Background paper for consultation with stakeholders

Presentation of the issue

Water scarcity and droughts (WS&D) increasingly affect many regions of Europe[1], with climate change and population growth predicted to still worsen the issue through increasing water demand. Europe continues to waste at least 20% of its water due to inefficiency[2]. The European Commission (EC) is therefore exploring the ways in which the EU can address WS&D problems, by reducing water uses in key areas and will communicate about this in the Blueprint to safeguard Europe's waters (end of 2012).

In the EU, the public water supply represents 21% of the total water use, and buildings account for the major use. In some regions, up to 30% of the volume of water consumed in buildings could be saved[2]. Therefore, an ongoing study investigates options to improve the water performance of buildings (WPB) at EU level. The relevance of these options depend on the type of building (residential or not), its status (new, existing, to be refurbished), ownership (public or private), and use (leased or not). Indeed, quantities of water used and patterns differ between residential (72% of the total building water use[3]) and non-residential buildings (28%). Around 160 L/person/day (see Figure 1) is used in residential buildings for personal washing (35% of the residential use), toilet flushing (25%), clothes washing (14%), dish washing (8%), and drinking and cooking (5%)[4]. Non-residential buildings (depending on their functions) will mostly use water for WC and urinals (70- 95% of the use[4]). However, reducing the residential use to about 140-150 L/person/day or lower is done in certain MS and could be extended across the EU.

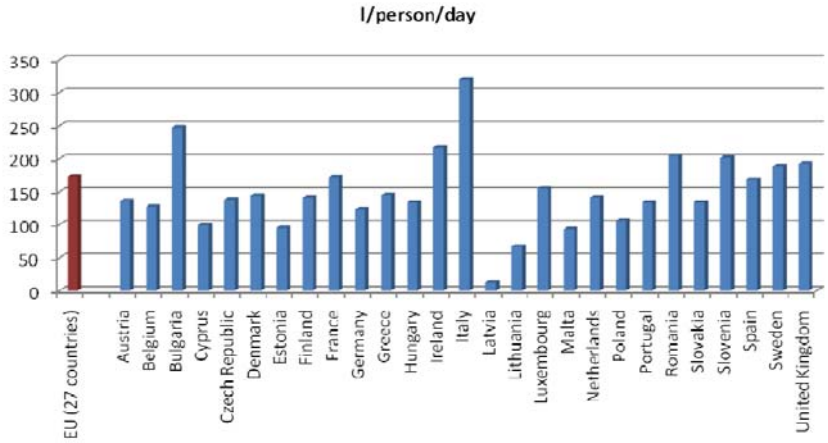

Figure 1: Residential water use in the EU and MS[4]

[1] EEA, 2009, Water resources across Europe - confronting water scarcity and drought

[2] European Commission (2007) Addressing the challenge of water scarcity and droughts in the European Union, COM(2007) 414 final

[3] EUREAU Statistics Overview on Water and Wastewater in Europe 2008 (Edition 2009)

[4] JRC, Ecotapware, Task 2: Economic and market analysis and Task 3: User behaviour, 2011, First Interim Report, Draft. The very low value for Latvia seems to be an outlier, which can probably be attributed to statistical inconsistencies.

Barriers to reducing the use are linked to a low awareness of water quantity issues, with water considered an abundant good, and prices generally not reflecting its value. However, negative environmental impacts of water use are increasing in many river basins, with water tables lowering, saline intrusion, rivers drying out in the summer, etc. Additionally, water use is closely linked to energy use, for pumping, heating and treatment. Finally, water should simply not be wasted, in line with the policies for sustainable consumption and production (SCP).

In order to reduce water use in buildings, several options are available, including: raising awareness to improve behaviours, changing the pricing policies, metering water to both detect leaks and raise awareness from consumers, limiting water use by regulatory requirements, installing more efficient water-using products (WuP, such as toilets, taps, washing machines, etc.), planning buildings so they are more water and energy efficient, but also using "alternative" water sources, such as rainwater or greywater. These options act on reducing water use, increasing efficiency of the water used and reusing water to reduce pressure on ecosystems. Policy options were selected and are presented in the following section, to assess their expected environmental, economic and social impacts at EU level.

Efforts to improve the environmental performance of buildings are on-going. In addition to the implementation of the Energy Performance of Buildings Directive (2002, recast in 2010), many green initiatives are currently in place in Member States (and beyond) to improve the environmental performance of the building sector (e.g. BREEAM in the UK, DGNB in Germany, HQE in France or LEED in USA), but their uptake is slow[5]. With increased population and urbanisation in the EU, increasing efficiency is key to reducing our pressure on ecosystems. It is expected that without further targeted actions, the reduction in water used by buildings will be only about 5% in 2050.

Description of Policy Options

Horizontal Policies (H)

Water metering / smart-metering (H1)

Water metering (and to a more advanced extent, smart-metering) in buildings directly informs the consumers about their water use, raising awareness to change behaviours while reducing water bills and detecting potential leakages. Water is metered in different ways in different MS (for the whole building, for an apartment, differently between cold and hot water), and is not always consistent in a MS (e.g. in the UK certain regions have metering, others do not). Metering is reported to be also strongly linked to water pricing discussions that recently took place in AT, BG, BE, EE, ES, NL, SE and UK, or that are still under development (CY, CZ, IE, RO and SK)[6].

[5] The number of certifications in the UK from the BREEAM programme evolved from about 500 certifications in 2004 to about 3 000 certification in 2009 for commercial buildings. BREEAM has also rated more than 100 000 residential buildings in total, while in England the residential dwelling stock is more than 22.6 million. This accounts for about 0.4% of the residential buildings.

[6] Third Follow-up Report to the Communication on water scarcity and droughts in the European Union, 2011 Report from the Commission to the European Parliament and the Council.

Water meters would need to be installed and possibly new tariff systems introduced for that option.

Water pricing and cost strategy (H2)

Article 9 of the Water Framework Directive requires to price water to reflect its true costs. Thus an option is to adapt water tariffs by raising the price of water. This would provide a price signal to push consumers to reduce their water use and influence the return on investment for installing devices. However, price elasticity of water being low, results are difficult to predict. The water utility companies could also provide services to advise consumers on reducing their water use, changing their business model.

Besides, financial incentives are a way to encourage the use of efficient WuP, the construction of green buildings, the setting-up of metering systems or water reuse/recycling schemes, etc. and in effect can be used as an accompanying measure for any of the policy options assessed below.

Awareness Raising and Education (H3)

Consumer behaviour is key to reducing water use in all types of buildings (home, office, factory, etc.), whether by changing behaviours (e.g. shortening shower time from 8 to 3 minutes can save about 63 % of water) or increasing demand for better performing WuP or buildings. It may target all types of public and may be implemented across the EU. Campaigns are already in place in many countries, and many school programmes include educational messages linked to water. The private sector could be also involved, as it is currently experienced in the UK with the Green Deal for energy savings. Results from such campaigns are difficult to predict and behaviour changes may take time (e.g. school campaigns). This option is also an accompanying measure for all other options.

Product-level policies (P)

An increasing number of Water-using Products (WuP) present on the market offer improved water efficiency compared to conventional products (e.g. dual flush toilets, faucet aerators, water-saving showerheads or washing machines). Installing efficient WuP increases the efficiency of water use, but does not necessarily save water[7]. Additionally, some WuP can be changed easily by the tenant (e.g. showerhead), while other must be installed more carefully and may be only decided by the building's owner (e.g. toilets). The lifetime of these WuP also differs. WuP can be integrated during the building construction or replaced by the occupant during the building lifetime[8]. In order to foster the uptake of efficient WuP, three options are foreseen:

- **Voluntary labelling (P1):** labelling informs the consumers of the water performance of a device and allows the comparison of models, fostering consumers to choose the model according to its preferences, needs and costs. Two types of labelling schemes may be implemented, endorsement labelling where the information given is whether or not the

[7] E.g. if a shower delivers water more efficiently but the time spent in the shower is longer, no water is saved. Similarly, if the lowflush button from a toilet is used twice, less water is saved.

[8] Note that replacement may be for a more efficient water using product, but also for a less efficient one, if the consumer does not consider that the efficient device at hand is adapted.

product meets the standard; or comparative labelling, which involves a scale. EU eco-label criteria for taps and showerheads are currently under investigation. Labelling involves costs to organise the labelling scheme, and manufacturers pay to obtain the label. However, such labels may only interest companies with already well-performing WuPs if voluntary.

- **Mandatory labelling (P2):** This option is similar to P1, but allows a full comparison in the market stock, since all products would be labelled. For some of the energy-using products, mandatory comparative labelling is already in place at EU level (ratings from A to F), and a similar label for water could be envisaged.
- **Minimum water efficiency requirements for water-using products (P3):** Water-efficiency requirements for different types of WuP could apply to products, similarly to the approach from the Ecodesign Directive for energy savings. Only the products meeting the targets would be allowed to be put on the market. Thus, the most inefficient products would progressively be removed from the market and efficient WuPs would then be installed in buildings when products need to be changed. For this option to be implemented, the innovative potential left to the industry and related costs (to the manufacturers, for consumers and for verification of conformity by the authorities) must be considered.

Building-level policies (B)

"Green building" approaches are in place in some EU countries and could be widened to the whole EU. Rating and auditing at building level are tools that allow communicating about a building performance against defined standards and comparing performances. The implementation of this policy option would leave flexibility in what to address in priority in a building and provide a harmonised European rating or audit scheme (such as the currently discussed eco-label for buildings or a BREEAM equivalent). It would include a number of indicators or requirements that a building would have to fulfil, concerning water performance, but possibly also covering other environmental issues. In most cases, to reach the objectives, metering, WuP and/or water reuse will be installed. In order to foster the uptake of such schemes, three options are foreseen:

- **Voluntary water performance rating/auditing of buildings (B1):** A robust and transparent informative scheme can be set up and harmonised at EU scale, that would be voluntary, informing about the theoretical performance of the building (actual performance would depend on consumer behaviour). Consumers could be made aware of the scheme at EU level, so that their choices are guided. While the performance would be set, no commitment to improvements is ensured and possibly only already performing buildings would be using the scheme. As for product labelling, costs must be considered.
- **Mandatory water performance rating/auditing of buildings (B2):** As for products, to ensure full comparison, a mandatory scheme could be implemented. The scheme would be harmonised across the EU. This could follow the example of the energy

performance rating of buildings[9] (on a A to G scale) that is currently in place in France within the implementation of the Energy Performance of Building Directive (EPBD).

- **Minimum water performance requirements of buildings (B3):** For new buildings or those that are being refurbished, requirements about the performance of the buildings could apply, so that minimum levels are achieved. This would provide more certainty in terms of the reduction in water use, but would increase the administrative burden and would not apply to existing buildings, unless refurbished.

Another way to act at the building level is to use "alternative" waters. The option selected is:

- **Certification scheme for water reuse and harvesting (B4):** Through greywater[10] recycling and rainwater harvesting, non-potable water sources can be substituted to potable water for specific uses in buildings, where the lower water quality does not affect consumer's health (e.g. toilet flushing or gardening). Related schemes are likely to be increasingly used in new buildings under construction, following their success in a growing number of commercial and residential development projects (e.g. in Berlin).

  The option to request certified schemes was selected, as sanitary risks and architectural issues must be well taken into account when installing the system. In that case, only authorised systems could be put on the market, and possibly only be installed by certified plumbers. Thus sanitary risks are reduced to a minimum, increasing public acceptance of the schemes, especially if accompanied by awareness-raising campaigns. Such systems may be difficult to install in existing buildings due to technical issues and are relatively costly. However, especially in the case of recycled greywater, the availability of water will not depend only on the mains supply.,

Main Foreseen Impacts

The different policy options were further analysed in order to identify and possibly quantify their potential impacts with regard to environmental, economic and social aspects. The presented outcomes are still under discussion and refining process.

Environmental impacts

The primary impact relates to potential water savings. At the horizontal level, 10% of water saving is expected for about half of the MS where water metering is not implemented yet (H1), while 3% water saving at the EU level is envisaged with efficient awareness-raising actions (H3). It is currently unclear what water amounts could be saved with changes in water pricing (H2).

At product level, potential water savings of about 40% (efficient toilets) and 25% (efficient toilets and showers) are respectively expected for non-residential buildings and residential buildings. However, the overall savings at EU level will depend on the uptake of such efficient WuPs. With

[9] information communicated to all new buyers or renters

[10] "Grey" water is water that has been used e.g. for washing, and is distinguished from "black" water, which contains human waste.

instruments such as information and financial schemes, the uptake may be higher. Expected water savings are 2.5 to 20% for P1[11], 3.75 to 20% for P2 and 3.75 to 40% for P3.

At building level, potential water savings of about 25% are expected for all building types when comparing a building with certification than without certification. As for the product level, the savings at EU level will depend on uptake rates. Expected water savings are 0.25 to 1.25% for B1[12], 1.25 to 5% for B2 and 1.25 to 10% for B3.

For B4, 20% reduction in residential buildings and 40% in non-residential buildings (where toilet flushing is more relevant) are envisaged, with a 2% uptake in existing buildings and a 20% uptake in new buildings, resulting in 0.62% of the total building water supply that could be saved.

Side environmental impacts include savings in the energy that is embedded in the water (i.e. for pumping, heating and treatment) and thereby, potential reduction in GHG emissions. Indeed, 44,000 kWh of energy / 8 tCO_2eq are saved per ML of hot water saved[13]. This is particularly relevant when considering use of water for showering, bathing or washing. The environmental impacts of producing the new devices or rainwater and greywater systems must also be taken into account.

Significant reduction of water use in buildings are sometimes accused of adversely affecting the sewer collection systems and causing blockages or other operational problems, but technical solutions are available to limit those risks.

Economic impacts

Large-scale implementation of the policy options can result in costs (i.e. capital, operation, enforcement) but also financial advantages by reducing the water and energy bills. However, there may be a misalignment between owner costs and tenant benefits. Under usual leasing arrangements, landlords pay the capital costs of efficiency measures while many of the benefits of green buildings apply to the user of the property.

Given the increasing exposure of a greener economy, new market opportunities will potentially appear for WuP manufacturers and/or building auditors/constructors. Early market entrants would benefit from a competitive advantage and possibly extend their activities/gain visibility to the EU level.

Social impacts

Public acceptance of water saving initiatives is a key success factor and highly varies between types of housing. The green building market is still emerging and harmonised schemes will need to progressively gain more exposure.

[11] Hypothesis : P1: 10-20% uptake in existing buildings and 20-50% uptake in new buildings, P2: 15-22% uptake in existing buildings and 35-50% uptake in new buildings, P3: around 15% uptake in existing buildings and 100% uptake in new buildings.

[12] Hypothesis : B1: 2-6% uptake in non-residential buildings and 0.2-0.6% uptake in residential buildings, B2: 5-20 % uptake for improved new buildings and 2-8% uptake for improved existing buildings, B3: 10% water savings are foreseen for new and to be renovated buildings and 1.25-2.5% for existing buildings.

[13] Waterwise, *www.waterwise.org.uk*

In addition, the development of water labelling/auditing schemes will bring employment to green building businesses, through the development of standards and advice services to be given to building owners / companies.

Sanitary and health issues are relevant to rainwater harvesting and to greywater reuse (B4). Indeed, such schemes are still emerging and depend on proper installation, maintenance and operation. They could present a risk that a misuse could result in contaminated water and potential health effects.