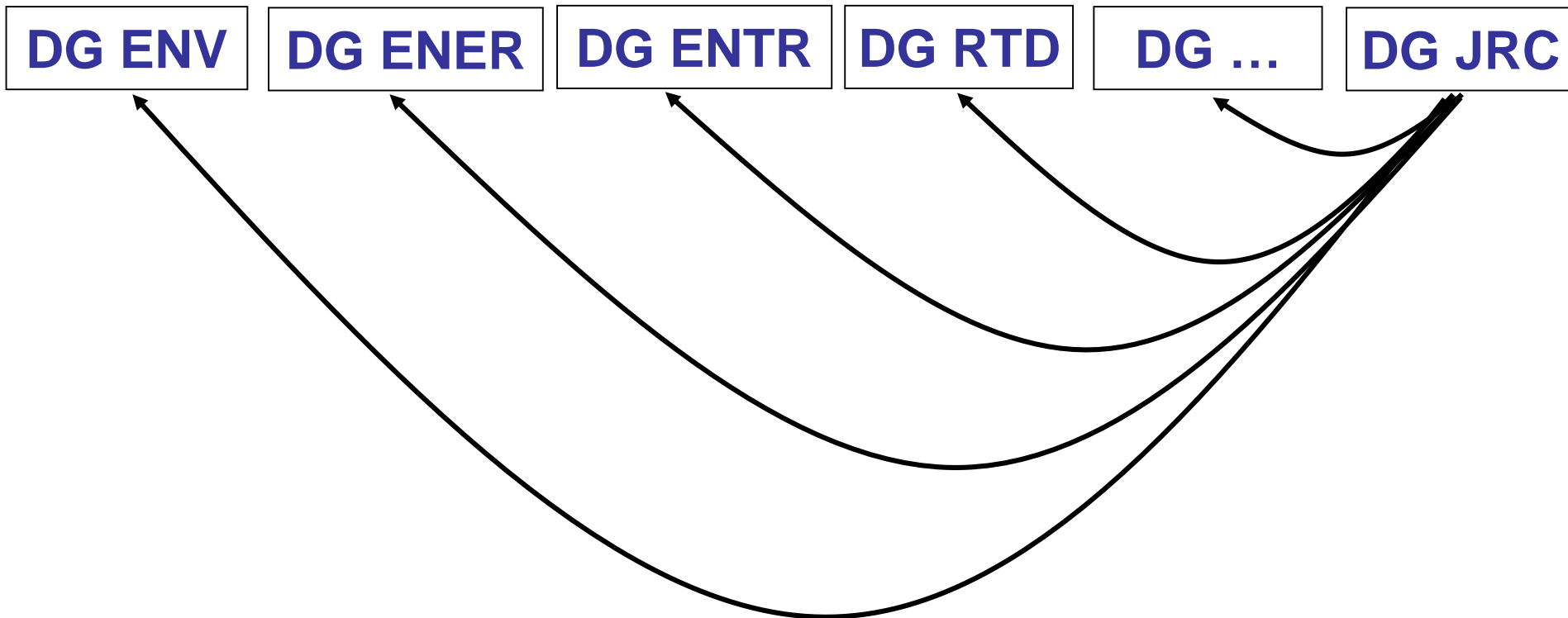
IES/ IHCP/ IPSC – Ispra, Italy
Institute for Environment and Sustainability



IPTS – Sevilla, Spain
Institute for Prospective Technological Studies



Joint Research Centre in the context of the European Commission:



Activities in support of Product Policy

JRC supports the development and implementation of environmental product policies:

- EU Ecolabel Regulation,
- Green Public Procurement Communication,
- Energy Related Products Directive
- Energy Labelling Directive.

Techno-economic research, development of environmental assessment methodologies, as well as the operational management of the stakeholder interaction.

Objectives

Developing an **evidence base** to prepare the potential integrated implementation of SPP for taps and showers.

MEErP compliant and representative Technical, Economic, Environmental analyses

Independent, neutral, science-based **research** with strong **stakeholder** involvement (Technical Working Groups)

Preparing the **ground for decisions** on appropriate SPP tool mix

Study overview

Task 1: Product group definition and scope, standards and legislation,

Task 2: Market analysis

Task 3: User behaviour and system aspects

Task 4: Technologies

Task 5: Environmental and economic assessment

Task 6: Design options

Task 7: Policy scenarios analysis

Milestones

Jan 2013, Start of works

Jun 2013, KO meeting with stakeholders: *official launch of the study*

Oct 2013, 1st TWG meeting: *finding consensus and discussing on potential outcomes*

Mar 2014, 2nd TWG meeting: *presentation of preliminary outcomes*

Jul 2014, Final report

Next steps?

Information collection

- Literature
- May 2013, 1st Questionnaire: preliminary update on background material
- Jul 2013, 2nd Questionnaire: supplementary information for Tasks 1-4
- Participation in meetings and further interaction with stakeholders for revision of Tasks 1-6
- Dec 2013, 3rd Questionnaire: Policy options (Task 7)

- **Scope and definitions:** improvement of definitions (e.g. shower/shower systems) and update
- **Market:** agreement on market and stock analyses, info on product costs and innovations
- **Users and system aspects:** approval of water and energy consumption at EU/product level, revision of saving estimation
- **Technologies:** definition of design options, technical and economic elements, BoM + input for the Ecoreport tool
- **Env-Eco Assessment:** Calculation of base cases and design options
- **Policy Analysis:** Gathering stakeholder feedback to build scenarios of combined policy instrument implementation and related impact

Next steps:

Deadline for comments: **11 April** (at the latest)

Completion of the final report (Jul 2014)

Support to DGs for the potential implementation of SPP

Study overview

Task 1: Product group definition and scope, standards and legislation,

Task 2: Market analysis

Task 3: User behaviour and system aspects

Task 4: Technologies

Task 5: Environmental and economic assessment

Task 6: Design options

Task 7: Policy scenarios analysis

TASK 1: SCOPE

- Product definitions and classifications
- Measurements methods and standards
- Legislation, voluntary agreements and labels
- Potential barriers to producers

1st TWG – 29.10.2013

Suggestions:

- to propose **clear definitions on showers, shower systems, showerheads and hand-showers**
- to include **standards** as EN 816 on automatic shut-off valves, to clarify the application of EN1111 and EN 1112 for low pressure and high pressure systems, to include more standards on noise, to delete standards on Al and Al-alloys

⇒ Included in the new version of the Working document for the 2nd TWG 'Task 1 report: Introduction and Scope (version 2)'

Technical definition and classification

- **Tap**, also referred to as "valve" or "faucet", means a **directly** or **indirectly, mechanically** and/or **automatically** operated **valve** from which water is drawn

Feature	Product	Definition
Core technology	Spindle taps Ceramic disc taps	Taps where the water flow is controlled with a spindle mechanism Taps where the water flow is controlled through two ceramic discs and one or more handles
Control of temperature and/or flow rate	Pillar tap Mixing valve	A deck mounted device, equipped with a single inlet (cold only, hot only or pre-mixed water), that allows the user to control the flow rate. Device that allows the user to adjust the temperature.
Design of the mixing mechanism	Mechanical mixing valve Two-handle mixer Single-control mixer (or single-lever mixer) Thermostatic mixing valve	Mixing valve that allow controlling water flow and temperature Mixing valve presenting two handles for the control of hot and cold water Mixing valve presenting one handle for the control of water flow and temperature. Mixing valve that allow setting the temperature and the flow of the mixed water at constant values, set by the user or pre-set, through the control of one or two handles. Special versions are available where the temperature is controlled only. The desired temperature is maintained in spite of temperature or pressure variation in the pipes.

Feature	Product	Definition
Manual mechanisms for the control of flow rate and/or temperature	Diverter	Feature that allows the user to select between a discrete number of water flow modes. It can be manual or automatic (automatic diverters switch back to a certain mode when water flow is shut. Typical application is bath/shower diverter).
	Two-stage valves with brakes	Valves where more water is delivered after a mechanical barrier is overcome. These are also known as click-cartridges
	Two-stage valves with automatic diverter	Valves that automatically return to a position with lower flow when released
Automatic mechanisms for the flow rate control (self-closing devices)	Push tap	Tap that starts delivering water after a mechanical operation from the user and that automatically stops the flow after a set delay time or a certain volume is delivered. Flow and temperature of the water can be pre-set or adjustable by the user.
	Sensor tap	Tap that starts automatically delivering water when a movement is detected by a sensor and that terminates after a set delay time or a certain volume is delivered. Flow and temperature of the water can be pre-set or adjustable by the user.

Feature	Product	Definition
Installation	Single-hole mixing valve (or mono-bloc valve)	Deck mounted mixing valve that needs one mounting hole
	Two/three-hole mixing valve	Deck mounted mixing valve that needs two/three mounting holes.
	Wall mounted mixing valve	Mixing valve which is connected to piping coming out from a wall.
	Concealed valve	Valve which is installed into the wall. Only controls and outlet(s) are visible.
Application and design	Kitchen taps	Tap/valve installed in kitchen sinks
	Washbasin tap/valve	Tap/valve installed in washbasins
	Bidet tap/valve	Tap/valve installed in bidets
	Bathtub tap/valve	Tap/valve which releases water to a bathtub.
	Shower tap/valve	Tap/valve which provides water to a shower systems
	Bathtub/Shower valve	Tap/valve which can either release water to a bathtub directly or to shower outlets through hoses.
	Outdoor tap/valve	Tap/valve installed for outdoor applications (e.g. gardening)

- **Shower valve** means a **valve** controlling the **release of water** in shower systems
- **Shower outlet** means:
 - a. a **fixed overhead** or **side shower outlet, body jet shower outlet** or similar device which may be adjustable and which directs water from a supply system onto the user or
 - b. a **moveable hand held shower outlet** which is connected to a tap with a **shower hose** and can be hung directly on the tap or on the wall with the aid of an appropriate support
- **Shower system**, also referred to as **shower**, means the **combination of shower outlets** and **interrelated control valves** and/or devices

Feature	Product	Definition
Type of outlet	Showerhead	Outlet that is fixed above the head. Generally used to indicate both hand showers and showerheads.
	Hand shower (or shower handset)	Outlets that are movable and connected to flexible hoses.
	Body spray/jet	Outlet that is fixed on a vertical surface.
Configuration	Shower column	Self-standing equipment that includes a wall mounted shower mixer and a showerhead, connected with a pipe. It may also present a hand shower and/or additional outlets.
	Shower panel	Self-standing equipment that may include more than one shower outlet and body jets mounted on a vertical plate.
	Wall mounted shower	Shower systems where valve and delivery systems are installed on the wall.
	Concealed shower	Shower system where valve and delivery systems are installed into the wall. Only controls and outlet(s) are visible.
	Bath/shower mixer	Shower system where the valve can either release water to a shower outlet or to a bathtub.
Related accessories	Slide bar	Bar fixed in the wall for the movement of the outlet support.
	Shower cabin	Unit with rigid plastic/glass walls to provide a watertight compartment.
	Shower tray	Horizontal equipment that welcomes the user during the shower and that allows water to be drained.

Classifications according to 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).
- **Inclusion of pillar taps**
- No clear category for **shower outlets**
- **See Task 2**

Definitions and classifications according to:

- **International standards** (e.g. EN 200:2008, EN 1112:2008, EN 13904:2003, BS 6100-7)
- **Labelling schemes** (e.g. EU Ecolabel and GPP criteria for sanitary tapware)

Measurement methods and standards

Main standards

- **EN 200:2008** Sanitary tapware – Single taps and combination taps for water supply systems of type 1 and type
- **EN 1112:2008** Sanitary tapware – Shower outlets for sanitary tapware for water supply systems of type 1 and type 2

Water supply system	Class	Flow rate in L/min	
		Taps	Shower outlets
Type 1	ZZ	-	1.5-7.2
	Z	≤ 9	7.2-12
	A	≤ 15.0	12-15
	S	≤ 20	15-20
	B	≤ 25	20-25
	C	≤ 30	25-30
	D	≤ 38	30-38
Type 2	X	≤ 7.5	-
	Y	≤ 15	-
	R	≤ 7.5 hot and ≤ 4.2 cold	-
	E	-	3.6-8.4
	H	-	> 8.4

Minimum flow rates in L/min to be tested for different applications

Supply system	Application	Type 1	Type2
Single taps	Basin, bidet	12	7.5
	Bath	19	15
Combination taps	Basin, bidet, sink (water saving)	4-9	3-6
	Basin, bidet, sink, shower	12	7.5
	Bath	19	15

Examples of standards/methods for water/energy efficiency

- **Swedish standards SS 820000 and SS 820001** ⇒ methods for temperature measurement, flow distribution and rinsing ability

New standards, mandates or revision planned of interest at EU level

- Standards such as **EN 246** (flow rate regulators), **EN 200** (specification for taps), **EN 817** (mechanical mix valves), **EN 15091** (electronic automatic taps), **EN 1111** (thermostatic mix valves), **EN 1287** (low pressure thermostatic mix valves) planned to be revised and updated
- **CEIR** has been developing a **pre-normative method for showerhead 'efficiency' or cleanability rating test.**
- **Others?**

Legislation

Water Framework Directive and Water Blueprint

- COM(2012)673 a Blueprint to Safeguard Europe's Water Resources , a strategy for ensuring that enough good quality water is available

Ecodesing and Energy labelling

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

Voluntary labelling schemes at European level

- **EU Ecolabel** and GPP criteria for sanitary tapware (published in 2013):
2 EU Ecolabel licences granted at February 2014

Key labelling schemes for resource efficiency

- **ANQIP label**
- **European Water Label**
- **Swedish Energy Efficiency Labelling**
- **Swiss Energy Label for Sanitary fittings**
- **Water Efficiency Label**

Product registered under Water Label scheme (Sep 2013)

Flow rate (L/min)	Basin taps		Shower controls		Shower handset		Kitchen taps	
	Number	%	Number	%	Number	%	Number	%
< 6	364	87.9	197	58.5	38	28.6	13	81.3
6-8	34	8.2	76	22.6	44	33.1	1	6.3
8-10	9	2.2	16	4.7	21	15.8	0	0.0
10-13	0	0.0	48	14.2	30	22.6	2	12.5
>13	7	1.7	0	0.0	0	0.0	0	0.0
total	414	100	337	100	133	100	16	100

PRODUCT	ANQIP Label						
	A++	A+	A	B	C	D	E
Bathroom tap	0	1	2	4	0	0	0
Kitchen tap	0	0	1	0	0	0	0
Showerheads	0	2	20	24	13	5	1
Showers	0	7	213	0	2	0	0
Flushing cisterns	8	8	118	8	0	0	0
Urinal flushing valves	1	0	0	0	0	0	0
Flow restrictors (aerators, etc.)	53 (only certification, with drawing of graphs pressure/flow, to allow proper selection by the consumer. No label is assigned by letters).						
Compact products for reuse of greywater in buildings	2 (only certification, with verification of sanitary security of compact products with wash-basin/toilet. No label is assigned by letters.)						

Product registered under ANQIP Label scheme (Jan 2014)

Other examples of legislation of use of resources from T&S

- Catalanian "VERDE" label for water saving products,
- Requirements for **max/min flow** provided in old Danish and Norwegian standards
- **National Building Code of Finland**
- Many **Spanish Communities** have adopted several generic laws to save water.
- **Building Regulation and Water Supply** (Water Fittings) **Regulation** in the **UK**. All new dwellings are subject to a 'whole house' maximum allowable water use calculation.

TASK 2: MARKET ANALYSIS

- EU production and trade volume (official statistics)
- Market and stock data (model)
- Market structure and trends
- Consumer expenditure and base data

1st TWG – 29.10.2013

Suggestions:

- to make **definitions clear** along the report to understand when reference is on **shower valve, outlet** or **system**
- to differentiate between what is actually installed and what is sold because the assumptions made can be accepted for the stock but not for the market
- to consider that the **lifetime** of a **shower outlet** is shorter than the lifetime of a valve

⇒ Included in the new version of the Working document for the 2nd TWG 'Task 2 report: Market (version 2)'

Generic economic data (official statistics)

- Production in EU-27 (1995-2012) (Prodcom, EUR and kg ⇒ **units**)
- Imports/exports from/to third countries (ComExt, EUR and kg ⇒ **units**)
- Sales in EU-27 = Production in EU-27 + imports – exports (EUR/**units**)

Taps and Showers - PRODCOM codes and corresponding 2012 CN codes

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)

Taps and shower valves are included in these categories

Pillar taps are included in CN 8481 8019

For **shower outlets** is difficult to identify a clear category

EU Production (1)

- All products reported in **PRODCOM** refer to **valves (taps and shower valves)** included within the scope of the project, including **pillar taps**. **Shower outlets** are **excluded** from these statistics
- The **ratio** between **taps** and **shower valves** is **3:1** (in terms of units).
- The **share** of **taps** and **showers (or shower system)** sold (in terms of units) and/or installed in **domestic premises** represents **90%** of the market and the remaining part (**10%**) is sold and/or installed in **non-domestic premises**

EU Production (2)

- The **ratio** between **taps** and **shower valves** is **3:1** for the **domestic sector** and **30:1** for the **non-domestic sector** (both in terms of units).
- The resulting **ratio** between **taps** and **shower valves** in the **overall market** is **5.7:1**.
- The **number** of **shower outlets** can be estimated considering the **average shower valves** and **outlets lifetime** in the domestic and non-domestic sector. The ratio between shower outlets and shower valves is therefore **1:1.6** (in terms of units).

A **shower** (or **shower system**) is **composed** by a **shower valve** and a **shower outlet**.

Based on feedback from stakeholders

Product	Average weight (kg/product)	Weight range (kg/product)	
		Min	Max
Taps	Basin mixer: 1kg	0.5 kg for a basin pillar tap	4 kg for a thermostatic bath/shower mixer
	Bath/shower mixer: 2.5kg		
	1.8 kg in a global retailer	1.2	3.5
	1.7 kg based on information received from stakeholders	1.3 based on information received from stakeholders	2.1 based on information received from stakeholders
Shower panels and columns	Shower panel: 10 kg Shower column: 4 kg	3	15
Shower outlets	100 mm plastic hand shower: 0.4 kg 150 mm metallic showerhead: 1.5kg	0.1 kg basic plastic hand shower	10 kg for a 500mm x 250mm showerhead

Assumptions

- The **average weight** of **taps** and **shower outlets** is evaluated as **average** of the **provided data**
- **Shower systems** are made of a **shower valve** and of a **shower outlet**. **Thermostatic valves** are installed in **50%** of the shower systems and **mechanical mixing valves** in the other **50%**.

Product	Average product (kg)	Min (kg)	Max (kg)	Calculated variation on average weight	
Tap	1.8	0.5	4.0	-21%	+36%
Shower valve	2.9	1.8	4.0	-11%	+11%
Shower outlet	1.0	0.1	10.0	-26%	+264%
Shower system	3.9	1.9	14.0	-15%	+76%

Split between taps and showers

- **Taps: 85%** of the total sold units - **78%** of the total sold volume in weight
- **Shower valves: 15%** of the total sold units - **22%** of the total sold volume in weight

Estimated production (in 2012):

- **173 millions of taps, 30 millions of shower valves and 48 millions of shower outlets**

EU trade

Total value

- **Other Valves (CN 8481 8019)** - largest importers/exporters
- **Mixing Valves (CN 8481 8011)** - largest importers/exporters

The same assumptions made for the production volume have been applied to the evaluation of imports and exports of taps and showers



Estimated trade (in 2012):

- **Import** ⇒ **84 millions of taps, 15 millions of shower valves and 23 millions of shower outlets**
- **Export** ⇒ **66 millions of taps, 12 millions of shower valves and 18 millions of shower outlets**

Intra-EU Trade and Extra-EU Trade

EU sales and trade

Half than in previous calculations
for EU Ecolabel and GPP

	Year	Population	Taps (M units)	Shower valves (M units)	Shower outlets (M units)	Ratio Taps to Shower valves	Ratio Shower valves to Shower outlets
France	2012	65,327,724	8.5*	1.7*	7.6*	4.9	4.4
UK	2012	63,456,584	7*	2.3*		3.0	
Germany*	2012	81,843,743	-	3.8*			
EU27 - scale up	2012	502,623,021	60	19	58	3.2	3.1
EU27 apparent consumption (EU statistics)	2012	502,623,021	191	33	53	5.8	1.6
% compared to EU27 apparent consumption (EU statistics)	2012	100%	32%	57%	110%		

- **Apparent consumption variation** considering weight
- **Lower average weights** ⇒ *apparent consumption from statistics vs. results of the scale-up* decreases **from 3.2 to 2.4 for taps** and from **1.8 to 1.6 for shower valves**

Market and stock data (model)

Installed stock and penetration rate

⇒ *Domestic stock*

Assumptions

- According to Eurostat, **houses** form **60%** of all dwellings across the EU27 and **apartments** the **remaining 40%**. This parameter has been considered constant over EU27 and time
- **4.5 taps** and **1.5 showers (shower systems)** per **apartment** and **5.5 taps** and **1.83 showers (or shower systems)** per **house** are installed on average in the EU27. The **ratio** between **taps** and **showers (shower systems)** is thus **3:1**
- The **growth factor** for domestic and non-domestic dwellings has been based on the **population increase rate** ⇒ the domestic and non-domestic dwellings will increase, cumulatively, by almost **4%** from 2010 to 2030

⇒ *Non-domestic stock*

Business

- **100% of private businesses** provide **showering** to employees
- **1 shower per 100 employees** is present in all cat. of companies
- Separate showers are provided for male and female employees
- The **ratio between taps and showers (shower system)** is equal to **30:1**
- An additional **20% of employees work in public administrations**

Healthcare

- **1 bathroom** with **1 tap every bed** (average across all MSs)
- **1 shower every 4 beds** (average across all MSs)
- **1 kitchen tap every 75 beds** (average across all MSs)

Tourism

- For **50% of beds**, **1 bathroom** with **1 tap and 1 shower**
- For the other **50% of beds**, **1 bathroom** with **1 tap and 1 shower every 2 beds**
- **1 kitchen taps every 100 beds**

Education

- **1 tap, 1 shower and 1 kitchen tap every 100 student/pupils**

Taps and Showers (**shower systems**) stock

- **domestic/non-domestic: growth (2010-2050) +5%**
- **non-domestic sector: 6% of domestic**

Annual sales

- Frequency of substitution = $1/\text{average lifetime of the product}$
- Annual sales = product installed x frequency of substitution

	Domestic dwellings	Non-domestic sector
	Average life time in years (min-max)	Average life time in years (min-max)
Taps and shower valves	16 (3-50)	10 (5-20)
Shower outlets	10 (2-30)	7 (5-15)

Taps, shower valves and shower outlets sales

- **domestic/non-domestic: growth (2010-2050) +3-4.4%**
- **non-domestic sector: 8.5-9% of domestic**



Results of the analysis		Taps (2012)	Shower valves (2012)	Shower outlets (2012)
Stock of taps (M units)	Domestic	1,197	399	399
	Non Domestic	71	24	24
	Total	1,268	423	423
Sales (M units)	Domestic	75	25	40
	Non Domestic	7	2	3
	Total	82	27	43
Apparent consumption (M units)				
(scale-up)		60	19	58
(EU statistics)		191	33	53
Average lifetime (years)	Domestic	16	16	10
	Non domestic	10	10	7
	Total			
	• from stock and total sales	15.5	15.5	9.8
	• under the assumption that 90% is domestic	13.9	13.9	8.8

▪ **Share of non-domestic stock and sales <10%**

- ⇒ **apparent consumption** based on official statistics would yield halved lifetimes for all taps
- ⇒ **For shower valves and outlets: estimation** based on official statistics would yield a life time lower than **23-24%** (12 years vs 15.5 for shower valves and 7.5 years vs 9.8 for shower outlets). **The model appears enough accurate**

Market structure

Consumers expenditure base data

Design feature	Kitchen taps	Bathroom taps	Shower valves	Shower outlets
	Range in EUR (median)	Range in EUR (median)	Range in EUR (median)	Range in EUR (median)
Single control mixer	10-500 (35-100)	15-500 (35-65)	15-300 (35-65)	
Double-handle mixer				
• Spindle	10-500 (35-50)	20-150 (35-50)	20-150 (35-50)	
• Ceramic discs	10-500 (35-100)	15-500 (35-65)	15-300 (35-65)	
Pillar taps (pair)		10-150 (20-50)		
Thermostatic mixer	25-800 (60-200), not common	25-800 (60-200), not common	25-800 (60-200)	
Self-closing tap (mechanical)	30-300 (50-120), not common	30-300 (50-120)	30-700 (50-120), varying from valve to complete shower column	
Infra-red sensor tap	100-600 (185-250)	100-600 (185-250)	100-600 (185-250)	
Industrial kitchen tap	150-300 (150)			
Hand shower				5-150 (40)
Shower head				20-200 (100)

Note:

Average prices:

1. Conventional tap/valve: 75 (50-100) EUR
2. Thermostatic valve: 200 EUR
3. Taps with diverters: 100 EUR
4. Two-stage taps: 180 EUR
5. Push tap: 150 EUR
6. Sensor tap: 375 EUR
7. Shower outlet: 70 (40-100) EUR

Domestic	Installation cost (EUR)	Maintenance and repair (EUR)	Frequency of maintenance and repair	Disposal (EUR)
Kitchen taps • Domestic • Non-domestic	Up to 150, A large proportion of consumers are able to install, maintain and make small repairs.	Up to 100	Seldom, product is usually replaced in the domestic sector, reparation costs are more relevant for the non-domestic sector	Free of charge (or even remunerated)
Bathroom taps • Domestic • Non-domestic	Up to 150, A large proportion of consumers are able to install, maintain and make small repairs.	Up to 100	Seldom, product is usually replaced in the domestic sector, reparation costs are more relevant for the non-domestic sector (maintenance every 2-5 years)	Free of charge (or even remunerated)
Shower valves and/or outlets • Domestic • Non-domestic	Up to 150, A large proportion of consumers are able to install, maintain and make small repairs.	Up to 100	Seldom, product is usually replaced in the domestic sector, reparation costs are more relevant for the non-domestic sector (maintenance every 2-5 years)	Free of charge (or even remunerated)
Outdoor taps • Domestic • Non-domestic	Up to 150, A large proportion of consumers are able to install, maintain and make small repairs.	Up to 100	Seldom, product is usually replaced in the domestic sector, reparation costs are more relevant for the non-domestic sector (maintenance every 2-5 years)	Free of charge (or even remunerated)

Notes:

- 1. Average installation, maintenance and repair costs for taps/valves installed in the domestic sector: 75 EUR (over the average lifetime)**
- 2. Average installation, maintenance and repair costs for shower installed in the domestic sector: 75 EUR (over the average lifetime)**
- 3. Average installation, maintenance and repair costs for taps/valves installed in the non-domestic sector: $75 + 50 \times 10 / 3.5$ EUR (over the average lifetime)**
- 4. Average installation, maintenance and repair costs for shower installed in the non-domestic sector: $75 + 50 \times 10 / 3.5$ EUR (over the average lifetime)**



Typical spare parts replaced in taps, shower valves and shower outlets		Cost (EUR)	Product of appliance	Frequency of replacement
Aerators	Single unit	5-10	Any tap with a threaded spout	Seldom (it may be once every 3-5 years). This is due to wear and it depends on the water quality. Customers might change aerator to change the flow pattern.
Ceramic disc cartridges	Single unit	40-50 for thermostatic valves, 20 for other valves	Mainly thermostatic and single control valves	Seldom (it may be once every 5-10 years). Usually the entire product is replaced.
Compression valves	Pair	25	Spindle taps	Seldom (it may be once every 3-10 years). Usually the entire product is replaced.
	Single unit	5		
Hoses	Single unit	5 if in plastic, 15 if in metal	Shower systems	Seldom (it may be once every 2-5 years)
O-Rings	Box of mixed o rings for taps (approx. 115)	10	All valves	Seldom (it may be once every 5-10 years)
	Single unit	0.2		
Tap heads	Single unit	10-40	Mainly Pillar taps, two handle valves and thermostatic valves	Seldom (it maybe be once every 5-10 years). Usually the entire product is replaced
Washers	Box of mixed washers for taps (approx. 80)	10	All valves and shower outlets	Seldom (it may be every 5 years)

Note:
Costs refer to component only without considering the price of repair and maintenance. Cost of spare parts considered for conventional products.

Discussion areas

1. Technical definitions and classification
2. Standards and measurement methods
3. Resource efficiency labels
4. Costs of products

Study overview

Task 1: Product group definition and scope, standards and legislation,

Task 2: Market analysis

Task 3: User behaviour and system aspects

Task 4: Technologies

Task 5: Environmental and economic assessment

Task 6: Design options

Task 7: Policy scenarios analysis

TASK 3: USERS AND SYSTEM ASPECTS

- Water and energy use in taps and showers
- Water and energy saving potential

Urban water consumption

- 60.7 billion m³/yr (FAO, 2008-2012), 17-25% of total abstraction
- Demographic and economic trends to increased use
- Different uses and differences across the EU (507 M persons)
- Domestic: 150 L delivered/p/d (EUREAU)
- Non-domestic: 50 L delivered/p/d (EUREAU)
- Water loss: 10-50%, 24% on average
- General consistency between EUREAU, FAO and EEA

Water and energy use in taps and showers

- Aim: EU average for domestic and non domestic sectors (2012)
- Domestic: based on 4 geographical zones
- Non-domestic: based on split between different uses
- Water → Hot water → Energy
- Tier 1: demand at the end-product (no losses)
- Tier 2: system aspects included

Water use at EU level

Domestic

- Total: 147.4 L/p/d (EUREAU: 149 L/p/d)
- 60% = taps and showers (88 L/p/d)
- 33% out of 60% = showering and bathing (93 : 7)
- Qualitatively similar results in the literature, limited uncertainty

Non-domestic

- Less information available
- EUREAU: 50 L/p/d
- 21.1% taps (2.8-37%)
- 3.7% showers (0.5-6.7%)

Water use in taps and showers – Tier 1

Taps

- Domestic: 8060 Mm³/yr
- Non-domestic: 2086 Mm³/yr

Shower systems

- Domestic: 8348 Mm³/yr
- Non-domestic: 363 Mm³/yr

Total: 12% non-domestic, 45% shower systems

Tier 2: → Water distribution loss: 24% (10-50%)

Hot water from taps and showers

- At domestic outlets: 51.7 L/p/d, about 60% of tot. from T&S
- At domestic boilers: 25.9 L/p/d, about 30% of tot. from T&S
- Plausible and consistent estimation (VHK Lot2, Swedish Energy Agency, stakeholders)
- Breakdown:
 - 79% showers
 - 8% washbasin taps
 - 6% bathing
 - 5% dishwashing
 - 2% cloth washing
- Non-domestic: hot water about 50% of total (70% in taps)

Energy use in taps and showers – Tier 1

Taps

- Domestic: 176.4 PJ/yr
- Non-domestic: 69.9 PJ/yr

Showers

- Domestic: 726.6 PJ/yr
- Non-domestic: 31.5 PJ/yr

Total:

- 10% non-domestic (contribution for water: 12%)
- 75% showers (contribution for water: 45%)

Tier 2 – Inclusion of system aspects

- Heating systems: summary of VHK Lot2 Ecodesign study
- Mix of energy and conversion (energy weighted EU average from Lot2)

Energy mix (total efficiency):

- 40% electricity (72%)
- 40% natural gas (50%)
- 20% oil (52%)

$$\Delta T = T - 15^{\circ}\text{C}$$

- **Water distribution loss: 24%** (10-50%)
- **Water supply: 0.63 kWh electricity per m³** (-25%/+43%).
Abstraction = 50%
- **Wastewater collection and treatment: 1.97 kWh electricity per m³** (-85%/+422%). Mainly treatment

Water consumption – Tier 2

- Total water abstraction for use in taps and showers in the EU28: 24860 Mm³/yr = **40% of total urban water abstraction**
- **87% in the domestic sector** and 13% in the non-domestic sector
- **Domestic:** 21640 Mm³/yr for taps (49%) and showers (51%)
- **Non-domestic:** 3223 Mm³/yr for taps (85%) and showers (15%)

Energy consumption – Tier 2

- **Total system energy demand** (= electricity + heat) associated to the use of water in taps and showers is 1890 PJ/yr
- **90% in the domestic** and 10% in the non-domestic sector
- **Domestic:** 1693 PJ/yr for taps (22%) and showers (78%)
- **Non-domestic:** 196 PJ/yr for taps (71%) and showers (29%)
- **Energy contributions:**
 - *Hot water: 46-55%*
 - *Water heating efficiency: 32-38%*
 - *Wastewater treatment: 5-15%*
 - *Water abstraction and delivery: 2-7%*
- **System primary energy*** = 1.62 times higher
(*) 1 e.u. of electricity = 2.5 e.u. of primary energy

Water and energy saving potential

Saving potential = f(technology; user behaviour)

	Volume of water	Wastage of water	Daily frequency
Baths	155-185 L (40% actual)	0-10%	0.2 in the UK
	Time of use	Wastage of water	Daily frequency
Showers	7 min (2.5-12 min)	10% (0-20%)	1 (0.6-1.5)
Washbasin taps	1 min (0.33-2.5 min)	10% (0-50%)	5 (3-7)
Kitchen taps	1 min (0.5-2.5 min)	10% (0-20%)	5 (3-7)

	Baseline (real flow rates)	Min	Max
Baths	185 L (50% actual)	155 L (40% actual)	200 L (60% actual)
Showers	10 L/min	6 (9.3) L/min	14 L/min
Washbasin taps	8 L/min	5 (7) L/min	10 L/min
Kitchen taps	8 L/min	5 (7) L/min	11 L/min

Theo potential saving due to immediate flow rate reduction:

- 13-38% for taps → 11-32% (21% as average) considering prolonged use
- 7-40% for showers → 6-34% (20% as average) considering prolonged use

Bonus for implementing NEW water/energy saving devices:

- +5%
- Applicable to 30-60% of domestic products
- Applicable to 45-90% of non-domestic products

Corrected water saving potential:

- 23% (12-35%) for domestic taps
- 24% (13-39%) for non-domestic taps
- 22% (7-37%) for domestic shower systems
- 23% (9-39%) for non-domestic shower systems

Effectiveness factor:

- 35% of water use in taps (bathroom + dishwashing by hands)
- 100% of water use in shower systems
- Hp. No switch from bathing to showering

Penetration factor:

- 60% for domestic products
- 90% for non-domestic products

EU average water/energy saving potential:

- 5% (4-12%) for water used in domestic taps
- 8% (4-14%) for water used in non-domestic taps
- 13% (7-37%) for water used in domestic showers
- 21% (9-39%) for water used in non-domestic showers
- **Stakeholders:** 20-50% saving achievable for 20% of taps and 45% of showers → 4-10% for taps and 9-22.5% for showers
- **Public buildings** in Loire Bretagne (France): 0-30%

Total EU28 **water saving potential** from taps and showers:

- 2300 Mm³/year (**87% domestic**, 13% non-domestic)
- **10%** of the total water abstraction for **taps and showers**
- **5%** of the total water abstraction for **urban use**
- Variation range: from 59% to 248%

Total EU28 **primary energy saving potential**:

- 336 PJ/year in Tier 2 (114 PJ/year in Tier 1)
- **93% domestic sector**, 7% non-domestic
- **11%** of the total system demand of primary energy for **taps and showers**
- Variation range: 88-2145 PJ

Product group	Estimated savings in terms of primary energy ^{a, b} (PJ/yr - %)	% normalised to total without considering taps and showers
System energy demand for taps and showers - upper limit	2145	65%
Electric motors	1215	37%
Domestic Lighting	351	11%
Street & Office Lighting	342	10%
System energy demand for taps and showers - average	336	10%
Standby	315	10%
Fans	306	9%
Televisions	252	8%
Circulators	207	6%
Air conditioners and comfort fans	99	3%
System energy demand for taps and showers - lower limit	88	3%
External power supplies	81	2%
Simple set top boxes	54	2%
Domestic refrigerators	36	1%
Domestic dishwashers	18	1%
Domestic washing machines	14	0%
Total without considering taps and showers	3294	
(a) In-house calculation based on the values reported in http://ec.europa.eu/enterprise/policies/sustainable-business/ecodesign/files/brochure_ecodesign_en.pdf (1 PJ of power considered equivalent to 2.5 PJ of primary energy)		
(b) Estimated at 2020 for product groups different than taps and showers / theoretical saving potential for taps and showers		

TASK 4: ANALYSIS OF TECHNOLOGIES

- Conventional and water/energy saving technologies
- Technical, economic and market elements
- Production, use, end-of-life

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
- **Innovations** in technology for taps and showers are on average introduced **every 2-10 years** and stay on the market **for 10-40 years**
- **Increasing number of water/energy-efficient** taps and showers

Water/Energy saving technologies

List of **technologies/features**:

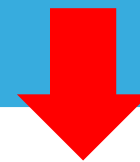
1. Flow and spray pattern design, aerators and flow regulators
2. Diverters (flow-switch options)
3. Automatic taps (Sensor + push taps)
4. Two- stage taps
5. Thermostatic valves
6. **Water meters**
7. Hot-water limiters

Flow rate: variable

Significant **saving potential** for all options

Payback time usually << lifetime for the product





Product	Cost increase (EUR)	Water and energy saving	Payback time (years)
Conventional taps – domestic	reference	0%	-
- Aerators	5-10	5-15%	1.0-5.9
- Flow regulators	5-10	15-32%	0.5-5.9
- Taps with diverters	18.5	12-35%	1.6-4.6
- Two-stage taps	40.0	12-35%	3.4-9.9
- Water meters	10-100	3-10%	3.0-99.0
Conventional taps – non domestic	reference	0%	-
- Push tap	18.0	13-39%	0.3-0.8
- Sensor tap	150.0	13-39%	2.3-7.0
Conventional showers – domestic	reference	0%	-
- Thermostatic mixers	62.5	7-37%	0.4-2.1
- Other water saving showers	25.0	7-37%	1.0-5.2
- Water meters	10-100	3-10%	0.6-19.2

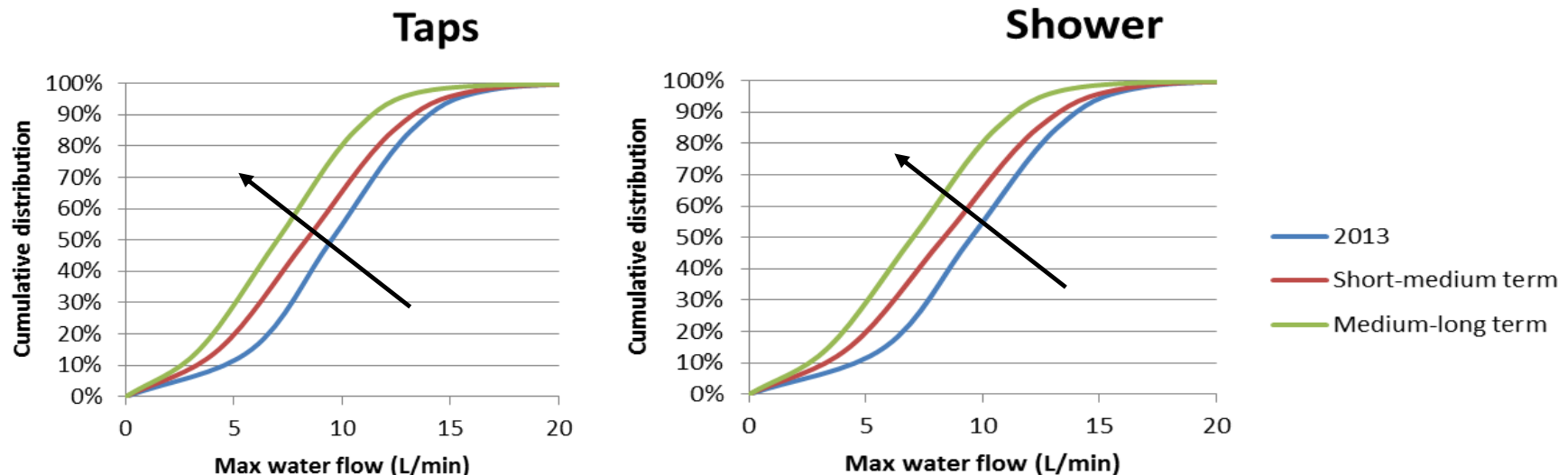
Technology penetration in terms of water flow rate (1)

- Key information but **limited information**
- **Different levels of performance** on the market
- **Statistics** from existing water label schemes (Water Label, ANQIP)
- **Consultation with stakeholder** for filling the gap

Technology penetration in terms of water flow rate (2)

Key input to Task 7

Product	Average maximal flow rate (and standard deviation) in L/min			Theoretical Limit (L/min)
	Today	Short/medium term	Medium/long term	
Taps	9.5 (3.7)	8.3 (4.0)	7.0 (3.6)	5.0
Showers	12 (2.0)	10.8 (1.6)	9.3 (2.1)	6.0



Expected trends and innovations (1)

- Product **size** reduction and increased importance of **water and energy savings** technologies
- Increase importance of **wellness** together with water saving.
- Increase **penetration of automatic valves** in private households and extending the battery life up to 10 years
- Increase penetration of **electronics**;
- Increase penetration of **thermostatic valves**;
- Integration of a flow switch element in the **aerator** and improved system for cleaning and change;
- Selection of **materials** that ensure the respect of hygiene quality standards.

Expected trends and innovations (2)

Shower systems, domestic

- increased use of thermostatic valves: 25-50%→55-60%→60-90%

Shower systems, non-domestic

- increased use of self-closing valves: 5%→25%→50%

Taps, domestic

- increased use of self-closing valves: 1%→2.5-5%→5-10%

Taps, non-domestic

- increased use of self-closing valves: 5%→25%→50%

Production - Materials

- 90-99% of the **taps mostly made of brass**, with chrome plating as metal finishing. Unlikely to change in the short to medium term.
- Other materials can play a more important but still limited role in some countries (stainless steel, Zinc-Al alloys, plastic)
- **Shower valves** mostly based on **brass** but higher relevance of plastics
Plastics used considerably more in **showerheads and hand showers** (up to 70-89% of the end product)
- Other materials: **brass** (more limited use of stainless steel)
- Scenarios for the coming year should not change significantly, although the **use of plastic could increase** in the future.

Bill-of-Materials of example products

- Examples of data on **material composition and weight** of taps and showerheads provided by manufacturers.
- **Selected examples** for domestic and/or non-domestic applications
- **Average BoM for typical products, normalised** to weights for T2
- **Taps:** brass tap
- **Shower systems:** brass tap + brass/plastic outlet
- Used in Tasks 5/6

Installation, use and maintenance

- **Typical lifetimes:**
 - *Domestic: 16 years for valves and 10 years for shower outlets*
 - *Non-domestic: 10 years for valves and 7 years for shower outlets*
- **Installation and maintenance varies** for all products and can have influence on **durability**
- Importance of **product cleaning and lime removal**
- **Very few replacements** of parts, some by the users others through intervention of the plumber

End-of-life practices

- **Usually collected by installers and recycled**, due to the value of their metal content (indicatively 90-95%)
- **Metals and alloys** can be extensively recycled
- No existence of major barriers
- Recovery of metals should be efficient also in case the product is collected and disposed by municipal services
- **Plastic components** usually disposed as municipal solid waste.
- Disposal costs, if any, are minimal (money return likely)

Identification of technical options for environmental assessment

Technical option(s)	
Typical product (T4)	- Brass tap - Shower (mixer + showerhead)
Weight/materials (T4)	- Average - Brass valve, Brass/plastic shower outlet
Use (T3)	- Domestic / Non-domestic
Water/energy consumption (T3)	- System aspects - En mix for water heating - Water/energy saving
Lifespan (T2)	- Typical durability

Domestic taps:

- Taps with diverters
- Two-stage taps

Non-domestic taps:

- Push taps
- Sensor taps

Domestic shower systems:

- Thermostatic mixers
- Other water saving showers

Discussion areas for Tasks 3 and 4

1. Water/energy saving
2. Information on technologies (types, costs, water/energy saving potentials)
3. Products on the market in terms of water consumption / technology

#1. Water and energy saving potential

Saving potential = f(technology; user behaviour)

	Volume of water	Wastage of water	Daily frequency
Baths	155-185 L (40% actual)	0-10%	0.2 in the UK
	Time of use	Wastage of water	Daily frequency
Showers	7 min (2.5-12 min)	10% (0-20%)	1 (0.6-1.5)
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- 13-38% for taps → 11-32% (21% as average) considering prolonged use
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- +5%
- Applicable to 30-60% of domestic products
- Applicable to 45-90% of non-domestic products

Corrected water saving potential:

- 23% (12-35%) for domestic taps
- 24% (13-39%) for non-domestic taps
- 22% (7-37%) for domestic shower systems
- 23% (9-39%) for non-domestic shower systems

Effectiveness factor:

- 35% of water use in taps (bathroom + dishwashing by hands)
- 100% of water use in shower systems
- Hp. No switch from bathing to showering

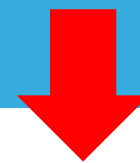
Penetration factor:

- 60% for domestic products
- 90% for non-domestic products

EU average water/energy saving potential:

- 5% (4-12%) for water used in domestic taps
- 8% (4-14%) for water used in non-domestic taps
- 13% (7-37%) for water used in domestic showers
- 21% (9-39%) for water used in non-domestic showers
- **Stakeholders:** 20-50% saving achievable for 20% of taps and 45% of showers → 4-10% for taps and 9-22.5% for showers
- **Public buildings** in Loire Bretagne (France): 0-30%

#2. Info on key technologies

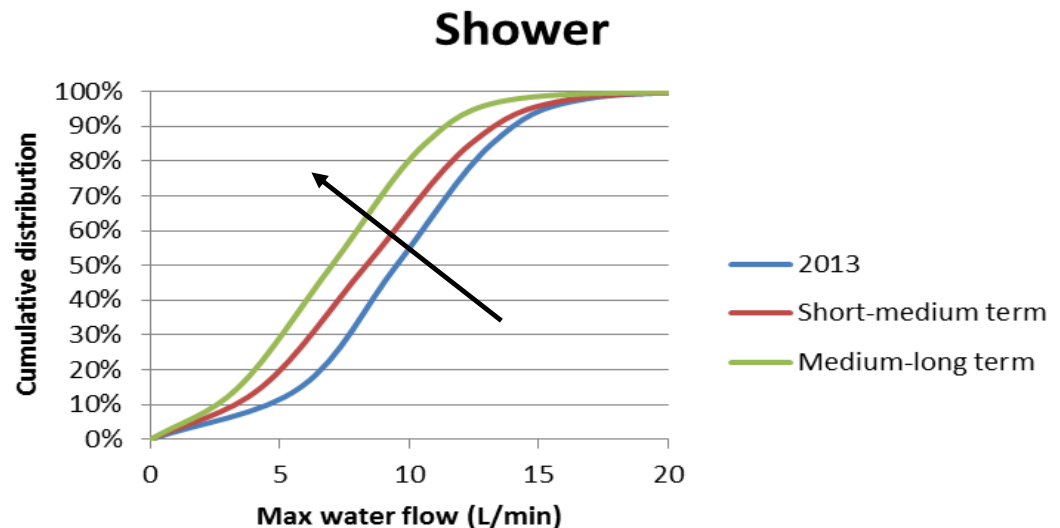
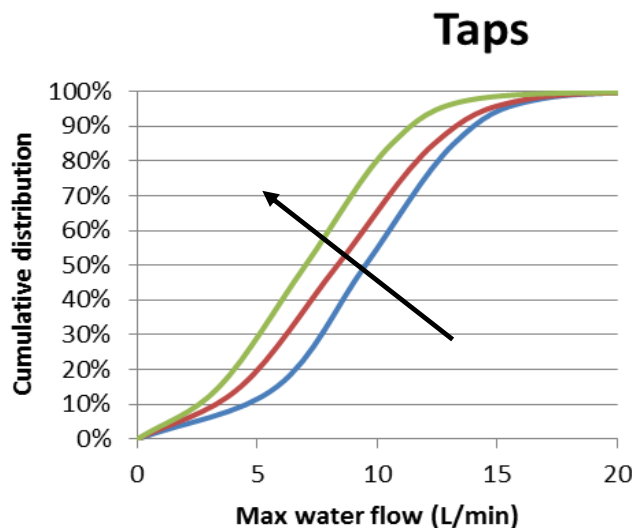


Product	Cost increase (EUR)	Water and energy saving	Payback time (years)
Conventional taps – domestic	reference	0%	-
- Aerators	5-10	5-15%	1.0-5.9
- Flow regulators	5-10	15-32%	0.5-5.9
- Taps with diverters	18.5	12-35%	1.6-4.6
- Two-stage taps	40.0	12-35%	3.4-9.9
- Water meters	10-100	3-10%	3.0-99.0
Conventional taps – non domestic	reference	0%	-
- Push tap	18.0	13-39%	0.3-0.8
- Sensor tap	150.0	13-39%	2.3-7.0
Conventional showers – domestic	reference	0%	-
- Thermostatic mixers	62.5	7-37%	0.4-2.1
- Other water saving showers	25.0	7-37%	1.0-5.2
- Water meters	10-100	3-10%	0.6-19.2

#3. Technology penetration/distribution in terms of water flow rate

Key input to Task 7

Product	Average maximal flow rate (and standard deviation) in L/min			Theoretical Limit (L/min)
	Today	Short/medium term	Medium/long term	
Taps	9.5 (3.7)	8.3 (4.0)	7.0 (3.6)	5.0
Showers	12 (2.0)	10.8 (1.6)	9.3 (2.1)	6.0



— 2013
— Short-medium term
— Medium-long term

Study overview

Task 1: Product group definition and scope, standards and legislation,

Task 2: Market analysis

Task 3: User behaviour and system aspects

Task 4: Technologies

Task 5: Environmental and economic assessment

Task 6: Design options

Task 7: Policy scenarios analysis

TASK 5: ENVIRONMENTAL AND ECONOMIC ANALYSIS OF BASE CASES

Outline:

- Introduction
- Identification of base cases
- Product specific inputs (for EcoReport tool)
- Environmental impact assessment of base cases
- Economic assessment: Life Cycle Costs of base cases
- EU Totals: Environmental impacts and annual expenditure

Introduction

Environmental impact assessment of base cases

Objective:

To assess environmental and economic impacts associated to different base cases.

Methodology + tool : MEErP 2011 + EcoReport 2011 v 2.06* (Excel tool for the environmental and economic assessment of ErP)

This analysis is based on outputs from:

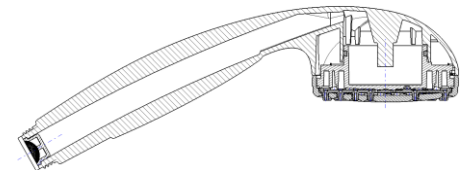
- ✓ Tasks 2 “Market Analysis”
- ✓ Task 3 “Users and System aspects”
- ✓ Task 4 “Analysis of technologies”

NOTE: Results presented next are subject to changes for the final version of the report since EcoReport Tool might be soon upgraded to a new version.

*<http://www.meerp.eu/documents.htm>

Identification of base cases

- ✓ Base cases reflect average EU products.
- ✓ In total four BC have been chosen:
 - **Base case 1:** tap made of brass (average weight) - domestic applications.
 - **Base case 2:** tap made of brass (average weight) - non-domestic applications.
 - **Base case 3:** shower system, including a shower valve with a shower outlet (average weight) - domestic applications.
 - **Base case 4:** shower system, including a shower valve with a shower outlet (average weight) - non-domestic applications.
- ✓ Average consumption of water and energy (Task 2 and 3)
- ✓ Water heating by energy mix (Task 3)



Product specific inputs (for EcoReport tool)

MANUFACTURING OF THE PRODUCT*:

BoM of the BC 1 & BC 2: TAP (Domestic & non-domestic)

Component/ Material		Weight (g)	Lifetime (years)		Material code in EcoReport tool
			Domestic	Non-Domestic	
Brass tap	Body (brass)	1296.1	16	10	32 -CuZn38 cast
	Nickel chrome plating	2.2			41-Cu/Ni/Cr plating
	Plastic materials	79.4			PA6
	Ceramic discs	22.7			Not available (inserted)
	Handle (zinc)	233.3			33 -ZnAl4 cast
	Pressure hoses (plastic)	166.3			8 -PVC
Packaging	Cardboard	607			57 -Cardboard

**Task 2 "Market analysis" and Task 4 "Analysis of technologies"*

Product specific inputs (for EcoReport tool)

MANUFACTURING OF THE PRODUCT*:

BoM of the BC2 & BC3: SHOWER SYSTEM (Domestic & non-domestic)

Component/ Material		Weight (g)	Lifetime (years)		Material code in EcoReport tool
			Domestic	Non-domestic	
Shower valve	Body (brass)	2118.1	16	10	32 -CuZn38 cast
	Nickel chrome plating	1.9			41-Cu/Ni/Cr plating
	Plastic materials	244.5			PA6
	Ceramic discs	30			Not available (inserted)
	Handle (zinc)	336.3			33 -ZnAl4 cast
Shower outlet	Plastic materials	264.5	10	7	11-ABS
	Brass	904.7			32 -CuZn38 cast
Packaging	Plastic (for the outlet)	352.9	10	7	LDPE
	Cardboard (for the valve)	540.4	16	10	57 -Cardboard

*Task 2 and Task 4

Product specific inputs (for EcoReport tool)

DISTRIBUTION PHASE*:

Average volume of the packaged product: 0.0103 m³

USE PHASE:

Energy mix for heating the water**:

- 40% electricity
- 40% natural gas
- 20% oil

In addition, in this phase it is also considered:

- Electricity for water supply
- Electricity for wastewater treatment

**Task 4*

***Task 2 and Task 3*

Product specific inputs (for EcoReport tool)

USE PHASE*: Average demand of water and energy

Parameter	Tap		Shower system	
	Domestic	Non-domestic	Domestic	Non-domestic
Lifetime (years)	16	10	16 for the valve 10 for the outlet	10 for the valve 7 for the outlet
Water abstraction (m3/year per unit of product)	8.9	38.8	27.7	20.0
Electricity for water supply (MJ/yr per unit of product)	21.1	92.2	65.7	47.5
Electricity for wastewater treatment (MJ/yr per unit of product)	47.8	209	149	107
Electricity consumption for hot water (MJ/year per unit of product)	99.6	667.1	1230.5	889.2
Natural gas consumption for hot water (MJ/year per unit of product)	99.6	667.1	1230.5	889.2
Oil consumption for hot water (MJ/year per unit of product)	49.8	333.5	615.3	444.6

*Task 2 and Task 3

Product specific inputs (for EcoReport tool)

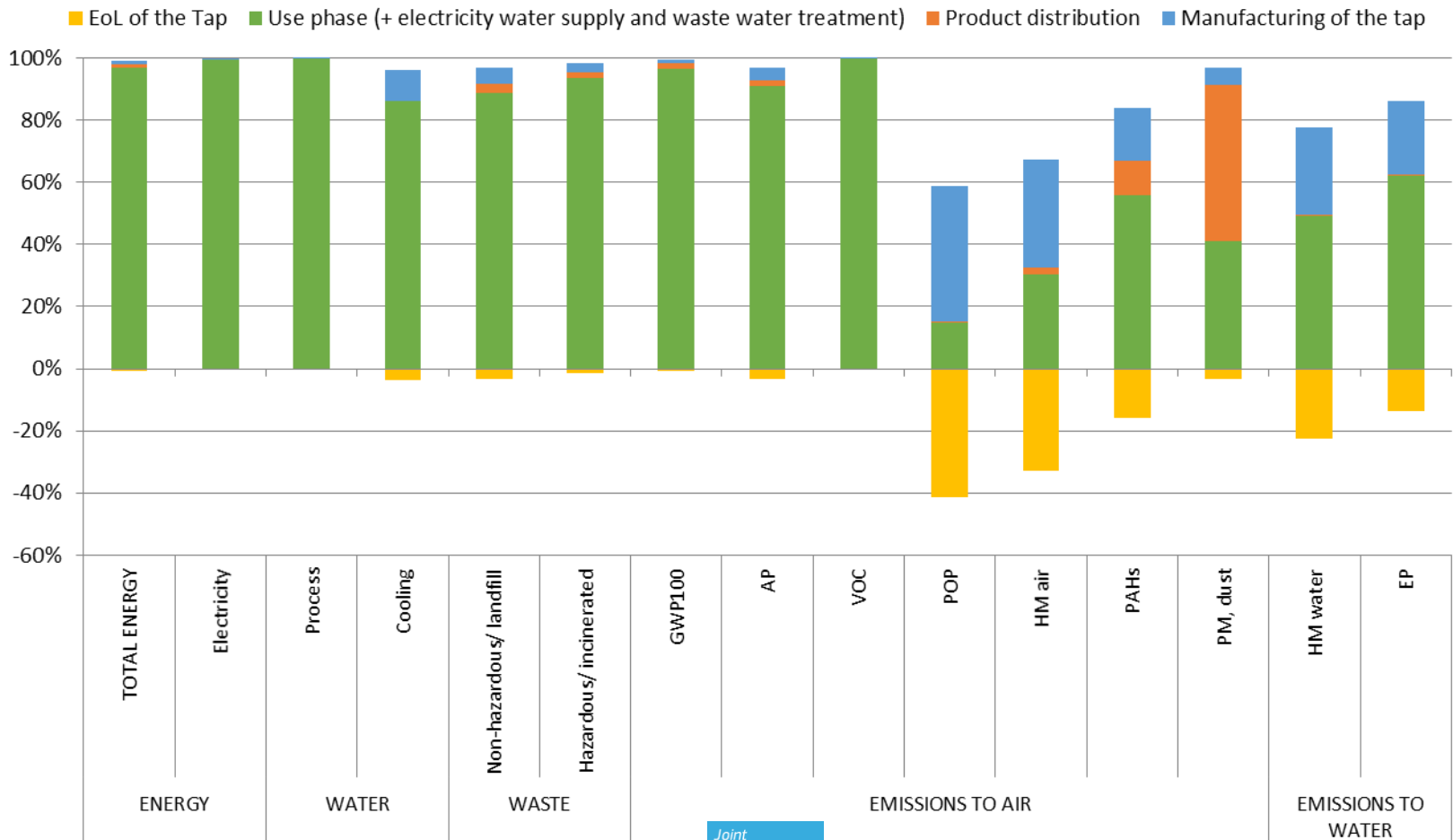
LIFE CYCLE COST*:

Input Parameter	Taps		Shower systems	
	Domestic	Non-domestic	Domestic	Non-domestic
Annual sales (Million units/year)	74.8	7.1	Shower valves: 24.9 Shower outlets: 39.9	Shower valves: 2.4 Shower outlets: 3.4
EU Stock (Million units)	1197	70.8	399	23.9
Typical product price (€)	67.5	67.5	137.5	137.5
Indicative installation costs (€)	75	75	75	75
Indicative maintenance and repair costs (€)	62 (referred to 16 years)	39 (referred to 10 years)	57 (referred to 10 years)	41 (referred to 7 years)
Electricity rate (€/kWh)	0.198			
Fuel rate (Oil-Gas mix) (€/GJ LHV)	19.13			
Water rate (€/m ³)	3.887			

*Task 2 "Market analysis"

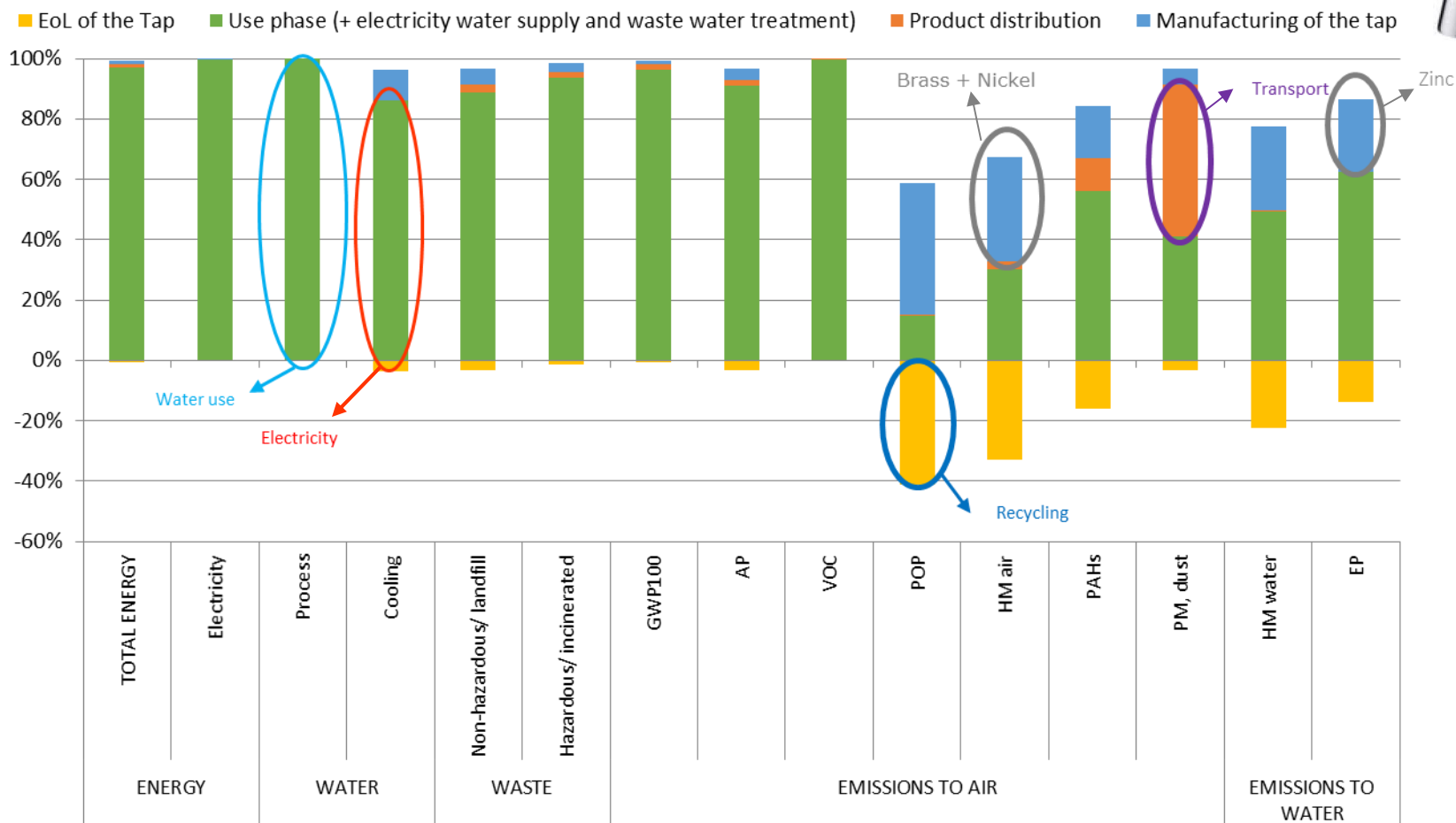
Environmental impact assessment

Base case 1: TAP Domestic
Energy, water and waste - Emissions to Air and Water

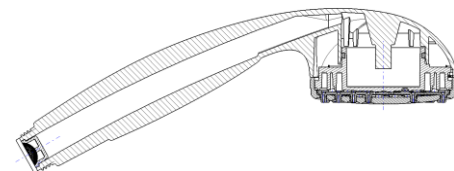


Environmental impact assessment

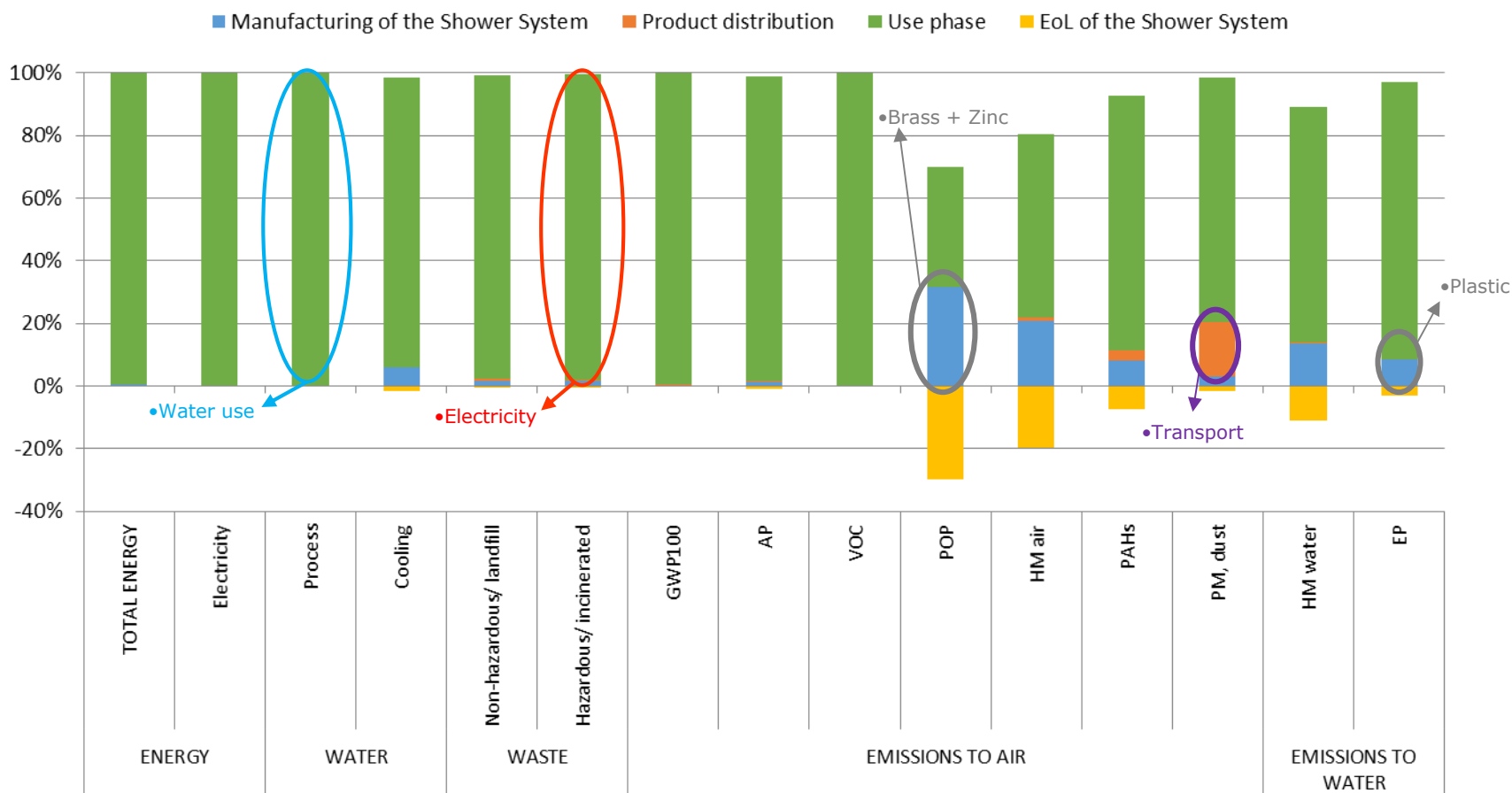
Base case 1: TAP Domestic Energy, water and waste - Emissions to Air and Water



Environmental impact assessment



Base case 3: SHOWER SYSTEM Domestic
Energy, water and waste - Emissions to Air and Water



Environmental impact assessment of base cases

Conclusions

- The **USE PHASE** is the main contributor (>85%) on RESOURCES and WASTE due to:
 - ✓ Electricity for heating the water, for water supply and wastewater treatment and water consumption (Water process).
 - ✓ This phase is also relevant on EMISSIONS TO AIR and WATER (15/100%).
- The **PRODUCTION PHASE** (tap: brass and nickel – shower system: brass and plastic) shows relevant impact on EMISSIONS TO AIR and WATER (5/43%).
- The **DISTRIBUTION PHASE** seems relevant only for PAHs (<11%) and PM (17/50%).
- Credits (avoided impacts) may be associated to the **EoL PHASE** (POPs, HMair, PAHs, HMwater and EP) mainly because of the recycling of materials (-41/-6%).

• Economic assessment: Life Cycle Costs

	TAP				SHOWER SYSTEM			
	Domestic		Non-Domestic		Domestic		Non-Domestic	
Product price	68 €	9%	68 €	3%	138 €	6%	138 €	11%
Installation costs	75 €	10%	75 €	4%	75 €	3%	75 €	6%
Fuels costs for water heating (natural gas + fuel oil)	49 €	6%	207 €	11%	381 €	18%	193 €	16%
Electricity costs for water heating (+ wastewater treatment)	120 €	16%	455 €	24%	740 €	34%	374 €	31%
Water costs*	399 €	52%	1,086 €	56%	776 €	36%	392 €	32%
Repair & maintenance	62 €	8%	39 €	2%	57 €	3%	41 €	3%
Total	772 €		1,930 €		2,166 €		1,213 €	
<i>Lifetime</i>	16		10		10		7	

• Most relevant costs along the lifecycle (for the 4 base cases):

1. Water costs
2. Electricity costs

**Electricity costs for water supply have been already included in the water costs.*

EU Totals: Environmental impact (installed stock, ref 2012)

BASE CASES	UNITS	TAPS		SHOWER SYSTEMS		TOTAL
		Domestic	Non-domestic	Domestic	Non-domestic	
Resources & Waste						
Total Energy (GER)	PJ	741.13	259.83	2356.78	102.62	3460.37
of which, electricity (in primary MJ)	PJ	505.95	171.58	1443.31	62.54	2183.37
Water (process)	mln. m³	10650.15	2746.69	11054.38	478.05	24929.28
Water (cooling)	mln. m³	25.12	7.88	68.35	3.15	104.50
Waste, non-haz./ landfill	kt	284.00	90.63	760.68	33.73	1169.03
Waste, hazardous/ incinerated	kt	8.38	2.75	23.18	1.02	35.33
Emissions (Air)						
Greenhouse Gases in GWP100	Mkg CO₂ eq.	36.22	12.81	118.28	5.15	172.46
Acidification, emissions	kg SO₂ eq.	111.38	36.77	316.72	13.95	478.82
Volatile Organic Compounds (VOC)	kt	11.50	3.91	33.06	1.43	49.90
Persistent Organic Pollutants (POP)	g i-Teq	4.85	0.75	6.21	0.41	12.21
Heavy Metals	ton Ni eq.	11.49	2.34	20.05	1.13	35.00
PAHs	ton Ni eq.	FALSE	0.46	3.87	0.19	4.52
Particulate Matter (PM, dust)	kt	4.95	1.03	8.13	0.42	14.53
Emissions (Water)						
Heavy Metals	ton Hg/20	3.43	0.86	7.35	0.37	12.02
Eutrophication	kt PO₄	0.13	0.04	0.30	0.01	0.48

EU Totals: Annual expenditure (ref 2012) *in millions of €*

<i>In millions of €</i>	TAP		SHOWER SYSTEM		TOTAL EU-27	<i>Share of the annual expenditure per type of cost</i>
	Domestic	Non-Domestic	Domestic	Non-Domestic		
Product price	5,049	479	5,486	468	11,482 €	7%
Installation costs	5,610	533	2,993	255	9,390 €	6%
Fuels costs for heating water (natural gas + gas oil)	3,695	1,464	15,217	659	21,035 €	13%
Electricity costs for water heating + electricity for wastewater treatment	8,972	3,222	29,512	1,277	42,984 €	27%
Water costs	29,824	7,692	30,956	1,339	69,811 €	43%
Repair & maintenance costs	4,638	276	2,274	140	7,329 €	5%
Total	57,789	13,666	86,439	4,137	162,031	100%
<i>Share of the annual expenditure per BC</i>	36%	8%	53%	3%	100%	

Conclusions of the EU Totals:

Base cases with most EU aggregated environmental and economic impacts:

1. Domestic shower systems
2. Domestic taps
3. Non-Domestic taps
4. Non-Domestic shower systems

TASK 6: IMPROVEMENT POTENTIAL - ANALYSIS OF DESIGN OPTIONS

- **Objective:**

- To analyse the improvement potential of taps and showers through representative design options.

- **Outline:**

- Identification of design options
- Product specific inputs (for EcoReport tool) of the design options
- Environmental improvement of the design options
- Costs effects associated to the design options - LCC
- Analysis of LLCC

Identification of design options:

6 Design options have been identified*:

Water and energy saving potential**

Base case 1: domestic taps

1. Tap with diverter

2. Two-stage taps



-23%

Base case 2: non-domestic taps

3. Push taps

4. Sensor taps



-24%

Base case 3: domestic shower systems

5. Shower systems with thermostatic mixers

6. Other water saving showers



-22%

*Task 4 "Analysis of technologies"

**Task 3 "Users and system aspects"

Product specific inputs (for EcoReport tool) of the design options

Use Phase inputs (calculations based on saving potentials)

PARAMETER	TAPS		SHOWER SYSTEM
	Domestic	Non-domestic	Domestic
	Taps with diverters & two-stage taps	Push taps & sensor taps	Water saving shower & thermostatic mixer
Lifetime (years)	16	10	16 for the valve 10 for the outlet
Water abstraction (m3/yr per unit of product)	4.9	21.2	15.6
Electricity for water supply (MJ/yr per unit of product)	12.5	53.8	39.3
Electricity for wastewater treatment (MJ/yr per unit of product)	28.2	121.9	89.2
Electricity consumption for hot water (MJ/yr per unit of product)	76.7	507	959.8
Natural gas consumption for hot water (MJ/yr per unit of product)	76.7	507	959.8
Oil consumption for hot water (MJ/yr per unit of product)	38.3	253.5	479.9

Product specific inputs (for EcoReport tool) of the design options

LCC inputs*

COST	Tap				Shower system	
	Domestic		Non- Domestic		Domestic	
	Diverter	Two-stage	Push Taps	Sensor Taps	Water saving shower	Thermostatic mixer
Typical product price (€/unit)	86	107.5	85.5	217.5	162.5	200
Indicative repair & maintenance costs (€/unit)	107 (referred to 16 years)	107 (referred to 16 years)	143 (referred to 10 years)	143 (referred to 10 years)	84 (referred to 10 years)	84 (referred to 10 years)

Inputs which remains unvaried with respect to the base cases:

- BoM
- lifetime
- water and energy prices
- market data

Environmental improvements of design options

DESIGN OPTION	COMPARED WITH	ENVIRONMENTAL IMPACTS AVOIDED
DIVERTERS & TWO STAGE TAPS	Base Case 1: Domestic Tap	From 10% to 23% according to each impact category
PUSH TAPS & SENSOR TAPS	Base Case 2: Non-Domestic Tap	From 18 to 24% according to each impact category
SHOWER WITH THERMOSTATIC MIXER & WATER SAVING SHOWER	Base Case 3: Domestic Shower System	From 18 to 22% according to each impact category

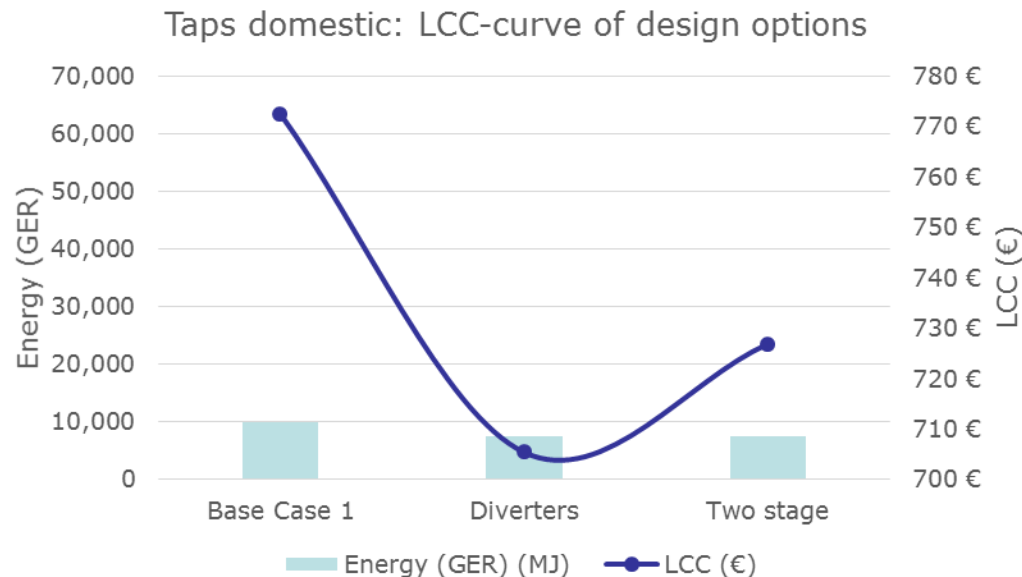
LCC improvement of design options

DESIGN OPTION	COMPARED WITH	LCC - COSTS REDUCTION	PRODUCT PRICE
DIVERTERS	Base Case 1: Domestic Tap	9%	22€ cheaper than the two stage taps
TWO STAGE TAPS		6%	
PUSH TAPS	Base Case 2: Non-Domestic Tap	15%	132€ cheaper than the sensor taps
SENSOR TAPS		9%	
SHOWER WITH THERMOSTATIC MIXER	Base Case 3: Domestic Shower System	17%	38€ cheaper than the water saving shower
WATER SAVING SHOWER		15%	

Analysis of LLCC

According to MEErP methodology, design options should be analysed to identify those with:

- BAT: the least life cycle environmental impacts in terms of energy (Best Available Technology)
- LLCC: the Least Life Cycle Cost



Analysis of LLCC

DESIGN OPTION	COMPARED WITH	ANALYSIS OF LLCC
DIVERTERS	Base Case 1: Domestic Tap	BAT & LLCC
TWO STAGE TAPS		BAT
PUSH TAPS	Base Case 2: Non-Domestic Tap	BAT & LLCC
SENSOR TAPS		BAT
SHOWER WITH THERMOSTATIC MIXER	Base Case 3: Domestic Shower System	BAT & LLCC
WATER SAVING SHOWER		BAT

Environmental and economic improvement potential

Conclusions

- 6 design options have been analysed:
 - BC1: DIVERTERS & TWO STAGE TAPS
 - BC2: PUSH TAPS & SENSOR TAPS
 - BC3: SHOWER WITH THERMOSTATIC MIXER & WATER SAVING SHOWER
- All design options improve the environmental profile (depending on the impact category) with respect their BC of reference.
- All design options reduce the lifetime costs with respect their BC of reference due to the saving potentials.
- All design options are BAT with respect their BC.
- The LLCC for each reference BC is DIVERTERS, PUSH TAPS and SHOWER WITH THERMOSTATIC MIXER.

Questions/Discussion:

- Any comments on the results of the environmental assessment of base cases?
- Any comments on the results of the economic assessment of base cases?
- Any comments on the analysis of the design options?

Study overview

Task 1: Product group definition and scope, standards and legislation,

Task 2: Market analysis

Task 3: User behaviour and system aspects

Task 4: Technologies

Task 5: Environmental and economic assessment

Task 6: Design options

Task 7: Policy scenarios analysis

POLICY SCENARIOS ANALYSIS

- Analysis of policy options
- Impact assessment of policy scenarios
- Discussion

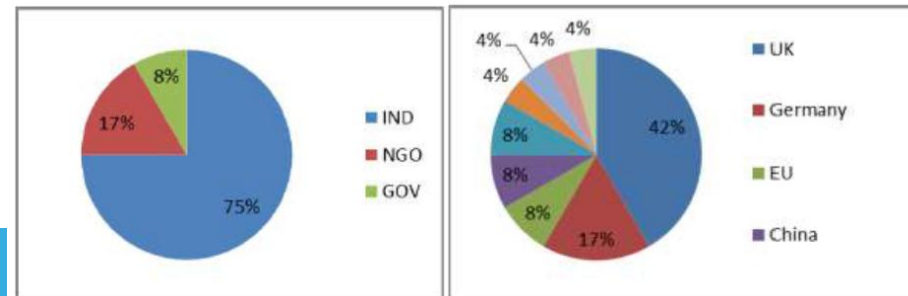
Base of evidence:

- Water consumption and scarcity as a problem in many EU zones
- Significant water and energy saving potential from T&S in the EU
- Variety of taps and shower models on the market
- Different levels of performance in terms of water and energy consumption.
- Water/energy saving technologies as technically effective, economically convenient and flexible options.
- EU Ecolabel and GPP... **some other SPP options?**

Analysis of policy scenarios - procedure

- Preliminary identification of possible SPP and technical measures
 - *Resource efficiency label*
 - *Generic and/or specific ecodesign requirements*
 - *Self-regulation/voluntary agreements by industry*
 - *Harm. and dev. of standards and measurement methods*
 - *Consumer information and education*
- Consultation of stakeholders and analysis
- Selection of policy options
- Definition of BAU and policy scenarios
- Assessment of impacts

*Questionnaire,
24 feedbacks*



Resource efficiency label

Analysis of comments

- Focus on water (and energy) consumption in the use phase
- Acceptability and ease of implementation
- Max water usage for almost all products + audit scheme
- No harmonised standards for energy (SS 820 000 and SS 820 001, HKI for industrial kitchens)
- Energy aspects calculated directly from the declared water usage
- Base reference: Directive 2010/30/EU
- Additional schemes of reference:

ANQIP label; Swedish Energy Efficiency Labelling; Swiss Energy Label for Sanitary fittings; Water Efficiency Label; Water Label

Expected benefits:

- Cost-effective without limiting consumer choices (EU cultural variety)
- Creation of a level playing field, stimulation of technical innovation and market competitiveness
- Comprehensive information to consumers and increased environmental awareness
- More effective and quicker penetration than a voluntary label.

Potential challenges and drawbacks:

- Overlap with existing labels and market surveillance
- Rules (if complicated) and costs (if not proportionate)
- Actual water/energy saving depends on different factors (e.g. user behaviour, system aspects)

Ecodesign requirements

Analysis of comments

- Generic/specific ecodesign mandatory requirements in addition to a resource efficiency label:
 - *Water/energy saving technologies acting on flow rate*
 - *Water meters on products*
 - *Ease of maintenance and cleaning, retrofitting, dismantling*
 - *Measurable performance/characteristics (flow rate)*
- Application of well-defined requirements with a technology neutral and flexible approach
- Satisfaction of fitness-for-use, especially for private use and wellness
- Importance of market surveillance, user behaviour and water cost

Expected benefits:

- Potentially more effective contribution to water and energy saving
- Availability of technologies + incentive for product innovation (if technologically neutral)
- Uniformity and clarity

Potential challenges and drawbacks:

- Scope definition and standards harmonisation and development
- Different water pressures require different technical solutions
- Time needed for finding EU consensus
- Technical and economic burdens (especially for SMEs) and confidentiality/sensitivity of design options
- Burdens related to enforceability and monitoring
- User expectations and influence of user behaviour
- Intensive public information campaigns are needed
- Clarity of information carried by the CE mark

Self-regulation/ Voluntary agreements

Analysis of comments

- Not preferable to EU/MS ecodesign measures
- Need of standards, consumer information and supervision of an independent-third party

Expected benefits

- Easier/flexible implementation and update and cost control for industry
- No forced production or use of technologies

Potential challenges and drawbacks

- Risk of requiring more time and being less effective and consistent
- Complete adoption by all companies may not be sure
- Cost reduction is uncertain

Standards and measurement methods

Analysis of comments

- Scope: water/energy consumption and efficiency
- Necessary in support of ecodesign/energy labelling
- Ecodesign horizontal mandate M/495
- Involvement of standardisation organisations
- SS 820 000 and SS 820 001 for energy efficiency

Expected benefits

- Set of a level playing field for all manufacturers and clarity
- Ease of market surveillance

Potential challenges and drawbacks

- Developing standards for “fitness for use”
- Timing >5 years needed
- Economic burdens for producers with limited market benefit

Consumer information

Analysis of comments

- Fundamental at all levels but not effective standing alone:
 - *Installation, use and maintenance of products*
 - *Water/energy saving achievement and related benefits*

Expected benefits

- Public awareness and achievement of water/ energy saving
- Influence on behaviour change and market transformation

Potential challenges and drawbacks

- Very difficult to reach all the population and not effective alone
- Cultural variety in the EU
- Direct link with water and energy bills

Possible timing according to stakeholders



2014-2015: Consumer information

2016-2018 (and before): Resource efficiency label

2016-2018: Self-regulation/voluntary agreements

2016-2020: Harm. and dev. of standards and meas. methods

2017-2019: Ecodesign requirements

Other options proposed by stakeholders

Option	Expected benefits	Potential challenges and drawbacks
Progressive increase of water price	Encouraging water and energy saving	Complaints from consumers
Harmonised directive about the acceptance of materials	Less types of materials = less embodied energy and logistic pressure	Not an issue
Addressing the hot water delivery system through building codes and retrofit requirements	Increased water and energy savings from a system perspective	Not the focus, other instruments exist Hard to assess, implement and monitor at EU level
No action other than EU Ecolabel and GPP	Avoid the risk of consumer confusion	No acceleration of market transformation

Pre-selection of policy options (1)

1) Mandatory resource efficiency label

- Benefit of the experience of the existing schemes
- Focus on water consumption (+ relation to theoretical energy)
- Further levels of complication associated to concept deviations

2) Mandatory implementation of technical devices limiting the consumption of water and/or energy

- Generic prescriptions for limiting the flow (*e.g. water brakes, automatic shut-off*), managing the temperature and/or the use of hot water (*e.g. hot water brakes, cold water supply in middle position, thermostatic mixing valves*), possibility of retrofitting
- Exhaustive and flexible list of technologies and fitness-for-use

3) Mandatory implementation of water meters in products

- Action on user behaviour and not on flow rate / temperature

Pre-selection of policy options (2)

4) Mandatory restrictions on water flow rates for some products

- Theoretical possible to restrict some categories of product
- Difficult definition of market segments and thresholds, possibilities of interpretation and bypass rules
- e.g. luxury/wellness products and kitchen vs. bathroom taps
- Consultation and support of industry still more important

5) ~~Ease of maintenance and cleaning, retrofitting and dismantling in the design of products~~

- ~~Some potential benefits in terms of End of Life and energy and material resource saving~~
- ~~Less significant based on outcomes of previous Tasks~~
- ~~High risk of having generic and not effective requirement~~

Impact of policy scenarios

Comparison of **4 scenarios** against **Business-as-Usual (BAU)** scenario for EU in **1990-2030** (2010 = ref.)

Based on

- Information from previous Tasks
- In-house assumptions built on further stakeholders consultation

6 parameters:

- Stock of taps and showers installed and annual sales (T2)
- Annual water abstraction (T3)
- Annual demand of primary energy (T3) and related GHG emissions
- Total annual expenditure for consumers (T2,3,4)

Confirmation from T5/6

Additional assumptions for BAU scenario

Water abstraction:

- **0.1%** annual variation rate (+3% urban water use in Europe from 2000 to 2030)

GHG emissions:

- 52.2 grams of CO₂_{eq} per **MJ** of primary energy
- Based on energy input in Task 3 and estimated EFs from Ecoreport
 - Electricity: 43 g of CO₂_{eq} /MJ of primary energy*
 - Natural gas: 59 of CO₂_{eq} /MJ of primary energy*
 - Fuel oil: 86 of CO₂_{eq} /MJ of primary energy*
- Considered constant over time

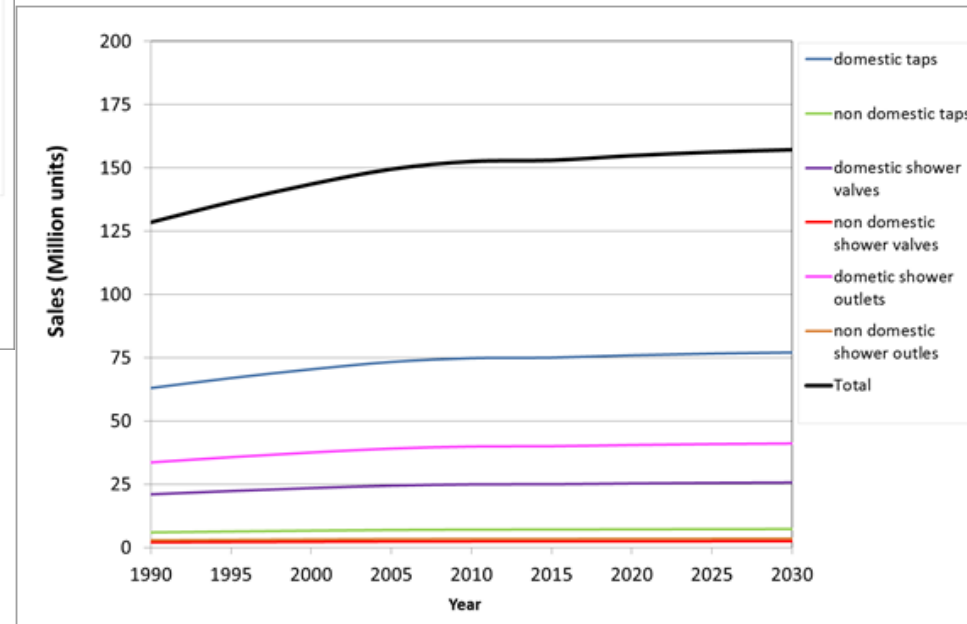
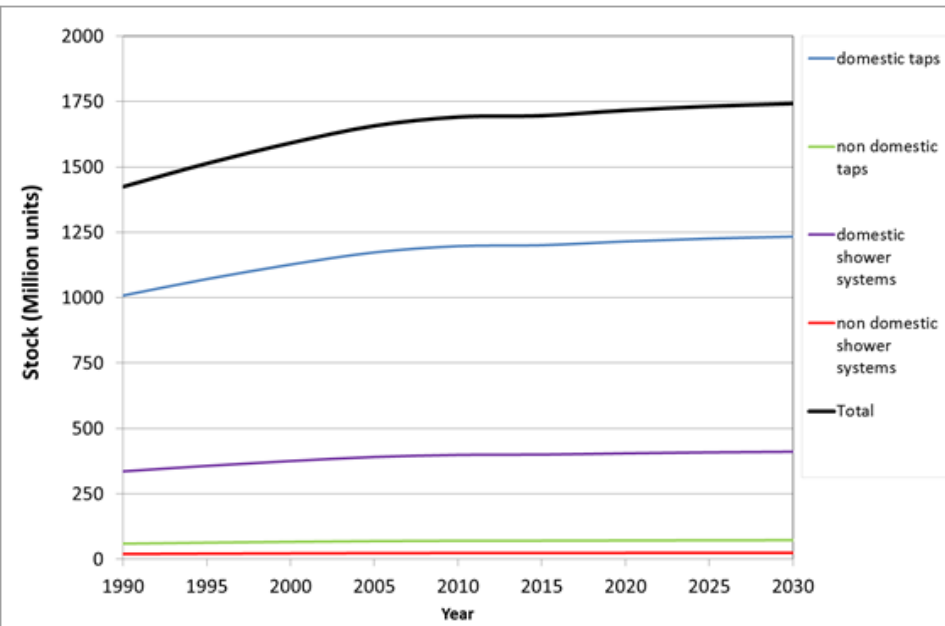
EU total annual expenditure for consumers:

- Calculation of **total costs** over the lifetime of model products
- Based on info from **previous Tasks** + consultation of **stakeholders** (LT: 16 yrs for Domestic, 10 yrs for Non-dom)
- Average costs for **product purchase, installation and maintenance**:
 - **Domestic taps**: EUR 205 (conventional) vs. 278 (average btw taps with diverters and two-stage taps)
 - **Non-domestic taps**: EUR 181 (conventional) vs. 369 (average btw push-taps and sensor taps)
 - **Domestic shower systems**: EUR 304 (conventional) vs. 392 (average btw shower systems with thermostatic mixers and other water saving showers)
 - **Non-domestic shower systems**: EUR 272 (conventional) vs. 297 (water saving showers)

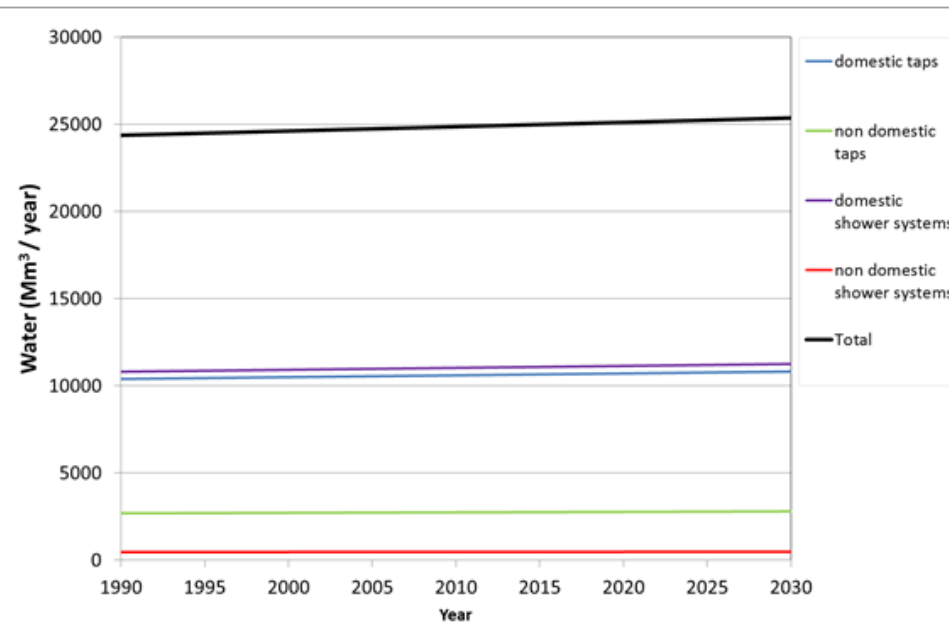
- **Penetration** of water/energy saving technologies in 2010: 40% for domestic, 10% for non-domestic
- Water/energy **consumption** from T3, NO water/energy saving
- **Water and energy price (T2):**
 - *water price (EUR/m³): 3.89*
 - *electricity price (EUR/kWh): 0.2*
 - *fuel price (EUR/GJ): 19.1*
- **Market weighted average, normalised** to 1 yr of use of 1 unit:
 - *49 EUR for domestic taps;*
 - *191 EUR for non-domestic taps;*
 - *206 EUR for domestic shower systems;*
 - *272 EUR for non-domestic shower systems.*
- **Constant parameters** over time (Self-balance of actualisation and inflation rates)
- **EU tot per year = Average total costs per product * Stock**

BAU scenarios (1)

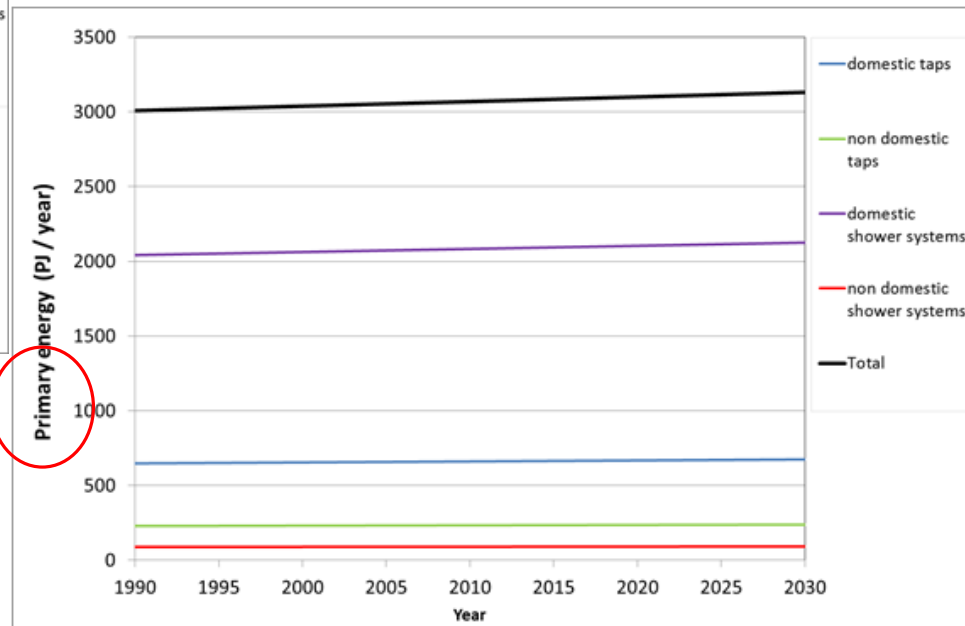
Consistency with Task 2



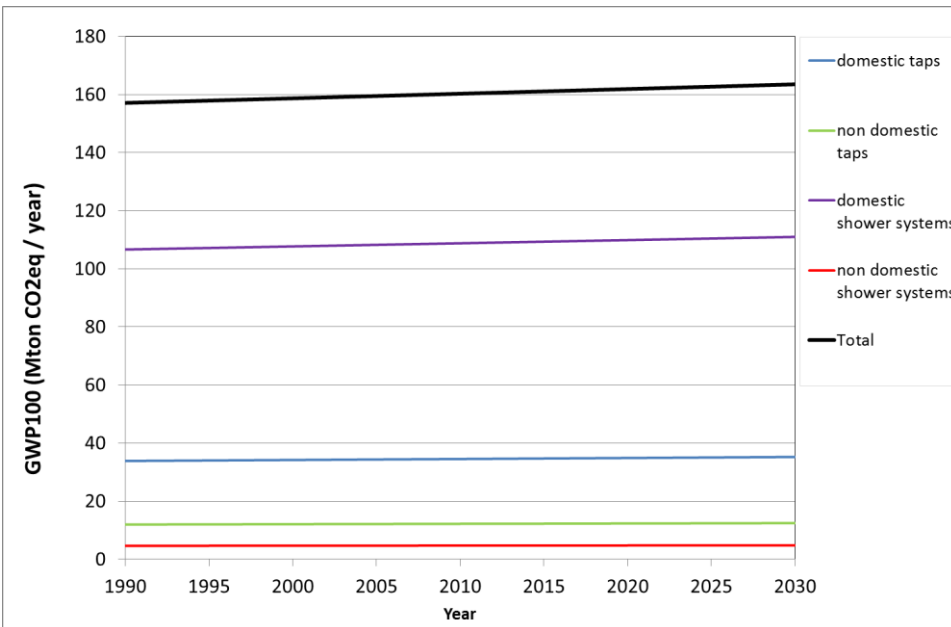
BAU scenarios (2)



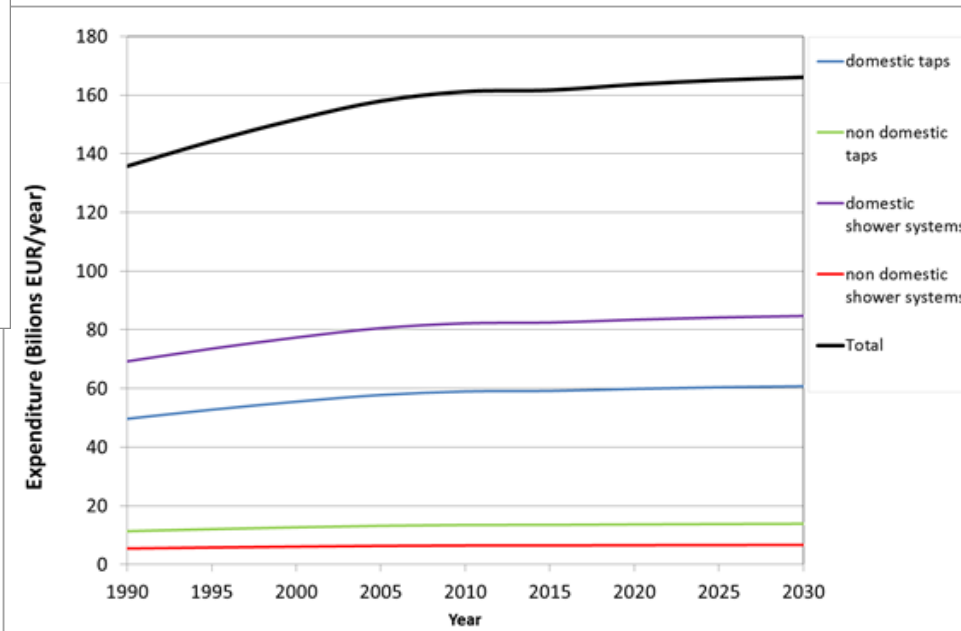
Consistency with Tasks 3 and 5



BAU scenarios (3)



Consistency with Task 5



Policy scenarios modelling

Two key elements:

1. Estimation of saving potentials
2. Variation of costs associated

Estimations:

- Short term
- Medium/long term

Common assumptions:

- Stock and annual sales of products are not affected
- Saving achievable for 35% of use in taps (bathroom + dishwashing by hands) and 100% of use in shower systems
- Combination of scenarios avoiding/limiting double counting

Resource efficiency label

- Average max. flow rates

Product	2010 (L/min)	Short term (L/min)	Long Term (L/min)
Taps	9.5	8.3	7.0
Showers	12	10.8	9.3

- Water/energy saving potential:
 - 13% for taps and 10% for shower systems, in the short term;
 - 26% for taps and 23% for shower systems, in the long term.
- 85% correction factor because of potential longer use
- Market change:
 - Short term (2015): 30% products in domestic sector, 45% in non-domestic
 - Long term (2025): 60% products in domestic sector, 90% of products in non-domestic

Water/energy saving devices

- Water/energy saving bonus = 5%, constant, for both taps and showers
- Reduction of water flow more of relevance for other measures
- Market change:
 - *Short term (2015): 30% products in domestic sector, 45% in non-domestic*
 - *Long term (2020): 60% products in domestic sector, 90% of products in non-domestic*
 - *Faster effects than labelling*

Water meters

- Water/energy saving potential:
 - *3% for taps and shower systems, in the short term;*
 - *10% for taps and shower systems, in the long term.*
- Representing shorter time of use
- Market change
 - 0% in the ref. year
 - *Short term (2015): 50% products*
 - *Long term (2020): 100% products*
- Water meter increase the cost of a unit of product by 55 EUR

Limitations on water flow rates

- Distribution of max. flow rates in the ref. year

Product	15 th perc. (L/min)	50 th perc. (L/min)	85 th perc. (L/min)	98 th perc. (L/min)
Taps	5.8	9.5	13.2	16.9
Showers	10	12	14	16

- Water/energy saving potential:
 - 12% for taps and 7% for shower systems, in the short term;
 - 28% for taps and 14% for shower systems, in the long term.
- Without identification and definition of categories of products
- 85% correction factor because of potential longer use
- Market change:
 - Short term (2015): 15% products
 - Long term (2020): 50% products

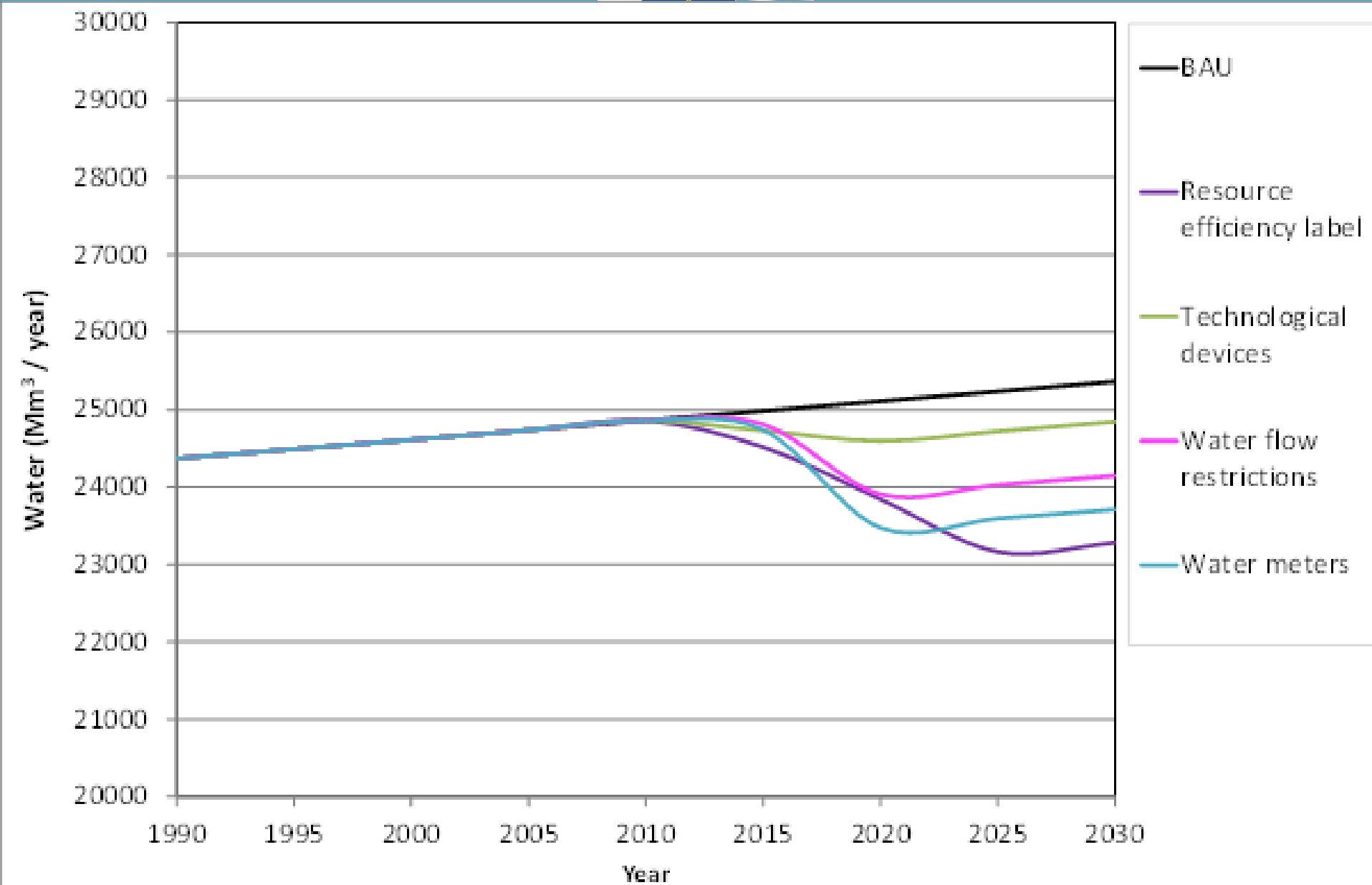
Average water and energy saving potentials for the total stock of products:

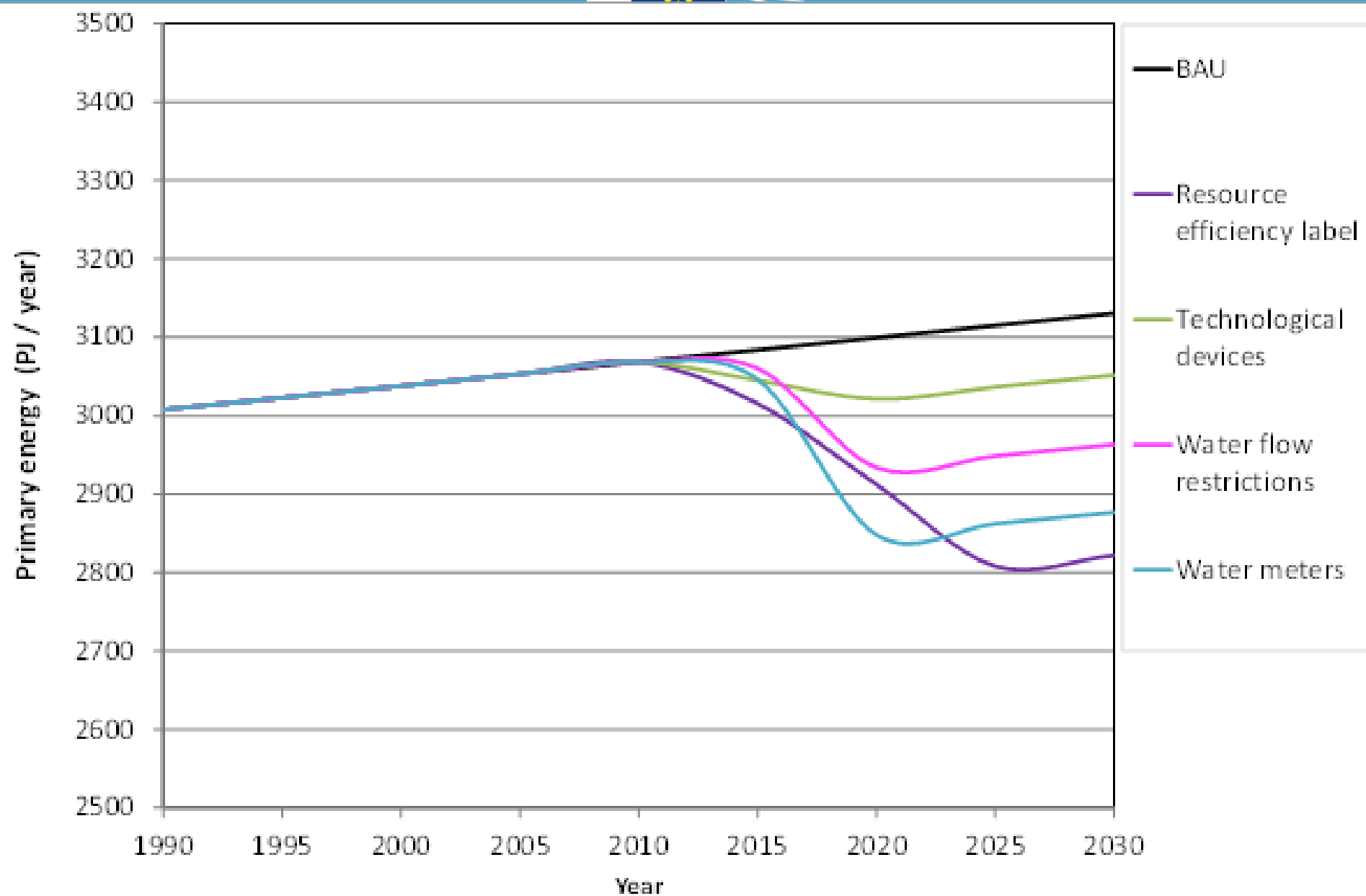
- Short term

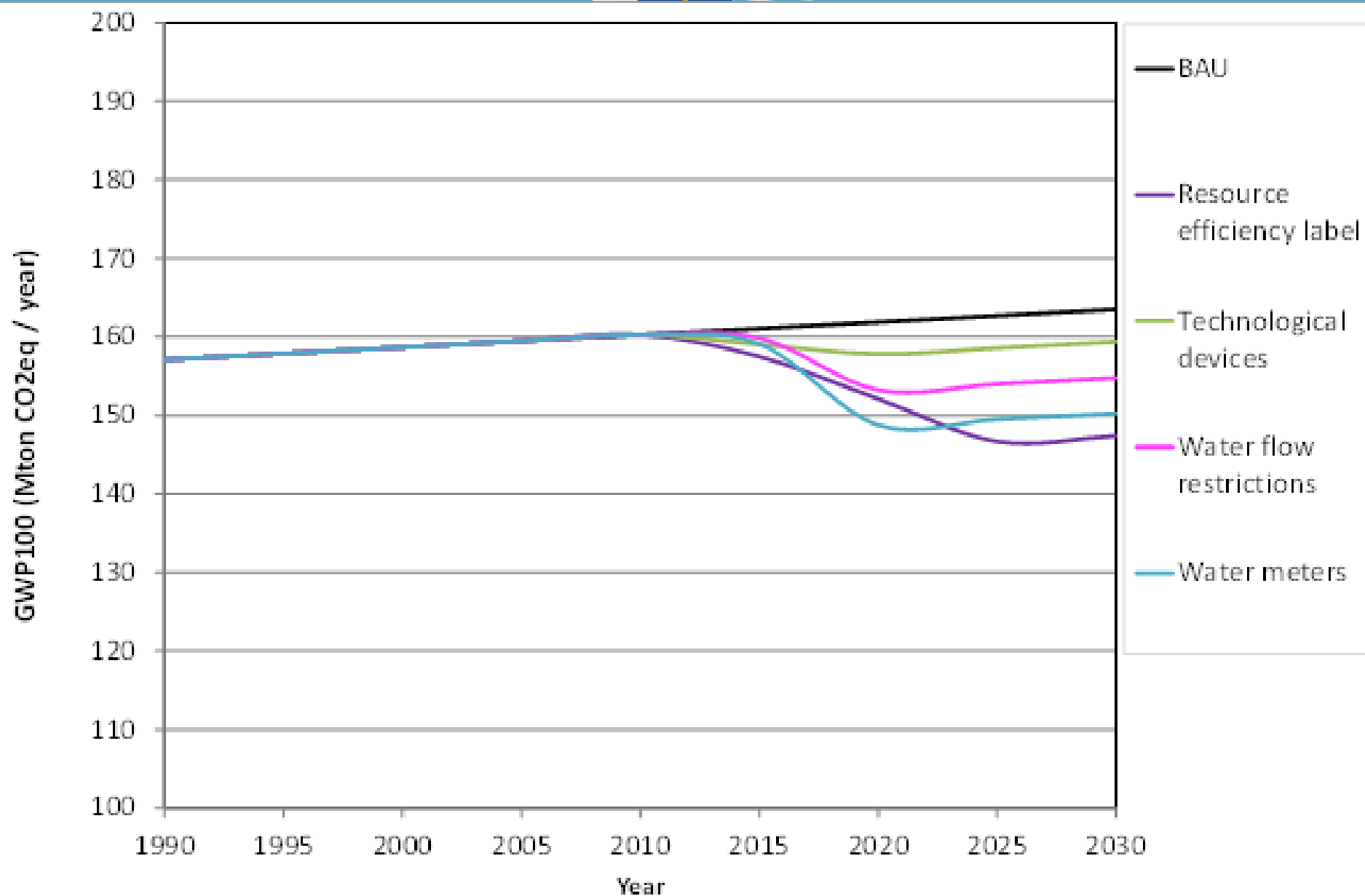
Product	Label	Water/energy saving devices	Water meters	Flow Restr.
Taps, domestic	1%	1%	1%	1%
Taps, non-domestic	2%	1%	1%	1%
Shower systems, dom.	3%	2%	2%	1%
Shower systems, non-dom.	4%	2%	2%	1%

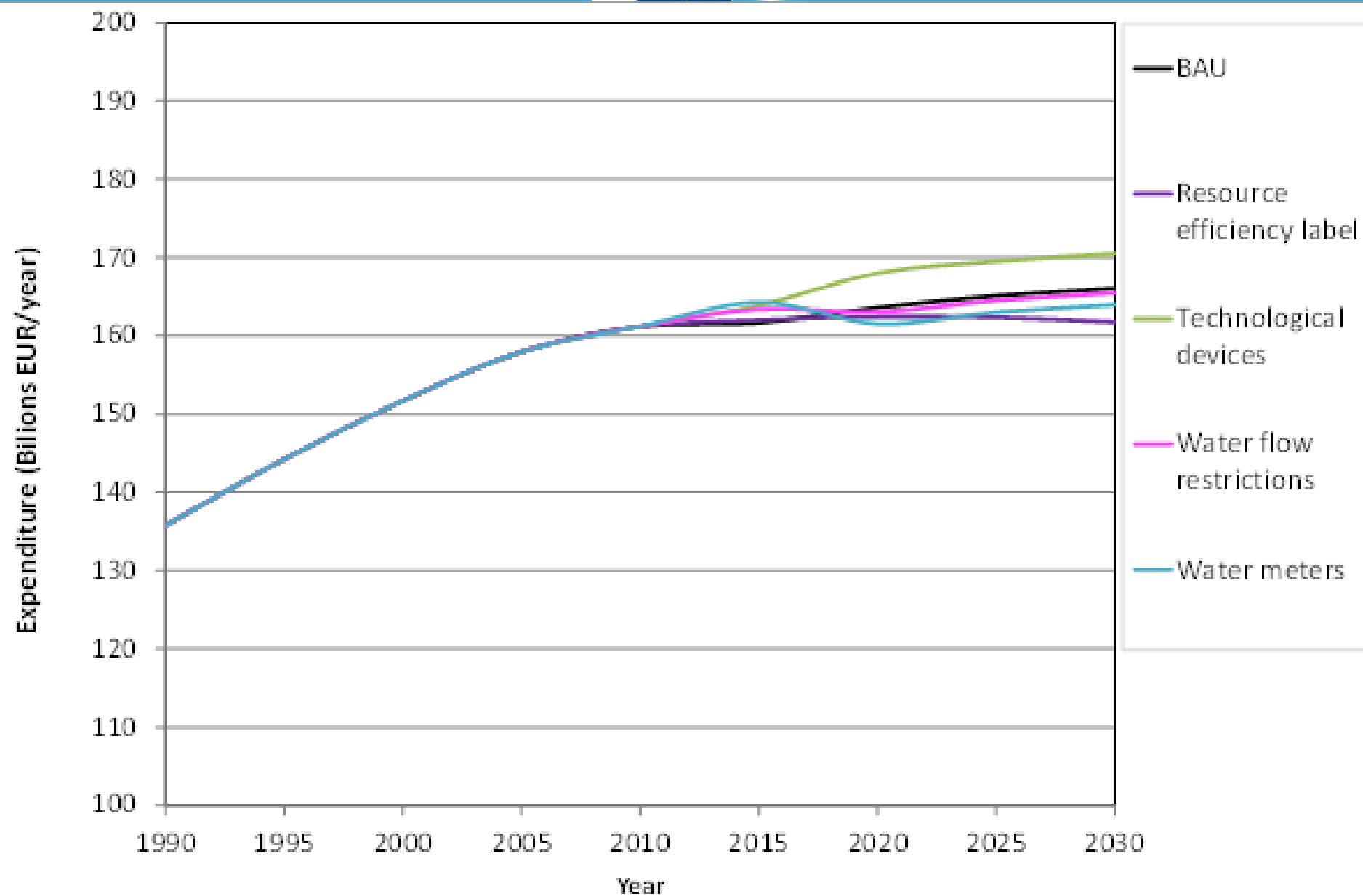
- Long term

Product	Label	Water/energy saving devices	Water meters	Flow Restr.
Taps, domestic	5%	1%	4%	4%
Taps, non-domestic	7%	2%	4%	4%
Shower systems, dom.	11%	3%	10%	6%
Shower systems, non-dom.	17%	5%	10%	6%









Results – Focus on 2030 (1)

POLICY SCENARIO (EU total values for 2030)	WATER ABSTRACTION (Gm ³ / year)			PRIMARY ENERGY DEMAND (PJ / year)			GWP100 (Mton CO ₂ eq / year)			CONSUMER EXPENDITURE (Billions EUR/yr)		
	Tot.	Var. (%)		Tot.	Var. (%)		Tot.	Var. (%)		Tot.	Var. (%)	
BAU	25.4	0	0%	3130	0	0%	164	0	0%	166	0	0%
Resource efficiency label	23.3	-2.1	-9%	2822	-308	-11%	147	-16	-11%	162	-4	-3%
Water meters	23.7	-1.7	-7%	2877	-254	-9%	150	-13	-9%	164	-2	-1%
Water flow restrictions	24.1	-1.2	-5%	2963	-167	-6%	155	-9	-6%	166	-1	0%
Technology	24.8	-0.5	-2%	3052	-79	-3%	159	-4	-3%	171	4	3%

- Significant **saving** figures from each policy scenarios
- **Consistency** with actualisation of results for Task 3
- **Water meters** = additional saving
- Partial overlap for **flow restrictions** (max potential)
- Clear **ranking** between the policy options: resource efficiency label > water meters > other ecodesign measures

Results – Focus on 2030 (2)

- Saving from **resource efficiency labelling** in 2030:
 - 2100 Mm³ of abstracted water (9% compared to BAU scenario)*
 - 308 PJ of primary energy (11% compared to BAU scenario)*
 - 16 Mton of GHGs (11% compared to BAU scenario)*
 - 3% of lifecycle cost allocated to consumers*
- Saving from **water meters**:
 - 1700 Mm³ of abstracted water (7% compared to BAU scenario);*
 - 254 PJ of primary energy (9% compared to BAU scenario);*
 - 13 Mton of GHGs (9% compared to BAU scenario).*
 - 1% of lifecycle cost allocated to consumers*
- **Other ecodesign measures**:
 - Decrease of water abstraction by 5% for water flow restrictions and by 2% for water/energy saving devices;*
 - Decrease of primary energy demand and emissions of GHG by 6% for water flow restrictions and by 3% for water/energy saving devices.*
 - Saving potentials may not compensate the increase of costs*

Results - Focus on 2030 (3)

Product group	Estimated savings in terms of primary energy ^{a, b} (PJ/yr)	% normalised to total	Country	Primary energy consumption in 2012 (PJ)
Electric motors	12 15	37%	Germany	12 491
Domestic Lighting	351	11%	France	10 019
Street & Office Lighting	342	10%	United Kingdom	8 014
Standby	315	10%	Italy	6 750
Fans	306	9%	Spain	5 581
Televisions	252	8%	Netherlands	3 803
Circulators	207	6%	Poland	3 739
Air conditioners and comfort fans	99	3%	Belgium	2 616
External power supplies	81		Sweden	2 101
Simple set top boxes	54		Norway	1 893
Domestic refrigerators	36	1%	Czech Republic	1 454
Domestic dishwashers	18	0%	Austria	1 419
Domestic washing machines	14		Denmark	1 179
Total without considering taps and showers	32 94		Finland	1 153
(a) In-house calculation based on the http://ec.europa.eu/enterprise/policies/sustainable-business/ecodesign/files/brochure_ecodesign_en.pdf (1 PJ of power considered equivalent to 2.5 PJ of primary energy)			Portugal	937
(b) Estimated at 2020			Denmark	721
			Slovakia	712
			Ireland	541
			Slovenia	482
			Luxembourg	180

Labelling

Water meters

Flow restrictions

Water/en. Saving devices

Conclusions

- Impacts assessed for a series of **SPP options** of potential interest
- **Environmental benefits** potentially achievable, some options more appealing
- **Mandatory resource efficiency label** as the key tool
- Technical guidelines should be defined and coupled with a **strategic communication policy**
- **Water metering** also interesting ecodesign measure to save water without limiting flow-rates
- **Technical challenges/drawbacks** more significant for other ecodesign options (e.g. difficult definition of market segments, no to partial compensation of economic burdens)

Discussion area

1. Analysis and selection of **policy options**
 - a. Resource efficiency label*
 - b. Implementation of technical devices limiting the consumption of water and/or energy*
 - c. Implementation of water meters in products*
 - d. Restrictions on water flow rates for some products*
2. **Key assumptions and outcomes**