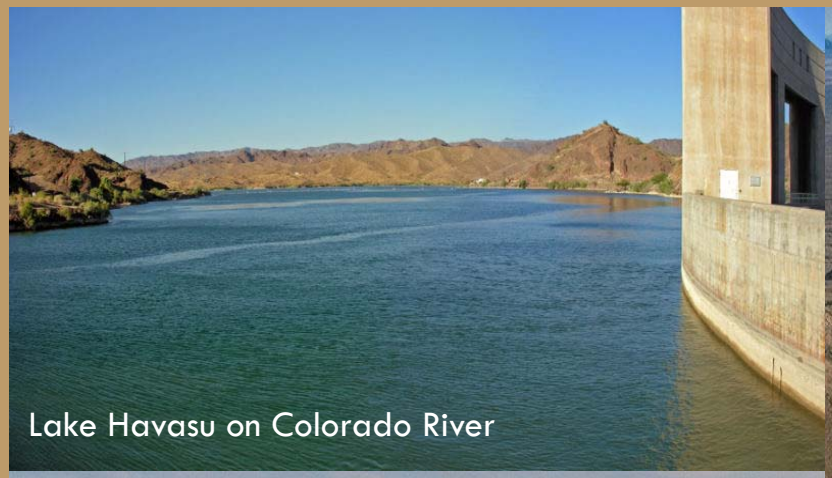
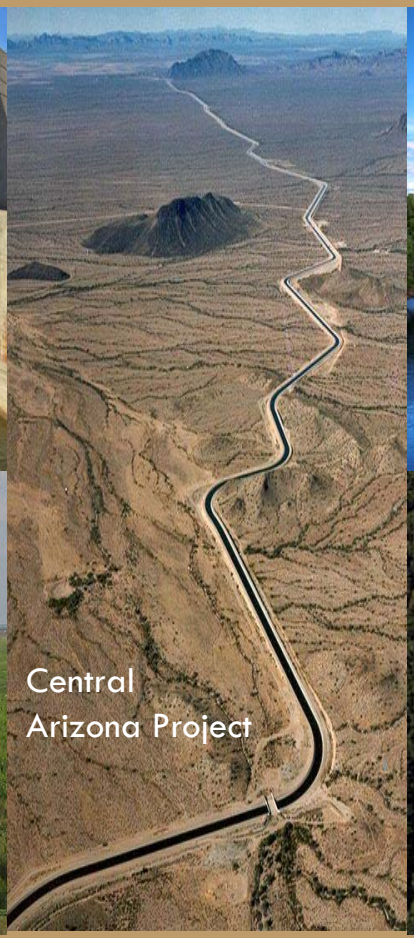

Lake Havasu on Colorado River


Central Arizona Project


Schuylkill River


California Aqueduct


Triangle Wastewater Treatment Plant

US WATER INFRASTRUCTURE ECONOMICS

Georgia Institute of Technology

Arka Pandit, John C. Crittenden and Ming Xu

Messner Project

Water Sectors and their Status:

Water Sector:	Grade (US):	Grade (GA):
Drinking (Potable) Water	D-	C+
Wastewater	D-	C
Municipal Wastewater		
Industrial Wastewater		
Stormwater	-	D+

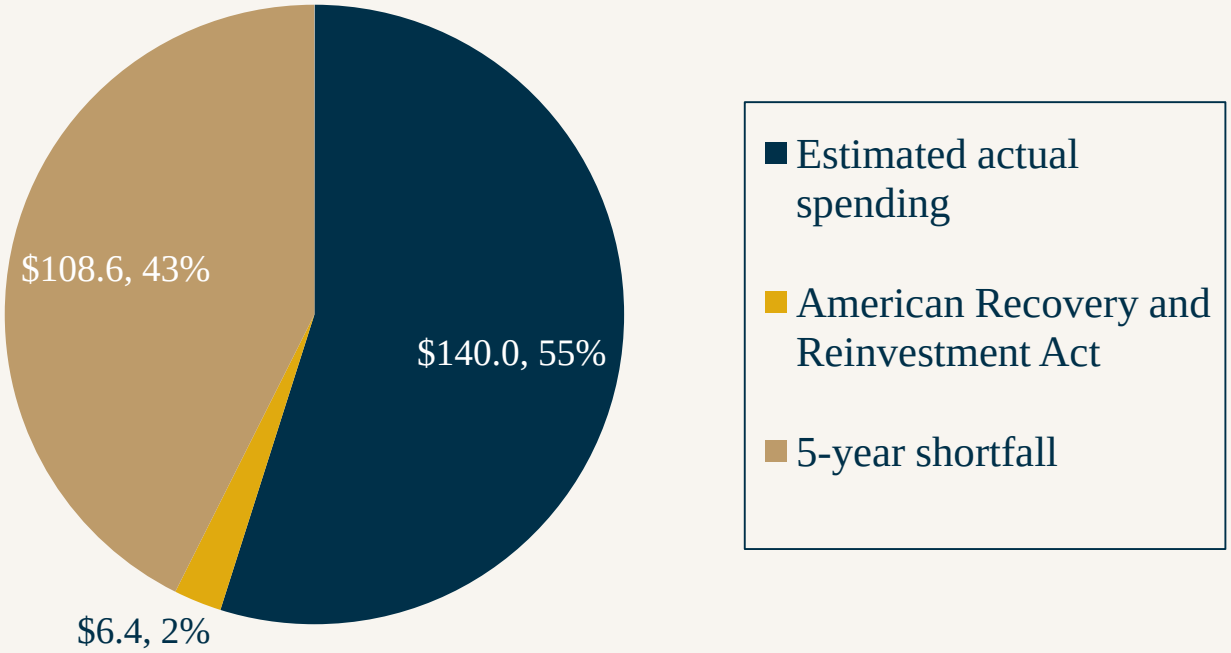
- Georgia doing slightly better than US average, but still not in good shape.

Why invest in Water Infrastructure?

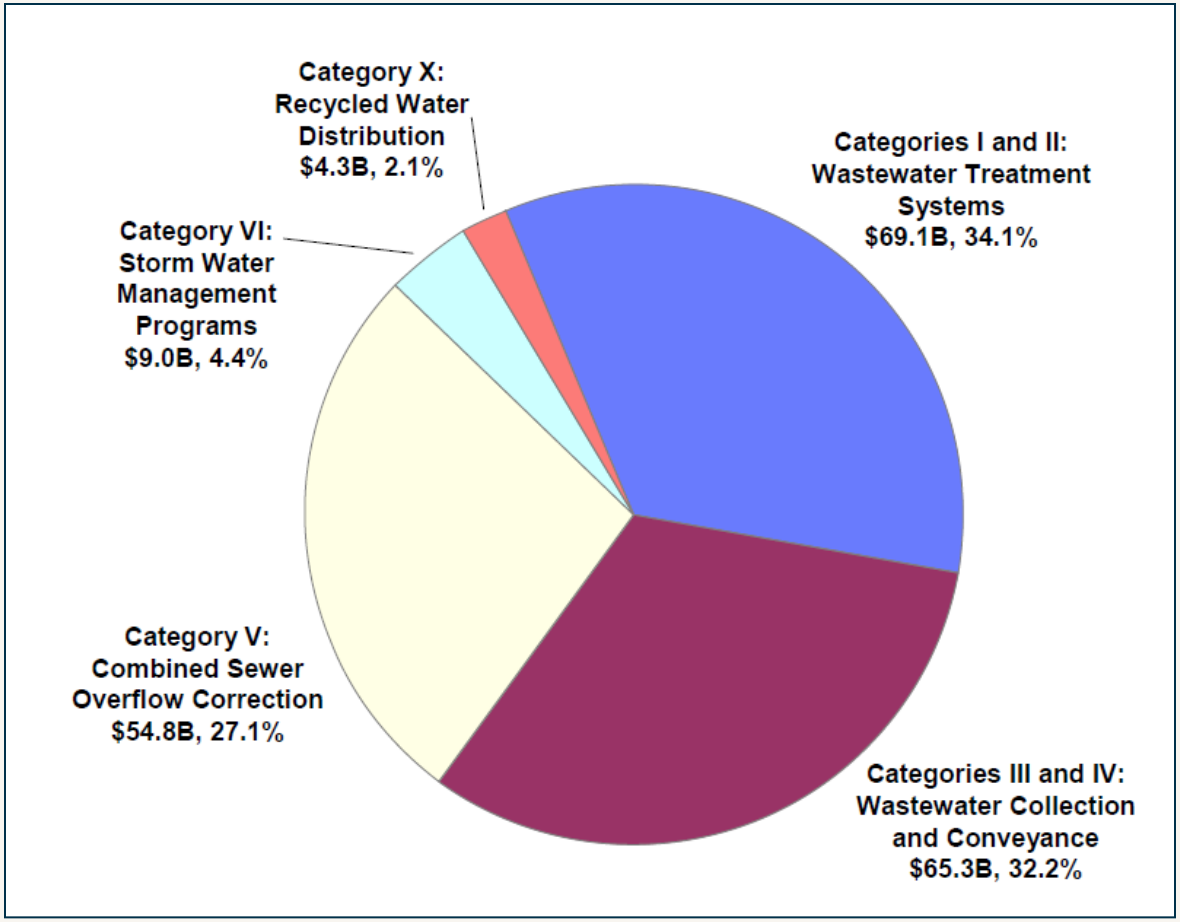
- Investment in water and wastewater systems pay substantial dividends to the environment, public health and the economy.
- Since the mid1970s, investments made in drinking water systems prevented 2 – 4.7 million cases of gastrointestinal illness per year[1].
- US portion of the Great Lakes generate about $7.0 billion and support 75K jobs in the fishing industry.
- Economic losses were estimated at $4.0 billion for the 1998 beach closure in New York and New Jersey.

Required Investment as in 2009:

5-year investment need (in Billions of dollars):
255.0



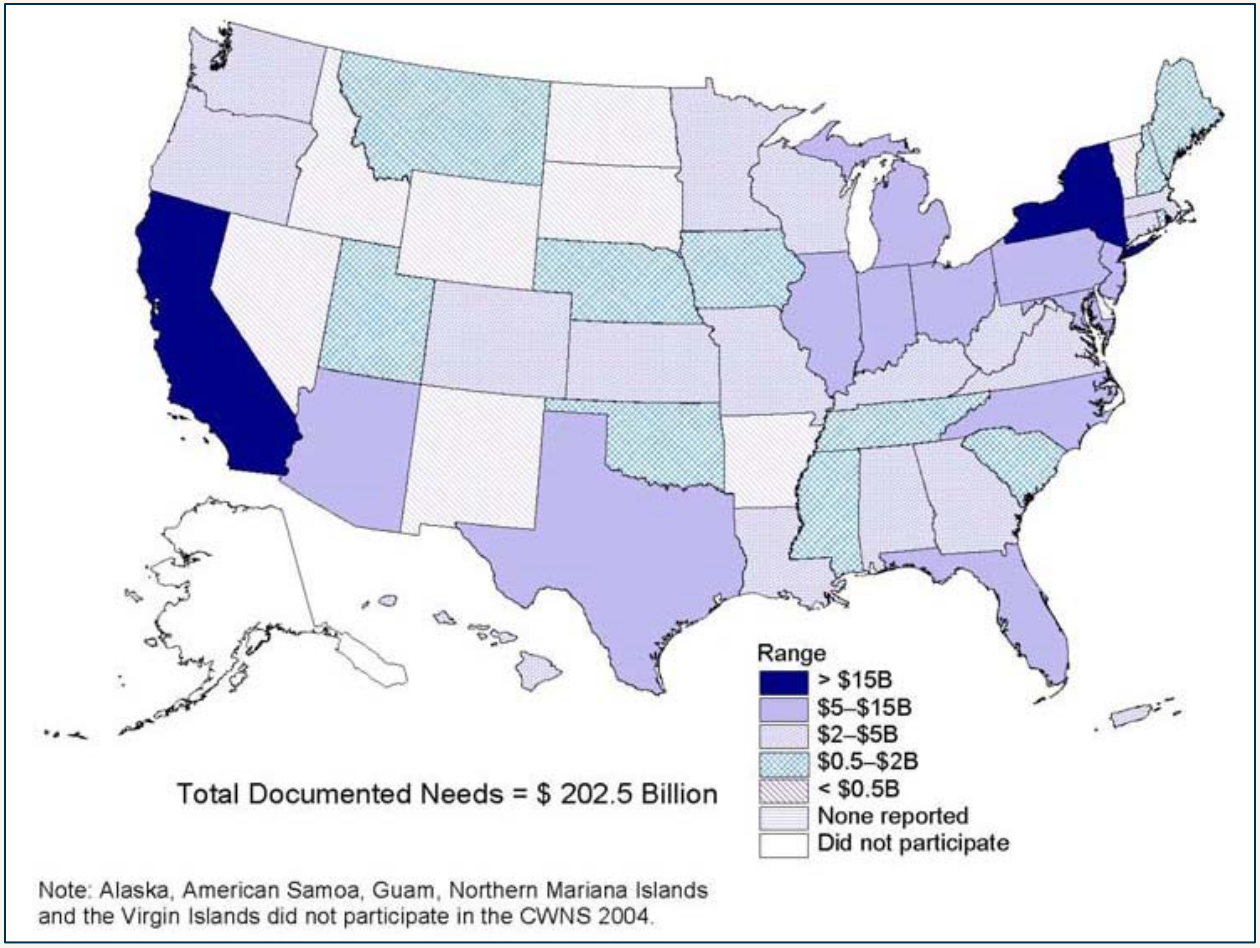
Category wise requirement for Wastewater sector:



CWNS 2004 total documented needs (January 2004 dollars in billions)

Source: Clean Watersheds Needs Survey (CWNS) ,2004 Report to Congress, US EPA

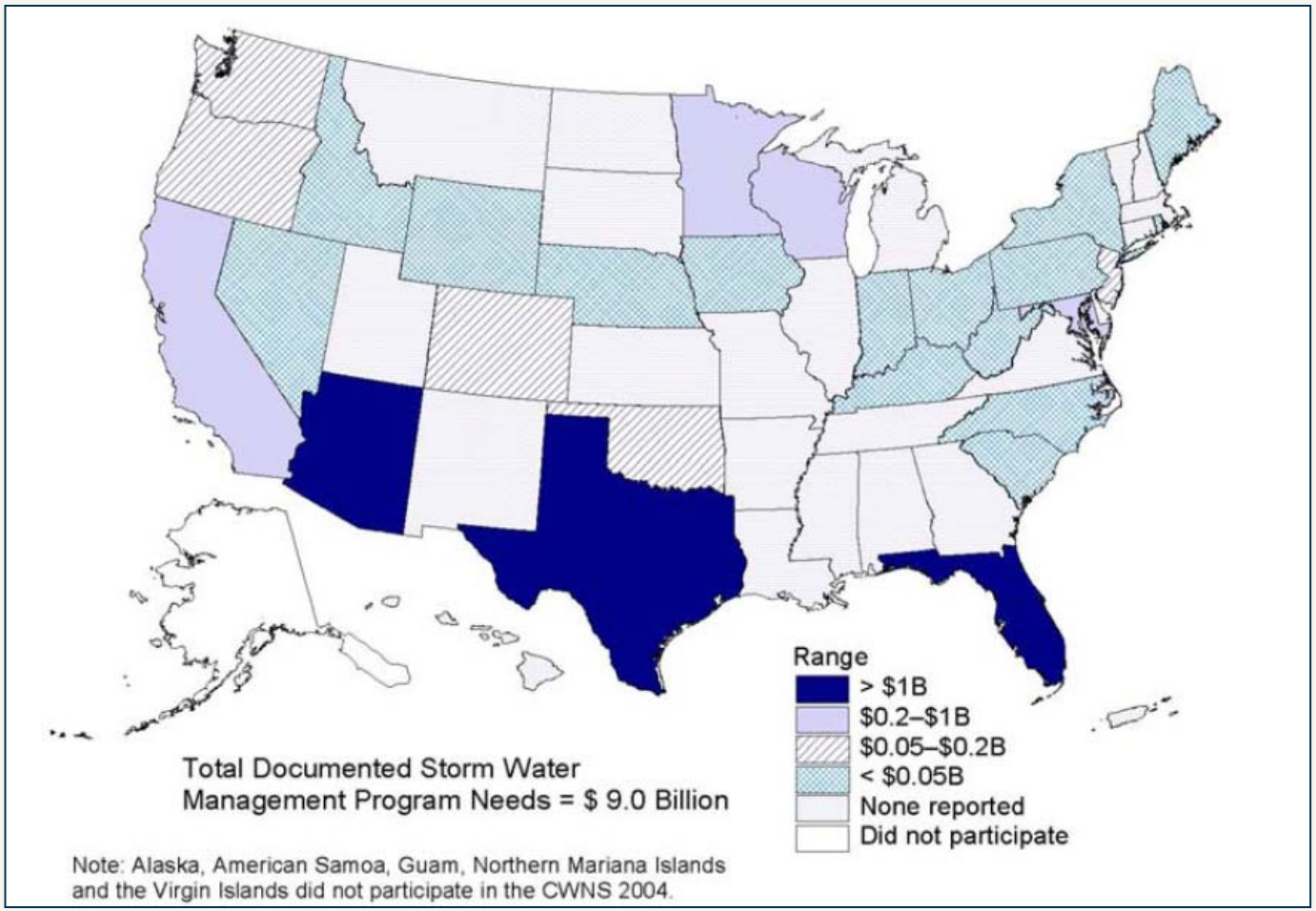
State wise distribution of investment requirement for Wastewater sector:



Distribution of total documented needs by State (January 2004 dollars in billions)

Source: Clean Watersheds Needs Survey (CWNS) ,2004 Report to Congress, US EPA

State wise distribution of investment requirement for Stormwater sector:



Distribution of total documented needs by State (January 2004 dollars in billions)

Source: Clean Watersheds Needs Survey (CWNS) ,2004 Report to Congress, US EPA

System wise requirement for Drinking water sector:

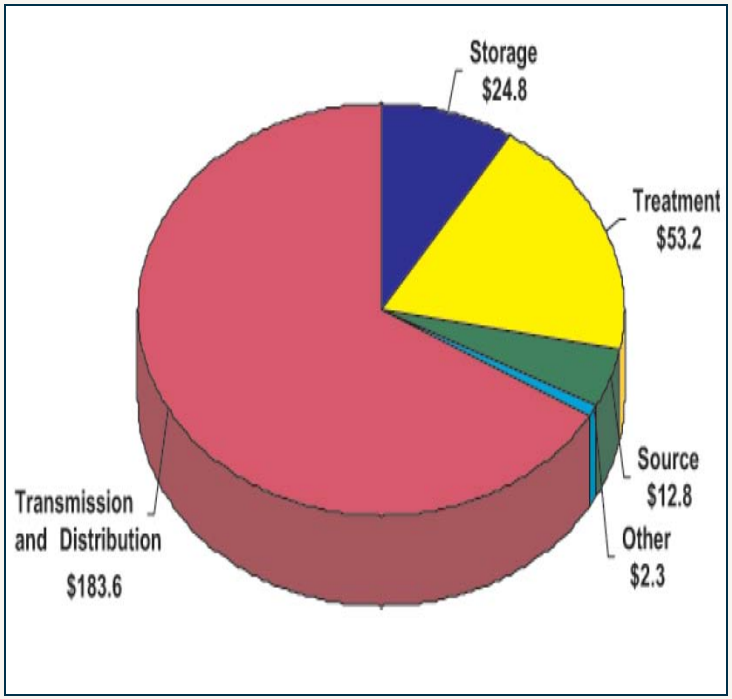
Total 20-Year Need (in billions of January 2003 dollars)

System Size and Type	Need
Large Community Water Systems (serving over 50,000 people)[1]	$122.9
Medium Community Water Systems (serving 3,301 to 50,000 people)[1]	$103.0
Small Community Water Systems (serving 3,300 and fewer people)[1, 2]	$34.2
Costs Associated with the Recently Promulgated Arsenic Rule[3]	$0.9
Not-for-profit Noncommunity Water Systems[4]	$3.4
American Indian and Alaska Native Village Water Systems[4, 5]	$2.4
Subtotal National Need	**$266.9**
Costs Associated with Proposed and Recently Promulgated Regulations (Taken from EPA Economic Analyses)	$9.9
Total National Need	**$276.8**

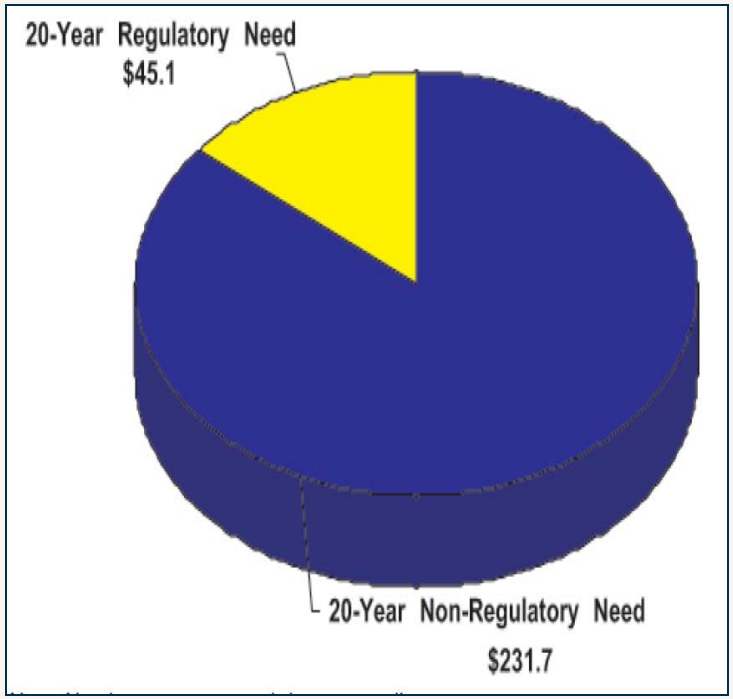
Source: Drinking Water Infrastructure Needs Survey and Assessment, 2003 Report to Congress, US EPA

Distribution of investment required:

Total 20 year need by projects:



20 year Regulatory and Non-Regulatory need:



Both graphs are in billions of January 2003 dollars

Source: Drinking Water Infrastructure Needs Survey and Assessment, 2003 Report to Congress, US EPA

Some economic facts:

- There being no increase in investment, annual shortfall for different sectors in capital infrastructure:
  - Drinking Water: $11.00 Billions
  - Wastewater: $13.00 Billions
  - *However, this does not take into account any growth in the demand for the next 20 years.*
- $390.00 billions need to be spent on replacing aging wastewater infrastructure systems and building new facilities in the next two decades.
- Federal assistance though the drinking-water state revolving loan fund (SRF) program was $9.80 billions in total, from 1997-2008, which is slightly more than the projected annual gap for those years.

Why is the need so large?

- Increasingly stringent federal requirements to improve water quality and drinking water safety.
- Increasing water supply costs as least-cost sources are depleted and the quality of raw water declines.
  - Increased requirement of material and energy to use more complex technologies in order to achieve the desired standard.
- Cost of replacing aging and failing water distribution systems and waste-water collection systems for the first time.

Impact of the Investment:

The impact of the investment can be categorized in four major categories:

- Economic Impact
- Environmental Impact
- Human Health Impact

Economic Impact

Economic Impact:

- Direct investment on the order of $10 billion in water/energy efficiency programs has the potential to boost U.S. GDP by $13 to $15 billion and employment by 150,000 to 220,000 jobs.
- The U.S. Conference of Mayors estimates that every job created in rebuilding our water systems creates nearly 3.7 jobs elsewhere, and every dollar invested in water infrastructure adds $6.35 to the national economy.

Job creation across different sectors:

Distribution of Benefits from $10 Billion of Direct Investment in Water/Energy Efficiency Programs

Economic Sector (2-digit NAICS)	GDP (Million $)	Employment (Jobs)
Ag, Forestry, Fish & Hunting	$89	1,706
Mining	$181	591
Utilities	$232	438
Construction	$1,112	16,917
Manufacturing	$2,313	24,315
Wholesale Trade	$1,016	8,353
Retail Trade	$1,398	24,768
Transportation & Warehousing	$357	5,235
Information	$431	2,459
Finance & Insurance	$753	5,594
Real Estate & Rental	$1,054	5,500
Professional- Scientific & Tech Svcs	$818	9,123
Management of Companies	$305	2,242
Administrative & Waste Services	$682	18,191
Educational Svcs	$57	1,651
Health & Social Services	$437	8,328
Arts- Entertainment & Recreation	$78	2,059
Accommodation & Food Services	$220	7,077
Other Services	$1,113	17,548
Government & Non NAICs	$857	13,409
Total	$13,501	175,504

Source: Transforming Water: Water Efficiency as Stimulus and Long-Term Investment, Alliance for Water Efficiency, 2008

Comparison of investment made and projects ready for start:

- The Stimulus Bill, contained $2.0 billion in new funds for the Drinking Water State Revolving Fund (SRF) program and $4.0 billion for the wastewater SRF program.
- AWWA had identified more than $10.0 billion in "shovel-ready" drinking water projects that the stimulus funds could benefit and they could start as early as within 120 days of receiving the fund.

Environmental & Human Health Impact

Environmental Impacts:

- The eradication of Combined Sewer systems would negate the chances of Combined Sewer overflow, a major cause of watershed impairment.
- Eutrophication being a major global issue, tertiary treatment of wastewater effluent is required to meet the standard[1]. Portions of the Gulf of Mexico between Texas and Florida is so hypoxic that it is detrimental to the fish population there.
- Ensuring a healthy ecosystem thus preserving biodiversity.

Human Health Impacts:

- Pharmaceutical and personal care products are increasingly being found in the water supplies, which requires advanced treatment techniques to ensure the water safety.
- While the population is on the increase, current infrastructure fails short to meet the present need. An adequate infrastructure is required to serve the population without risking human health.

Need for Federal Support

Limitation of Local Revenue:

Limitation of local revenue generation can be attributable to:

- Public misperception of need
- Political resistance to change in fee structure
  - 22% of US population pay over 4% their annual income for water and wastewater (considered to be the affordability limit)
- Equity and affordability issues

Benefits of a Federal Role:

- Size of the challenge
  - The sheer magnitude of the anticipated funding provides enough rationale for federal involvement.
- Validation of needs
  - Increases the public awareness
- Program Stability and Predictability
- Varied options of financing

Conclusions:

"If the nation fails to meet the investment needs of the next 20 years, it risks reversing public health, environmental, and economic gains of the past three decades."

– America's Infrastructure report Card, ASCE, 2009.

References:

- 2009 ASCE Georgia Infrastructure Report Card
- America's Infrastructure report Card, ASCE, 2009
- AWWA Issue Agenda, Job creation
- 'Sudden Impact' – a Clean Water Council Report, 2009
- 'Transforming Water: Water Efficiency as Stimulus and Long-Term Investment', Alliance for Water Efficiency, 2008
- 'Clean & Safe Water for the 21st Century' – A Water Infrastructure Network Report
- 'Drinking Water Infrastructure Needs Survey and Assessment', Third Report to Congress, Environmental Protection Agency (2005).
- 'Clean Watersheds Needs Survey (CWNS)'. Environmental Protection Agency (2005).