

# This presentation premiered at WaterSmart Innovations

[watersmartinnovations.com](http://watersmartinnovations.com)



# Water Conservation in Buildings:

## Water Efficiency Enhancing Sustainable Development

 **GEBERIT.**

 **CHICAGO  
FAUCETS**

a Geberit company

WaterSmart  
Innovations

October 2008

# Water Conservation in Buildings:

## Overview



- Water Conscience: Essential for Life
- The Power of Water
- Design Tools
- High Efficiency Solutions

- Water is the principal substance that separates our planet from all others and makes life possible... Water is essential to life, good health and economic development.
  - Food
  - Energy
  - Transportation
  - Nature
  - Leisure
  - Identity
  - Culture
  - Social norms



## Water Conservation in Buildings:

### **Water Conscience: Essential for Life**



- Less than one-fifth of one percent of our planet's water is accessible fresh water, and only about 30 percent of that is potable.
- Over 80 percent of municipally supplied water is used in buildings.
- Every \$1 spent on water and sanitation creates, on average, another \$8 in costs averted and productivity gained. (Source: 2006 United Nations Human Development Report)

## Water Conservation in Buildings:

### **Water Conscience: Essential for Life**



- Sustainability and social responsibility are closely interrelated.
- From a manufacturing viewpoint, this simply means to make and deliver a product using the least amount of our natural resources as possible.
- Quality of life is improved on a sustainable basis through innovative solutions in plumbing technology.
- Integrated systems solutions provide efficient water use.
- Efficient water use is KEY to sustainable development.

## Water Conservation in Buildings:

### The Power of Water



- There's a reason that water has become a national priority. A recent government survey showed at least 36 states are anticipating local, regional, or statewide water shortages by 2013. (Source: EPA)
- By using water more efficiently, we can:
  - Help preserve water supplies for future generations
  - Save money
  - Protect the environment

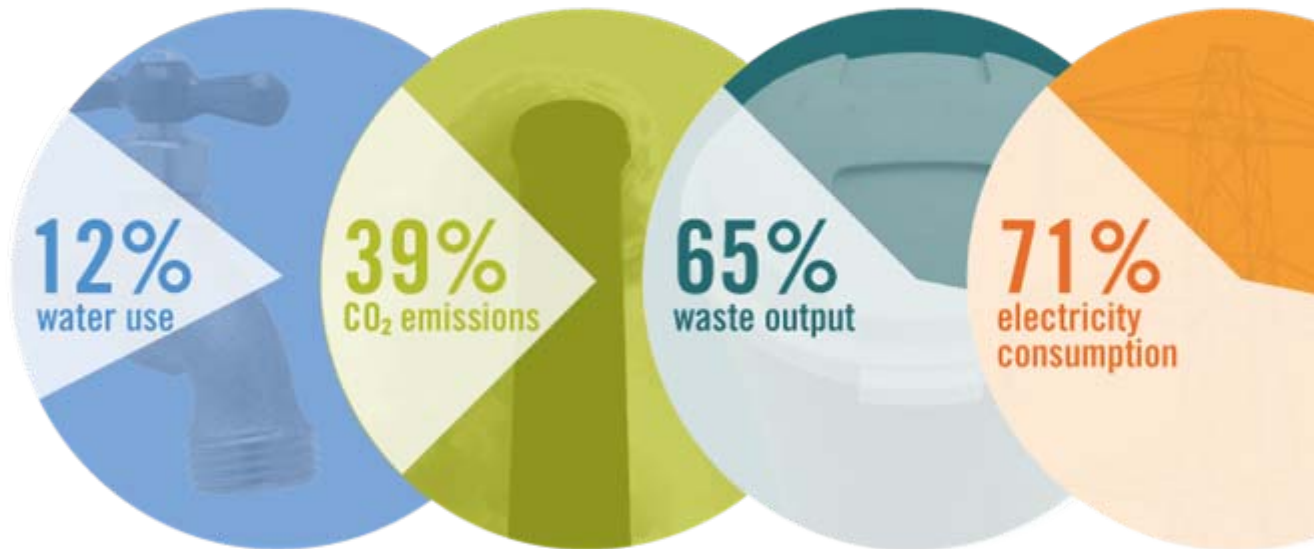


# Water Conservation in Buildings:

## The Power of Water



### U.S. Building Impacts:



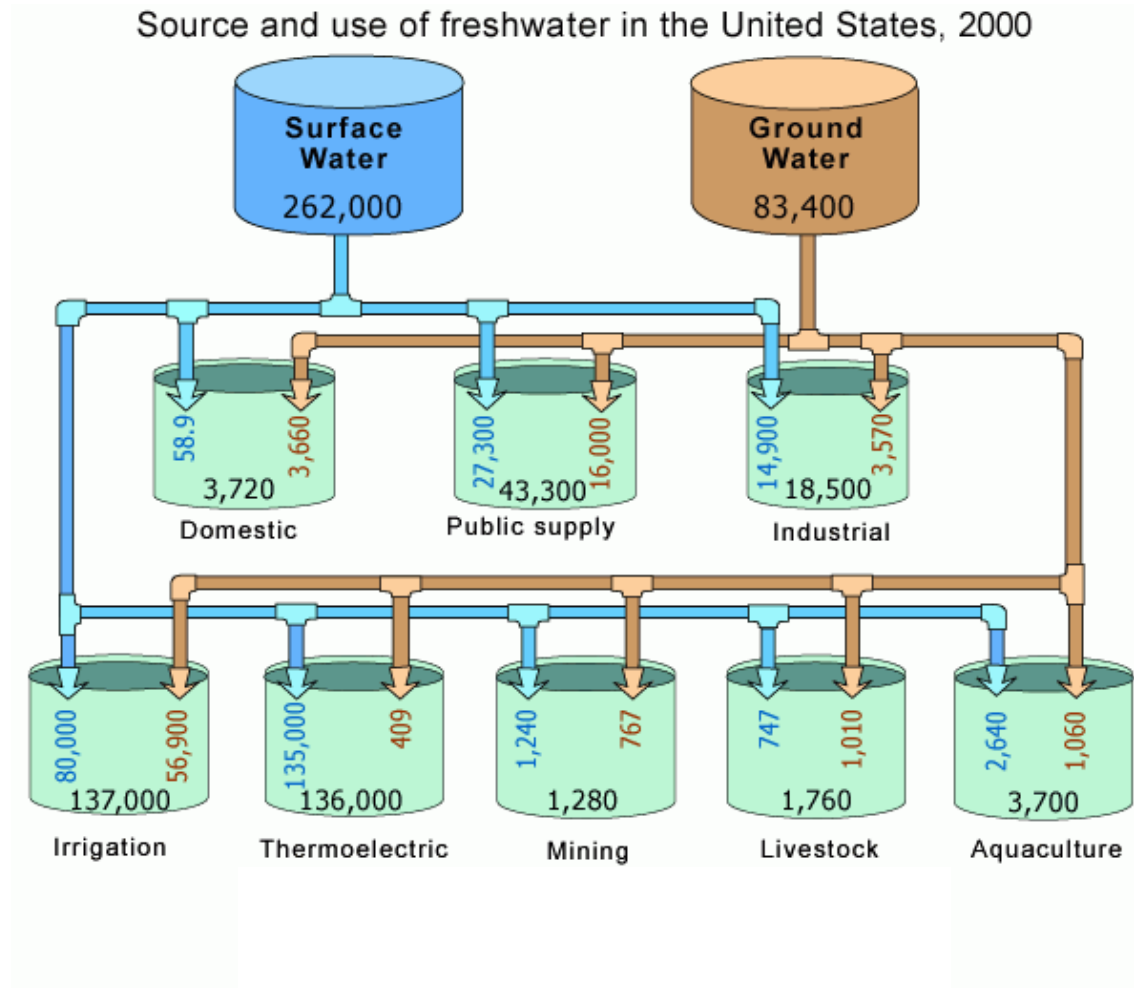
Source: USGBC

Water Conservation in Buildings



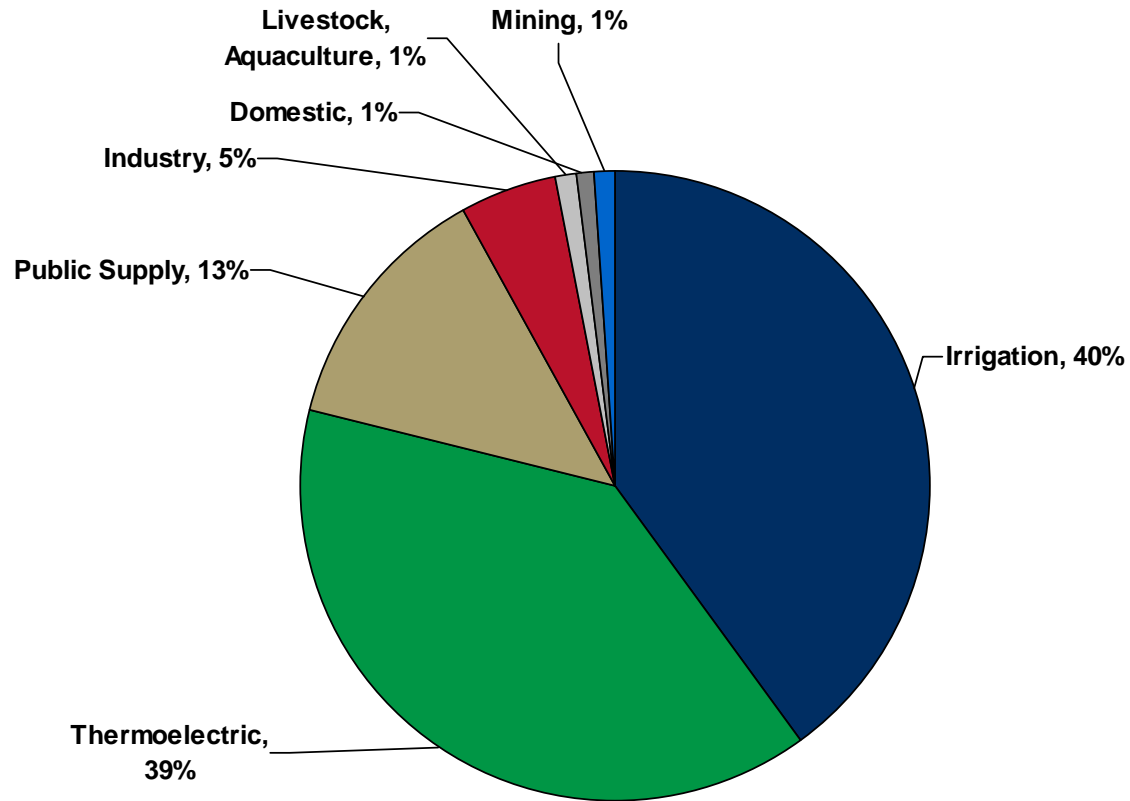
# Water Conservation in Buildings:

## The Power of Water



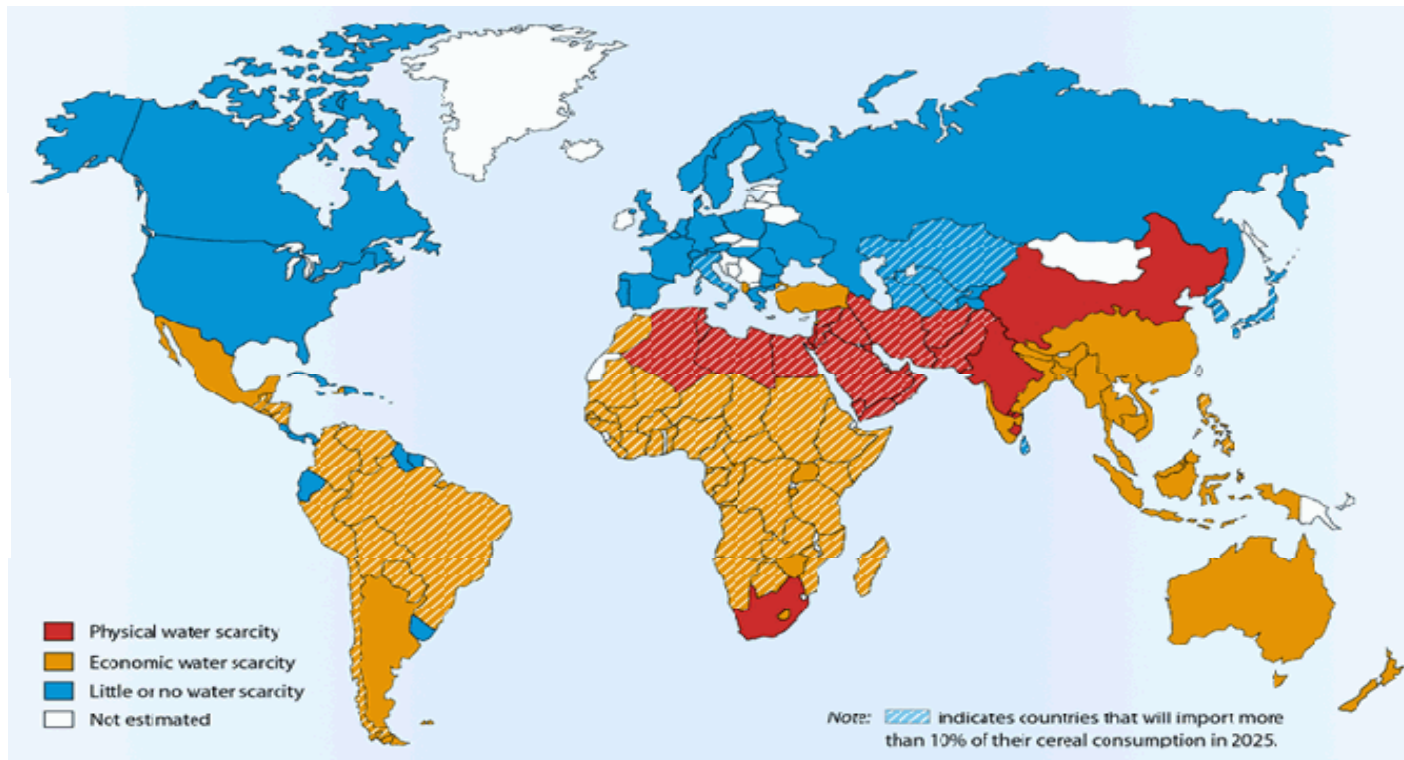
Source: USGS

### ■ Freshwater Usage in the U.S.



Source: USGS

### ■ Projected Water Scarcity by 2025



Source: IWMI

- Helping to integrate efficiency into total building design, sustainable design has been made easier with guidance and building environmental design tools.

- ASHRAE GreenGuide
- Alliance for Water Efficiency
- USGBC LEED®
- EPA WaterSense®



- Each guideline requires indoor water usage to be reduced by 20 percent or more from the **Energy Policy and Conservation Act (EPAct)** guideline.
  
- **EPAct Guideline**
  - Toilets – 1.6 gallons per flush (GPF)
  - Urinals – 1.0 GPF
  - Showerheads – 2.5 GPM @ 80 PSI
    - or 2.2 GPM @ 60 PSI
  - Commercial Faucets – 0.5 GPM @ 80 PSI
  - Metering faucets – 0.25 gallon per cycle @ 80 PSI

#### ■ ASHRAE GreenGuide

- GreenGuide is a reference book intended for mechanical engineers new to the field of green design
- Covers green design techniques applicable to related technical disciplines, such as plumbing and lighting, and it addresses how mechanical and electrical systems may interact with and be influenced by architectural design
- Includes a new chapter on LEED® guidance for mechanical engineers and a new chapter on building systems' impact on the local environment, both indoor and outdoor

### ■ ASHRAE GreenGuide

Options that should be considered in design of water-conserving systems include:

- Infrared faucet sensors
- Delayed action shutoff or automatic mechanical shutoff valves (metering faucets at 0.25 gal per cycle [0.95 L/cycle])
- Low-flow or ultra-low-flow toilets
- Lavatory faucets with flow restrictors
- Low-flow kitchen faucets
- Domestic dishwashers that use 10 gal (38 L) per cycle or less
- Commercial dishwashers (conveyor type) that use 120 gal (455 L) per hour
- Waterless urinals
- Closed cooling towers (to eliminate drift) and filters for cleaning the water.



### ■ Alliance for Water Efficiency

- North America's voice for water efficiency and conservation.
- Seven key tasks to support and enhance water conservation efforts, providing benefit to water utilities, water conservation professionals, planners, regulators, and consumers:
  1. **Stand as a clear and authoritative national voice for water efficiency.**
  2. **Provide comprehensive information about water-efficient products, practices, and programs - what works and what doesn't.**
  3. **Represent the interest of water efficiency in the development of codes and standards.**
  4. **Transform the market for fixtures and appliances.**
  5. **Coordinate with green building initiatives to institutionalize water efficiency.**
  6. **Train water conservation professionals.**
  7. **Educate water users.**

#### ■ LEED®

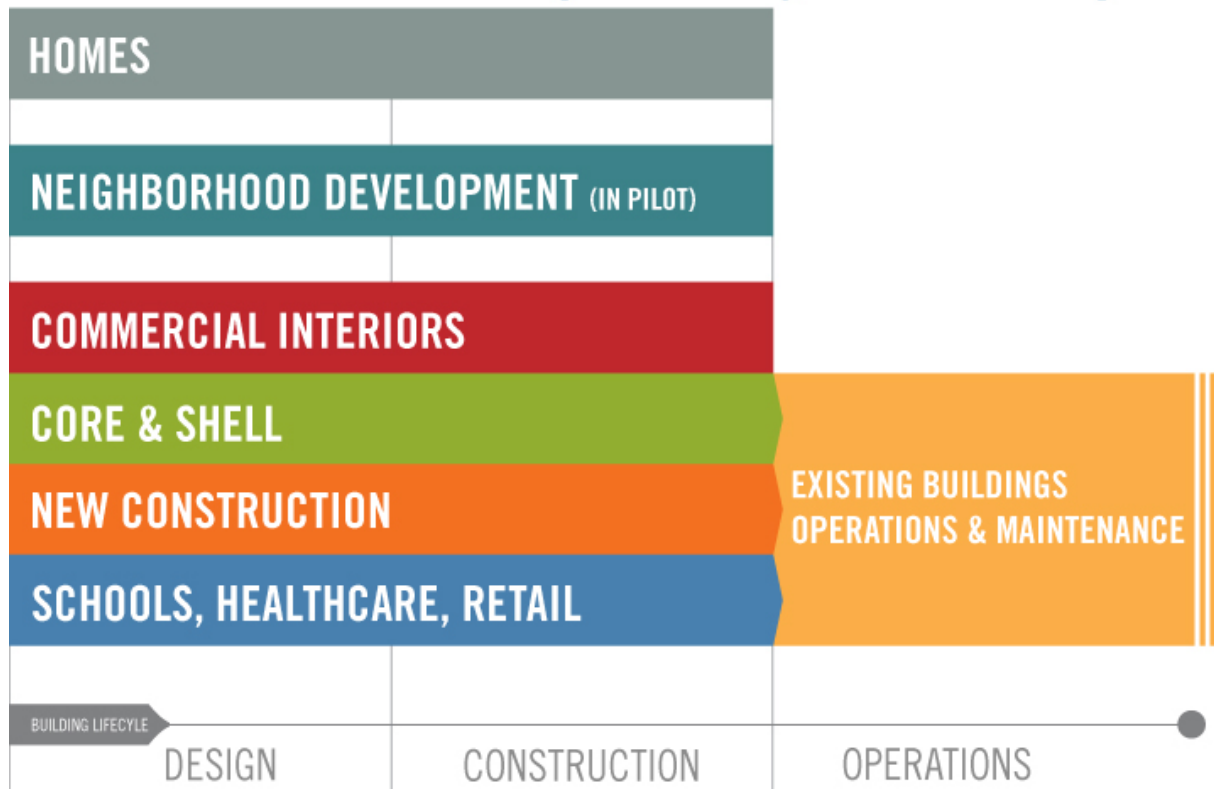
- **The Leadership in Energy and Environmental Design (LEED)** Green Building Rating System is a voluntary, consensus-based national rating system for developing high-performance, sustainable buildings.
- LEED addresses all building types and emphasizes state-of-the-art strategies in five areas:
  - Sustainable site development
  - Water savings
  - Energy efficiency
  - Materials and resources selection
  - Indoor environmental quality

# Water Conservation in Buildings: Environmental Design Tools



## ■ LEED®

**LEED address the complete lifecycle of buildings:**



Source: USGBC

# Water Conservation in Buildings: Environmental Design Tools



## ■ LEED®

**USGBC has four levels of LEED:**



Source: USGBC

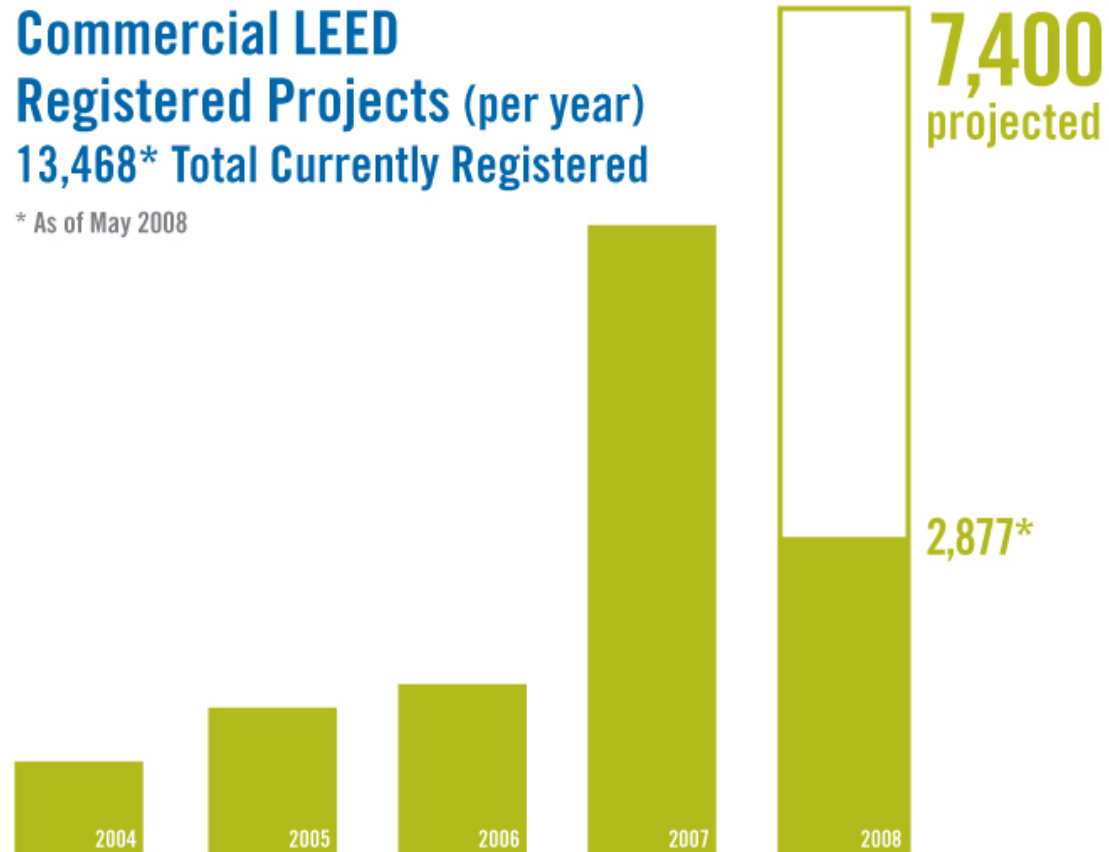
# Water Conservation in Buildings: Environmental Design Tools



## ■ LEED®

**Commercial LEED  
Registered Projects (per year)**  
13,468\* Total Currently Registered

\* As of May 2008



Source: USGBC

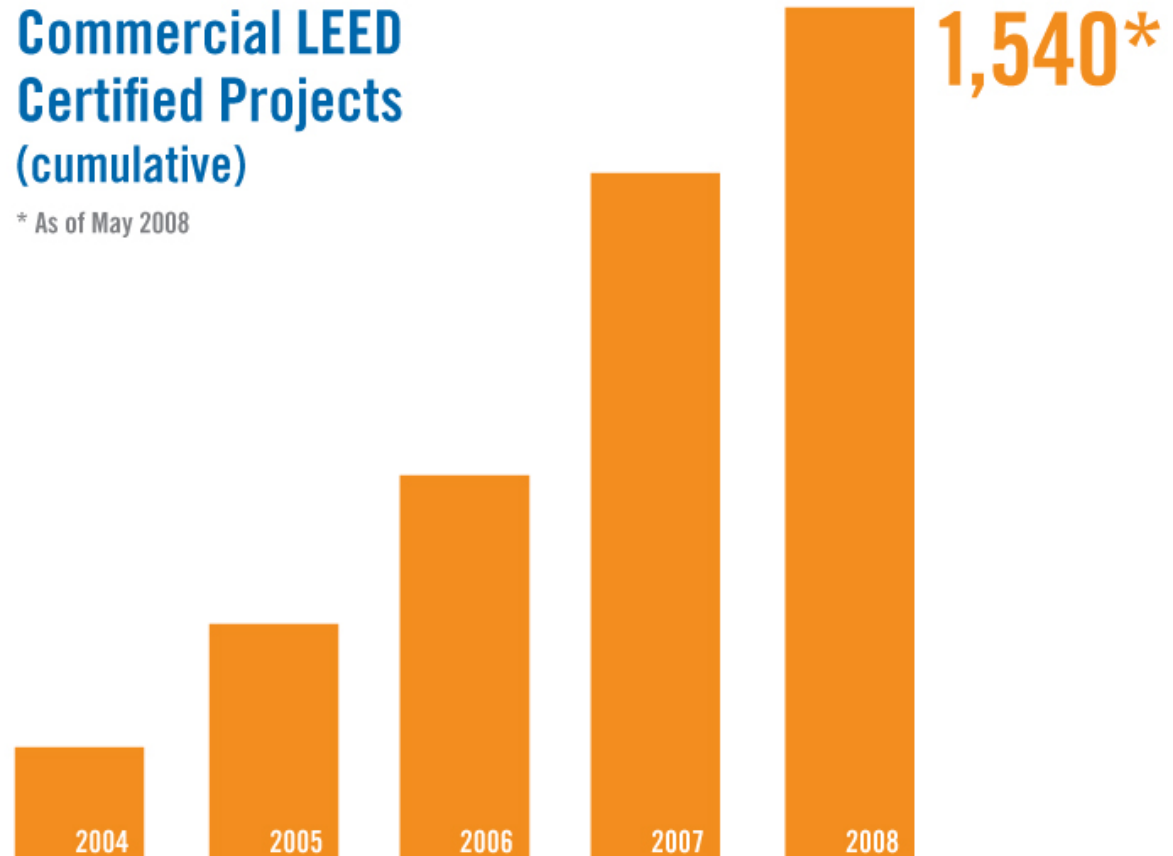
# Water Conservation in Buildings: Environmental Design Tools



■ LEED®

## Commercial LEED Certified Projects (cumulative)

\* As of May 2008



Source: USGBC

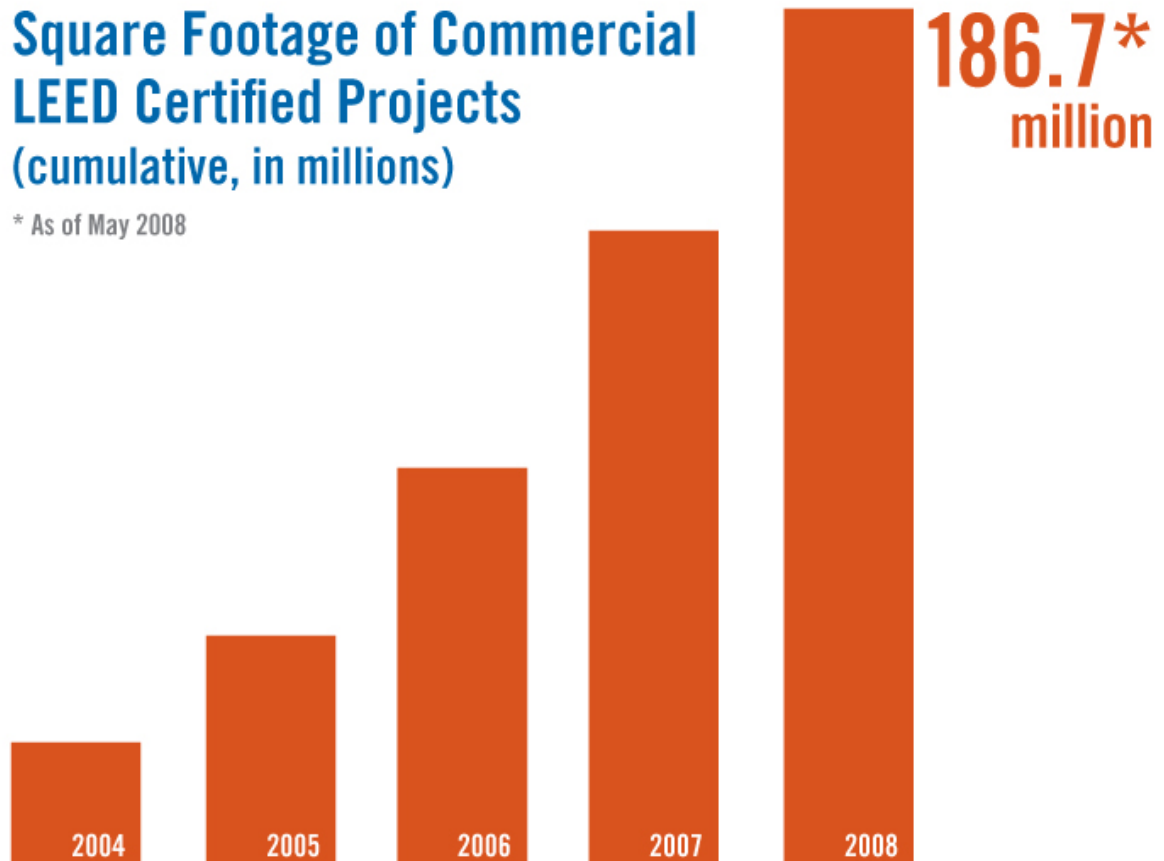
# Water Conservation in Buildings: Environmental Design Tools



## ■ LEED®

### Square Footage of Commercial LEED Certified Projects (cumulative, in millions)

\* As of May 2008



Source: USGBC



#### ■ LEED® – NC

##### - Water Efficiency Credit 2: Innovative Wastewater Technologies

- **Intent:** Reduce generation of wastewater and potable water demand, while increasing the local aquifer recharge.
  
- **Requirements:**
  - OPTION 1: Reduce potable water use for building sewage conveyance by 50% through the use of **water-conserving fixtures** (water closets, urinals) or non-potable water (captured rainwater, recycled greywater, and on-site or municipally treated wastewater).
  - OPTION 2: Treat 50% of wastewater on-site to tertiary standards. Treated water must be infiltrated or used on-site.

#### ■ LEED®

##### - Water Efficiency Credit 3: Water Use Reduction

- **Intent:** Maximize water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.
- **Requirements:** Employ strategies that in aggregate use 20% less water (Credit 3.1) or 30% less water (Credit 3.2) than the water use baseline calculated for the building (not including irrigation) after meeting the Energy Policy Act of 1992 fixture performance requirements. Calculations are based on estimated occupant usage and shall include only the following fixtures (as applicable to the building): water closets, urinals, lavatory faucets, showers and kitchen sinks.

#### ■ EPA WaterSense®

- WaterSense – a partnership program sponsored by the U.S. Environmental Protection Agency, seeks to protect the future of our nation's water supply.
- WaterSense will help protect the future of our nation's water supply by promoting water efficiency and enhancing the market for water-efficient products, programs, and practices.
- WaterSense helps identify water-efficient products and practices.
- WaterSense makes it easy for Americans to save water and protect the environment.

### ■ EPA WaterSense®

- WaterSense as a national brand for water efficiency.
  - Bring water-efficient products to market thru partnerships with:
    - Manufacturers
    - Retailers and distributors
    - Local and state governments
    - Utilities
    - Water districts
    - Trade associations
    - Nonprofits
    - Certified irrigation professionals
    - Professional certifying organizations

#### ■ EPA WaterSense®

##### - HET

An HET is defined as a toilet that flushes at 20 percent or better below the standard 1.6 gpf level. All new toilets are required by federal law to use 1.6 gallons per flush (gpf) or less.

#### **HETs fall into three distinct categories:**

1. Dual-flush models
2. Gravity flush models
3. Pressure-assist models



#### ■ EPA WaterSense®

##### - HET

1. Dual flush toilet is a toilet that allows the user to choose between a "short flush" that uses between 0.8 and 1.0 gallons when there is only liquid waste in the bowl to be flushed, and a "full flush" using 1.6 gallons when solid waste is to be flushed. Many new models have a combined or average flush volume of 1.2 GPF.
2. The 1.0 GPF pressure-assist single flush toilet uses compressed air to create a powerful flush to push the waste out of the bowl.
3. Gravity flush toilets is the most common type of toilet found in homes. Gravity flush HET's are designed to flush with 1.3 GPF or less, and use the weight of the water along with gravity to pull the waste from the bowl.

- Delivering the same or better service for less water by using better technology.
- Toilets are by far the main source of water use in the home, accounting for nearly 30 percent of residential indoor water consumption.
- Faucets follow, with about 16 percent of residential indoor water consumption.



- Plumbing innovations such as high-efficiency, dual-flush toilets help empower users to manage water shortages.
- Dual-flush HETs are gaining popularity because they easily meet performance standards.
- High-efficiency, dual-flush toilet regulates the flushing volume and enables users to use considerably less water for flushing.
- Two modes of flushing waste down the toilet:
  - One full flush for solid wastes that uses the standard 1.6 GPF
  - One low flush for liquid wastes that typically uses half of the full flush, or about 0.8 to 1.1 GPF



## Water Conservation in Buildings:

### High-Efficiency Solutions

**GEBERIT**

**CHICAGO  
FAUCETS**  
a Geberit company

- The dual-flush toilets can be disguised as standard tank-type toilets. The only visible difference is that the handle or the flushing mechanism looks and functions differently.
- When using dual-flush toilets, the liquid waste mode is used more often than the full flush.
- Conservative ratio used is 2:1 – two low volume flushes and one large volume flush.
- For a family of 4, equates to an approximate 10,000 gallons of water savings per year.



### Bottom Line

- The average household spends as much as \$500 per year on its water and sewer bill.
- Homeowners could save about \$170 per year just by making a few simple changes to use water more efficiently.

### Benefits

- Possibly the most attractive feature of the dual flush is it does not require significant behavioral changes for benefits to be realized.
- End users can continue to use the toilet with the same frequency as they normally do and still save water, energy and money.
- Greater efficiency at the end-user level translates into resource and monetary benefits at the water utility level.

### ■ Manual faucets

- Manual metering faucets deliver a precise amount of water for a specified period of time.
- Can be easily set to cycle intervals as low as two seconds.
- Using 0.5, 1.0 or 1.5 GPM pressure compensating outlet devices on these faucets allows for additional water savings while maintaining consistent flow over varying pressure ranges.



# Water Conservation in Buildings: High-Efficiency Solutions



## ■ Electronic faucets

- Reduce water consumption by using 0.5 GPM pressure compensating outlet device.
- Electronic metering that allows you to easily adjust cycle time to reduce water usage.



- Saving water also means saving costs for electric power, gas, chemicals, and wastewater disposal.
- Efficient water use also can have major environmental, public health, and economic benefits by helping to improve water quality, maintain aquatic ecosystems, and protect drinking water resources.
- Efficient use of water, through behavioral, operational, or equipment changes, if practiced broadly, can help mitigate the effects of drought.



Water Conservation in Buildings:

**Closing**



Questions?

Thank you!