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**Annex 8: Water Sector Fact Sheet –Water Efficient fixtures and Appliances**

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| **Sector** | Water |
| **Category** | Infrastructure installation |
| **Adaptation needs** | The sparing use of water during times of drought<br>Initiatives to improve water conservation at home, school and industry. |
| **Technology Name** | Water-efficient fixtures and appliances |
| **How this technology contributes to adaptation** | A warmer climate is highly likely to result in more frequent drought (IPCC, 2007). Additionally, growing populations will push many countries into water stress and water scarcity by 2050. Water conservation is an essential part of comprehensive strategies to reduce pressure on existing water resources. The industrial and agricultural sectors account for a large majority of global freshwater use. However, total freshwater withdrawals reported for 163 countries by the Pacific Institute showed that in the median country residential water use accounted for 16% of total freshwater withdrawals (Gleick et al., 2006). Therefore, residential conservation efforts can make a strong positive contribution to reducing pressure on water resources. |
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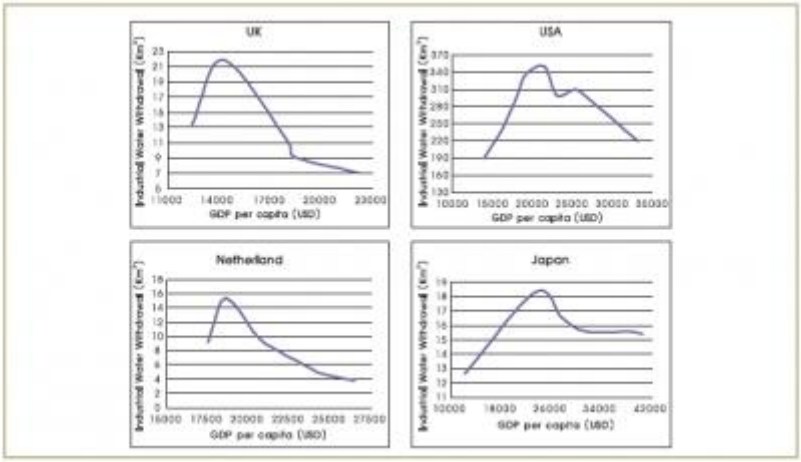
| **Background/Notes, Short description of the technology option sourced from ClimateTechWiki, Seminars, etc.** | There is some evidence that per capita water use in a society follows the pattern of the Environmental Kuznets Curve (EKC) (Yang and Jia, 2005; Anisfield, 2010). That is, per capita water use increases rapidly with economic development to a "turning point" where it begins to decline (Figure 1). In Belize, the per capita usage of water is about 50 gpd and during the last 5 to 10 years there has been an increase in the usage of water due to increase in average household, water fixtures and appliances. Examples of industrialized countries that have experienced declining per capita water use include the United States and Japan. In the US, per capita water use peaked in 1975 and then declined nearly 30% over the next 30 years (Pacific Institute, 2009). Although most progress in the US has been attributable to improved industrial and agricultural efficiency, the use of water efficient appliances and fixtures in homes, institutions and businesses can contribute greatly to water conservation efforts. In Japan, residential per capita water use increased by about 25% in the 1980s, leveled off in the 1990s and began to decline in 2000. This progress has been attributed to the increasing use of water efficient appliances and fixtures (Nakagawa et al., 2010).<br>  <br><br>Figure 1: Industrial water use vs. GDP per capita in the USA, UK, Japan and the Netherlands (source: Yang and Jia, 2005)<br>The most common water efficient appliances include dishwashers and clothes washing machines; popular fixtures include toilets, showerheads and faucets. They can simply use less water while yielding comparable performance (e.g. low-flow showerheads). Alternatively, these appliances can be more complex, as devices that use gray water from the sink for toilet flushing (see figure 2). Other products give visual or audible feedback to the user about resource consumption and rely on behavior change (Elizondo and Lofthouse, 2010). |


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Figure 2: The Aqus toilet uses gray water from the sink for toilet flushing (source: Elizondo and Lofthouse, 2010)

The transfer of the water efficient technologies from wealthy countries to developing countries can potentially hasten progress toward the EKC "turning point" and conserve water resources (Elizondo and Lofthouse, 2010). Making efficient appliances available on the market is necessary but may not be sufficient. Three major strategies to increase the use of water efficient appliances and fixtures are discussed below:

- Mandates – mandating water efficiency standards for new construction and replacement of old fixtures and appliances; mandating use of water efficient products in government facilities.
- Labeling – certification systems for water efficient products; adding the estimated cost of use, also called the "second price tag," to labels.
- Tax incentives – for purchasing and installing efficient products; for retro-fitting and replacing older fixtures.

Although important and effective, these are only a few of the strategies used to reduce residential water use. Educating users, metering individual homes, implementing volumetric pricing, fixing leaks, and limiting outdoor water use are also important steps for conversion (Elizondo and Lofthouse, 2010; USEPA, 2008).
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| **Implementation assumptions, How the technology will be implemented and diffused across the subsector?** | A functioning infrastructure for standard-setting, testing and certification of water efficient products require expertise across a range of areas. Professionals with experience from other sectors in standard-setting and certification may be able to transfer their knowledge to water efficiency. Alternatively, standards could be adopted in whole or part from a nearby country where the same products are generally available.<br>Regardless of the mechanism used to encourage water conservation, policy makers and residents must be educated. Initiatives to promote water conservation may be practical in schools, through media and by other means. Branding and marketing is necessary for any certification system so that residents know the label and associate it with quality and efficiency.<br>Increasing the use of water efficient appliances is primarily an institutional challenge. Although some citizens may be motivated to save water by environmental concerns, economic or other incentives are likely to be necessary to either incentivize or mandate the installation, production and sale of such appliances (Elizondo and Lofthouse, 2010; Geller et al., 1983; Van Vugt, 2001). Transparent processes are necessary for standard-setting, testing and certification of individual products. Additionally, the use of tax incentives requires a tax structure that allows exemptions (e.g. from sales tax) or tax credits for certain purchases. In Belize the reduction in water usage is anticipated to decline by 25%. |
| **Costs** | Establishing a functioning certification process may be costly depending on existing capacity. Water saving fixtures would mostly be used by industries such as the hotel/restaurant and others that pay for BWS services. However, the costs for individual households are generally small and may be fully recovered by water savings over the lifetime of the product. In Belize, toilets can cost about US$350 while faucets and |
| **Country social development priorities** | • Growth and Sustainable Development Strategy 2014 – 2017<br>Efforts are geared to achieve universal access to drinking water and enhancing its quality. BWSL, Belize Social Investment Fund and Ministry of Labour, Local Development and Rural development are tasked to carry out these objectives. Actions will also be administered to improve sewerage disposal in Placencia and San Pedro. Additionally studies will be conducted to assist in improving sewerage disposal in other priority areas. |
| **Country economic development priorities – economic benefits** | Growth and Sustainable Development Strategy 2014 – 2017<br>Water conservation can lead to large savings in the energy used to transport, treat and distribute piped water (USEPA, 2010). In addition, a Water Master Plan, a National Groundwater and Surface Water Assessment and a Water Vulnerability Profile will be carried out to focus on concerns over rapid depletion of groundwater resources and rising risk of salt intrusion. |
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| **Country environmental development priorities -- environmental benefits** | • Horizon 2030.<br>• A National Adaptation Strategy to Address Climate Change in the Water Sector in Belize. This policy is based on the following principles:-<br>Freshwater is a finite and vulnerable resource, essential to sustain life, development and the environment;<br>Access to safe drinking water is a fundamental right of all Belizeans;<br>Water basins and their linkages to the marine environment are the basic functional units for achieving Integrated Water Resources Management (IWRM);<br>Integrated Water Resources Management (IWRM) is paramount to the socio-economic development of Belize;<br>Water resources are vested in the state and require stewardship. |
| **Social benefits** | Increasing access to municipal water systems within homes leads to large gains in health and development. However, domestic water demand increases rapidly as households gain access to water intensive appliances and sanitary facilities (Zhou and Tol, 2005). As population expands and water resources are stressed, economic development can be hindered (Gleick et al., 2002). Implementing residential water efficiency measures can slow the onset of water stress and preserve water resources. In Belize the current water resources include: surface waters, wells, springs, sea as well as rain harvesting. Homes with high-efficiency plumbing fixtures and appliances save about 30 percent of indoor water use and yield substantial savings on water, sewer, and energy bills. |
| **Other considerations and priorities (such as market potential)** | Employing water-saving fixtures and appliances can save Belizean households money and divert less water from our water resources which help keep the environment healthy. It can also reduce water and wastewater treatment costs and the amount of energy used to treat, pump, and heat water. This lowers energy demand, which helps prevent air pollution. |
| **Capital costs (per facility)** | Total current capital cost of appliances and fixtures for Belize would be about US$1,250,000 (Source: Public Utilities Commission) |
| **Operational and Maintenance costs (per facility)** | Total current operating and maintenance costs of appliances fixtures for Belize would be about US$3,750,000 and US$1,750,000 (Source: Public Utilities Commission) |
| **Daily supply capacity per facility** | The reduction of loss of water is the result of the capacity of the equipment. For example there are low-flush toilets which use about 1.6 gallons per flush. |
| **Up scaling potential** | This technology can be applied to individual hones, and to commercial and industrial establishments as well as hotels and offices. |
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