Statement of Mary Ann Dickinson
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Regarding Water Efficiency and Its Impact on Energy Use

For the Record of the Hearing of July 25, 2012
Subcommittee on Water and Power
Senate Committee on Energy and Natural Resources

The Alliance for Water Efficiency is pleased to participate in this hearing on the important connection between water and energy, and we greatly appreciate the strong leadership of Senator Shaheen and the Senate Committee on Energy and Natural Resources on this issue. The Alliance is a non-profit organization of diverse stakeholders with experience in water conservation programs and policies, and dedicated to furthering the efficient and sustainable use of water in North America. It is the only national organization devoted solely to this purpose.

We have been interested in the relationship between water and energy since we were founded five years ago. A project of which we are particularly proud is a joint effort we undertook with the American Council for an Energy Efficient Economy (ACEEE) in 2010, to

coalesce the views of 75 organizations involved in the water-energy arena. The resulting work product, *A Blueprint for Action*, contains numerous recommendations for national and state action in the areas of policy, standards and codes, programs, and research. Of particular interest is how much water is needed (or "embedded") in the generation of electricity, and how much energy is "embedded" in drinking water pumping and treatment as well as waste water treatment. With a fuller understanding of this significant relationship, federal policies and funding programs can be developed which will cost-effectively and collectively save the most amount of energy, water and greenhouse gas emissions for the United States. Hardcopies of the report are being provided to Committee members and staff, and we urge you to consider its recommendations. Electronic copies of *A Blueprint for Action* can be downloaded at the following link: http://www.allianceforwaterefficiency.org/blueprint.aspx

We wish to make three basic points in our testimony, as follows:

1. **Water efficiency has already been very successful in saving the nation's resources and in helping to defer new capacity infrastructure, and should be further promoted at the federal level.** Plumbing product and appliance standards, in effect since the Energy Policy Act of 1992 and refined in subsequent legislation, have reduced indoor water consumption by a range of 43-86% per fixture, depending upon the product (see Table 1). EPA's WaterSense label, launched in 2006, has labeled over 4500 products, the sales of which have resulted in 287 billion gallons saved and $4.7 billion saved in consumer water and energy bills. By the end of 2011, reductions of 38.4 billion kWh of electricity were achieved along with reductions of 13 million metric tons of green house gas emissions -- equivalent to the planting of over 50 million trees. EPA's work in this area is a significant achievement in a very short time. But the nation's water utilities have been active as well, reducing consumer demand across the country through cost-effective investments in end use conservation programs. With the country's infrastructure needs now estimated by EPA to be in the neighborhood of $334.8 billion by 2027, reduced demands due to water efficiency programs can help reduce the need for infrastructure capacity expansion, a significant part

of the infrastructure estimate. In fact, EPA's Community Water System Survey in 2006 estimated that in the nation's 53,000 community systems, 52.6% of the capital expenditures were for expansion of infrastructure, not rehabilitation or replacement. Thus, water efficiency can be a cost-effective solution in these expanding systems where population growth may require new supplies, storage or enlarged treatment systems.

2. **Saving Water Saves Energy -- and the benefits are documentable.** California has been a leader in this area, having done the seminal research in 2005 which the *Blueprint for Action* recommends be duplicated nationwide. This work by the California Energy Commission showed that the amount of embedded energy in water and wastewater was in the range of 2,000 kWh to 20,000 kWh per million gallons of water produced (see Figure 1). A national study conducted by River Network in 2009 called *The Carbon Footprint of Water* estimated that as much as 13% of the nation's electric energy load is related to water and wastewater deliveries, equivalent to 5% of the US carbon load (see Figure 2). Further studies completed by the California Public Utilities Commission clarified in more detail the extent of embedded energy in a variety of different water supply sources (see Table 2). Energy intensities for drinking water and wastewater treatment technologies were documented. Now these values, as evidenced by the pilot projects which measured them, can be productively used in models to estimate energy savings from future water efficiency programs which include a wide variety of measures. The Alliance for Water Efficiency has built just such a model, called the Water Conservation Tracking Tool, which estimates not only the energy savings to the utility from both cold and hot water conservation programs, but also the savings to the customer and the overall reduction of green house gas emissions for a suite of chosen water efficiency programs (See Figure 3 for a sample output).

3. **Water efficiency research, as well as consumer retrofit programs, should be incentivized on a par with energy efficiency programs, because they yield documentable energy savings.** With drought now gripping 62% of the counties in the US, and with water supplies likely to reach shortage conditions if it continues, the time is right for the federal

government to carefully assess water efficiency as a beneficial strategy. Although many water-efficient products, technologies, and programs already exist, more research and development is needed. To date, funding has been limited and insufficient given the chronic need. For example, in the past 10 years only $3.5 million has been spent by EPA in water efficiency research, a fraction of what has been spent by the Department of Energy on energy efficiency research. With respect to consumer incentives, billions of dollars have been spent over the past decade on energy efficiency consumer rebates and tax incentives (see Figure 7). In the area of water efficiency, these programs have largely been undertaken by the water system ratepayers, with very little state funding. Virtually no federal money has been allocated for dedicated water efficiency programs. Even the American Recovery and Reinvestment Act (ARRA) allocated out of its $780 billion package $30 billion for energy efficiency programs but only $6 billion for overall water programs -- 20% of which had to be spent on "green infrastructure" which could include water efficiency. But an examination of the actual expenditures shows that only 29% of the 20% was actually spent on water efficiency; most of the money in the 20% set-aside was spent in energy efficiency, storm water, and environmental innovation projects (See Table 3). In FY12 Congress appropriated $811 million for energy efficiency programs in DOE's Office of Energy Efficiency and Renewable Energy (EERE), and $50 million for Energy Star. Contrast that with zero funding for water efficiency programs and $2 million for WaterSense.

Thus, we strongly recommend that national incentives be enacted for water efficiency programs, and further that a national policy be instituted to allow energy efficiency funding to be used for cold water conservation programs as well as hot water conservation programs because of the clear embedded energy benefits that this investment would provide.

Thank you for the opportunity to comment.

Tables and Figures Referred to in the Testimony

TABLE 1

Water Consumption by Water-using Plumbing Products and Appliances -- 1980 to 2012

Water-using Fixture or Appliance	1980s Water Consumption	1990 Requirement	EPAct 1992 Requirement	2009 Baseline Plumbing Code	2012 'Green Code' Requirement*	% Reduction in avg water use since 1980s
Residential Bathroom Lavatory Faucet	3.5+ gpm	2.5 gpm	2.2 gpm	2.2 gpm	1.5 gpm	**57%**
Showerhead	3.5+ gpm	3.5 gpm	2.5 gpm	2.5 gpm	2.0 gpm	**43%**
Toilet – Residential	5.0+ gpf	3.5 gpm	1.6 gpm	1.6 gpm	1.28 gpf	**74%**
Toilet - Commercial	5.0+ gpf	3.5 gpm	1.6 gpm	1.6 gpm	1.6 gpm	**68%**
Urinal	1.5 to 3.0+ gpf	1.5 to 3.0 gpf	1.0 gpf	1.0 gpf	0.5 gpf	**67%**
Commercial Lavatory Faucet	3.5+ gpm	2.5 gpm	2.2 gpm	0.5 gpm	0.5 gpm	**86%**
Food Service Pre-rinse Spray Valve	5.0+ gpm	No requirement	1.6 gpm (EPAct 2005)	No requirement	1.3 gpm	**74%**
Residential Clothes Washer	51 gallons/load	No requirement	26 gallons/load (2012 standard)	No requirement	16 gallons/load	**67%**
Residential Dishwasher	14 gallons/cycle	No requirement	6.5 gallons/cycle (2012 standard)	No requirement	5.0 gallons/cycle (ASHRAE S191P)	**64%**

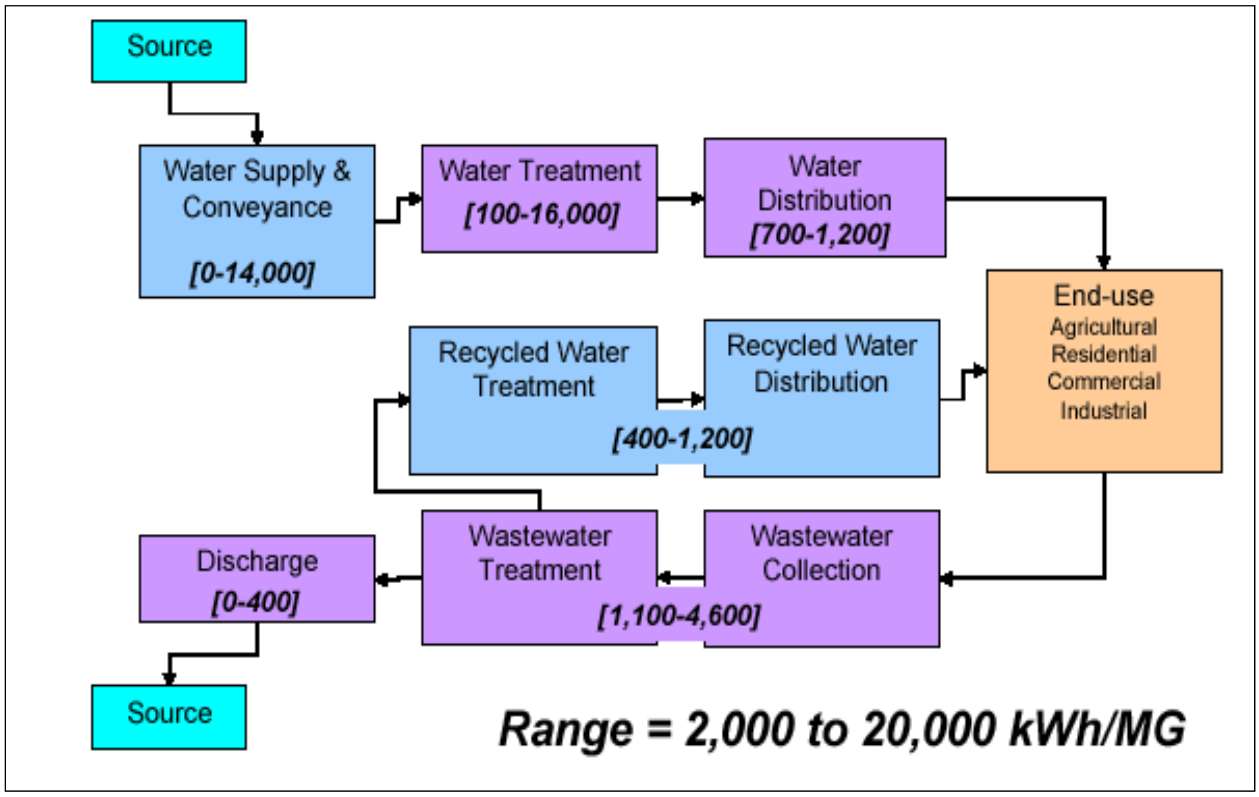
gpm: gallons per minute

gpf: gallons per flush

**International Association of Plumbing and Mechanical Officials (IAPMO) Green Plumbing and Mechanical Code Supplement (GPMCS)*

FIGURE 1

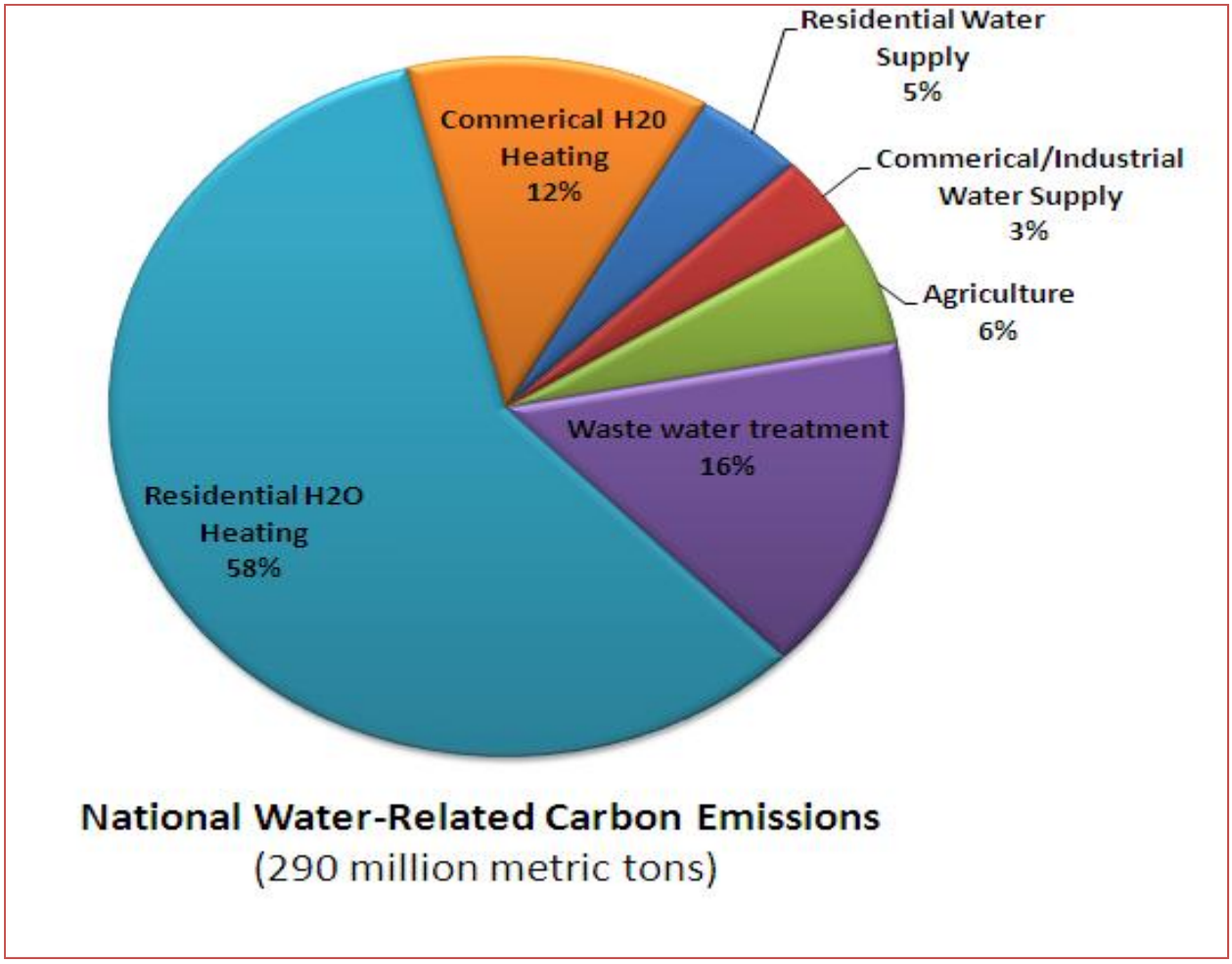
The Energy Intensity of Water



Source: *Integrated Energy Policy Report*, California Energy Commission, 2005.

FIGURE 2

The Carbon Footprint of Water



Source: *The Carbon Footprint of Water,* River Network, 2009.

TABLE 2

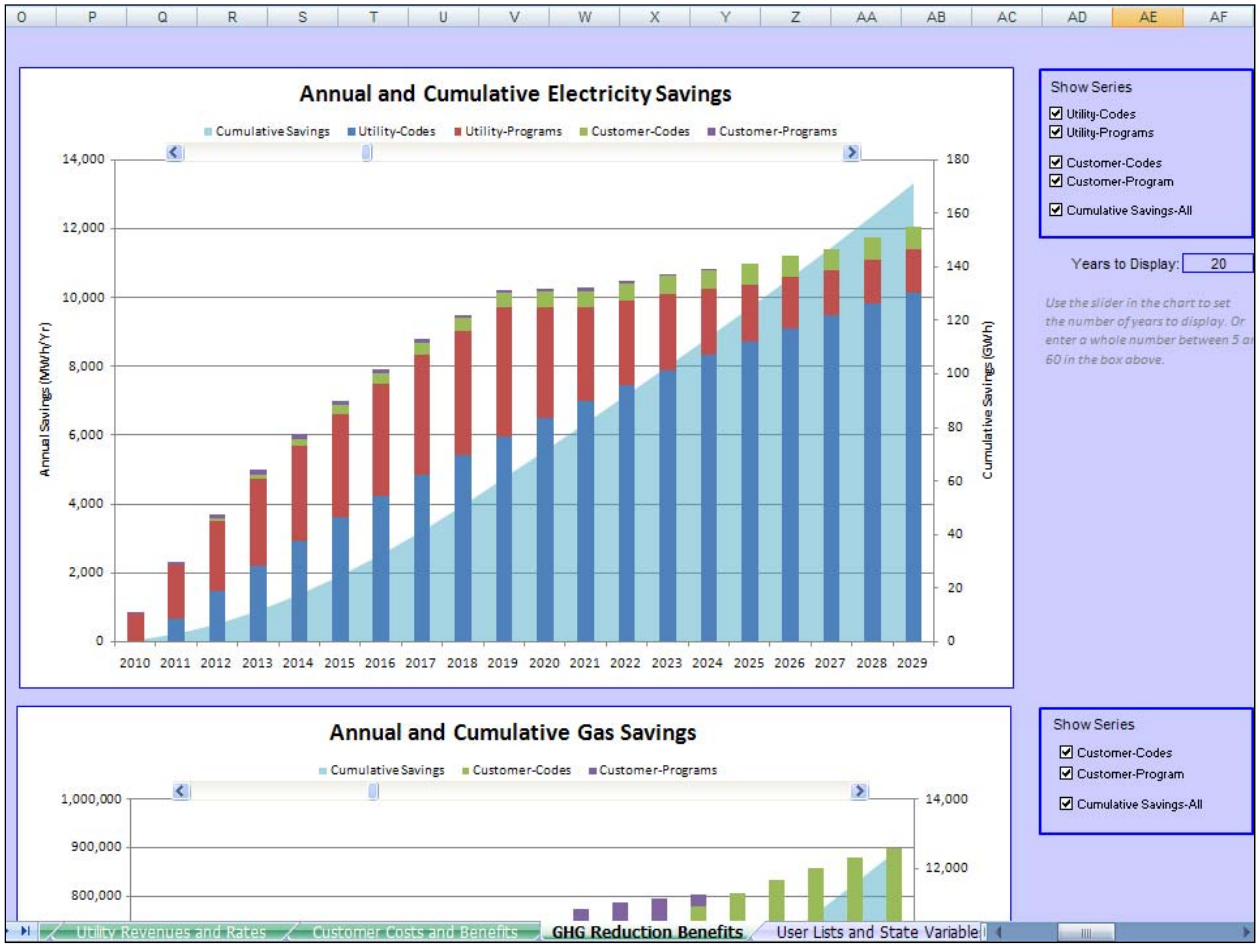
Retail Energy Intensities

	KWh/MG		
Local Supply Energy Intensity Defaults	**Low**	**High**	**Mid**
Local Surface Water	152	1213	682.5
Groundwater	906	2924	1915
Brackish Desalination	1415	1824	1619.5
Recycled Water	1072	3410	2241
Seawater Desalination	13800	13800	13800
Local Treatment Energy Intensity Defaults			
Coag, Flocc, Filtration	44	457	251
Microfiltration	220	718	469
Disinfection (Ozone)	168	272	220
Water Distribution Energy Intensity Defaults			
Booster Pumps			
Flat Terrain	48	60	54
Moderate Terrain	45	956	501
Hilly Terrain	379	1574	977
Pressure System Pumps	360	2569	1465
Wastewater Energy Intensity Defaults			
Wastewater Collection Pumps	2	455	229
Primary + Secondary	488	1622	1055
Primary + Secondary + Tertiary	1086	4531	2809
Microfiltration (incremental energy)	794	836	815
Reverse Osmosis (incremental energy)	1578	1595	1587
UV (incremental energy)	306	330	318

Source: "Embedded Energy in Water Studies, Study 2: Water Agency and Function Component Study and Embedded Energy-Water Load Profiles." Prepared for California Public Utilities Commission by GEI/Navigant Consulting. 2010, Table 4-6, p 85.

FIGURE 3

Sample Energy Savings from Water Efficiency Programs



Source: *Water Conservation Tracking Tool, Version 2,* Alliance for Water Efficiency, 2011.

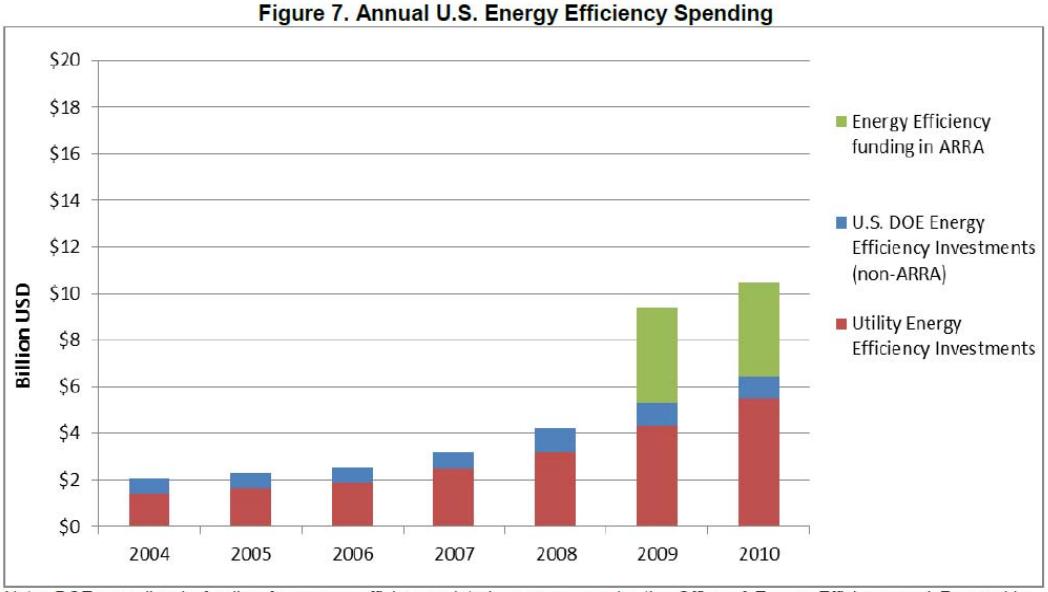
TABLE 3: Funded dollars distribution and percentage among Green Project Reserve categories for 19 study states*

Project	Green Infrastructure	Water Efficiency	Energy Efficiency	Environmental Innovation
Clean Water Projects	$179,194,094	$67,387,356	$295,948,968	$114,779,206
Drinking Water Projects	$6,200	$216,673,298	$66,759,344	$28,808,232
Total/percentage	$179,200,294/18%	$284,060,654/29%	$362,708,312/38%	$143,587,438/15%

*Dollars per category per project were taken directly from EPA's 3/25/2010 file sent to American Rivers.

Source: *Putting Green to Work: Economic Recovery Investments for Clean and Reliable Water*, American Rivers, 2010.

Figure 7. Annual U.S. Energy Efficiency Spending



Note: DOE spending is funding for energy efficiency-related programs run by the Office of Energy Efficiency and Renewable Energy. Utility investments are actual spending on electric and gas demand side management programs in 2004, 2006, 2007, and 2008, while figures for 2005 (CEE 2006), 2009, and 2010 are budgets (CEE 2011; Sciortino et al. 2011b).

Source: International Energy Efficiency Scorecard Report, ACEEE, 2012
http://www.aceee.org/research-report/e12a

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