Water Conservation BMPs: Residential Plumbing Retrofits

RWSPG Meeting
March 25, 2008
Residential Plumbing Retrofits

Presentation Overview

• Definition
• Retrofit Trio- Toilets, Showerheads, Faucets
• Benefits of Retrofits
• Water savings information
• The Public and Retrofits-Distribution
• Case Studies
• Sample Recommendation Statements
Residential Plumbing Retrofits

**Definition**

- Upgrade or modify inefficient plumbing fixtures in residences…

- Toilets
- Showerheads
- Faucets
  - Kitchen
  - Bathroom
Homes and EPACT 1992

• Energy Policy Act of 1992
  – Toilets 1.6 gallons per flush
  – Showerheads 2.5 gallons per minute
  – Faucets 2.5 gallons per minute

• Homes built before 1994=Retrofit Potential
Retrofit Trio

Toilets

Showerheads

Faucets
Toilet Retrofits

Requirement:
• 1.6 gallons per flush

Toilet water use history
  – 1950s >>>> 7 gallons per flush
  – 1960-70s >>>> 5.5 gallons per flush
  – 1980s >>>> 3.5 gallons per flush

• FUNFACT: Replacing ONE 3.5-gallon toilet with a 1.6-gallon toilet could save an average of 2 gallons-per-flush, totaling a household savings of 12,000 gallons of water per year.
Toilet Types

- Gravity Tank Toilets

- Flushometer Valve Toilets- (no tank)
  - Commercial
  - City of Chicago

- Installation costs
  - Homeowner vs. professional plumber
Toilet Retrofits

**Devices:**
- HydroClean toilet fill valve
  - Balance water in tank and bowl
- Replace toilet flappers
  - Cause links/water loss

**Benefits:**
- HydroClean water savings-36% of daily
- Flapper water savings 0.5-1.5 gallons per flush
- Detect leaks
  - Few gallons to 100 gpd
  - 25%
Showerhead Retrofits

**Requirement:**
- 2.5 gallons per minute at 80 psi or 2.2 gpm, 60 psi

**Device:**
- Complete replacement of showerhead
  - Cost: $4-$8
  - Wall-mounted
- Other Options
  - Shut off valves
  - Flow restrictors-disk inserts

**Benefits:**
- Water savings-up to 2.6 gallons per minute
- Multiple settings
Faucet Retrofits

Requirement:
• 2.5 gallons per minute at 80 psi (2.2 gpm, 60 psi)

Device:
• Faucet aerators
  – Tip of the faucet
  – Cost: $.50 to $3
  – Faucet replacement ($50-$250)

Benefits:
  – Water savings-0.5-2.0 gallons per minute
  – Fix drips

3/27/2008
Why Retrofit?

- Cost Effective
- Better fixtures and performance
- Water savings
  - Energy savings
Daily Residential Indoor Water Use

- Showers: 17%
- Toilets: 26%
- Faucets: 16%
- Clothes Washers: 22%
- Baths: 2%
- Dishwashers: 1%
- Leaks: 14%
- Other Uses: 2%

Residential End Uses of Water, Mayer, et al. 1999
Water Use Statistics - Indoor

- Showers
- Toilets
- Faucets
- Clothes Washers
- Dishwashers
- Baths
- Leaks
- Other Uses

Gallons per Capita

Non-conserving Per Capita
Conserving Per Capita

3/27/2008
Water savings

- Utility
  - Less water pumped/treated to and from home

- Homeowner
  - Less water used, lower water bill
Energy savings

• Utility
  – Less energy needed to pump and treat water

• Homeowner
  – Less energy needed for hot water
  – Shower (671-42 kWh per capita per year)
  – Faucet (112-393 kWh per capita per year)
  – Toronto Example: $30-$45 per person per year
The Public and Retrofits

What is distributed:
• Retrofit kits with leak detection
• Free to customer

Distribution Methods:
• Designated pick up location-Depots
• Mass Mail outs
• Rebates
• Door-to-door
• Direct Install
• Community groups
Case Studies

- Connecticut
- Massachusetts
- California Urban Water Conservation Council
- Santa Cruz, CA
- RWSPG Area
Connecticut

- Law requires water suppliers serving > 1,000 people or 250 service connections
- Offer free kits to all customers
- Distributed 626,439 kits to 616,708 households.
- Participation rate of 56%

- Portland, CT was able to reduce the number of new wells it needed from 7 to 2.
Showerheads in Massachusetts

- Athletic facility
- 35 low-volume 2.5 gallons per minutes (gpm).
- Water savings totaled 328,000 gallons a year.
- Initial cost of $300
- Annual savings of $3,300 from reduced water, sewer, and hot water energy costs,
- Payback - one month.

- Multi-family retrofit scenario-potential
California Urban Water Conservation Council

- Residential Plumbing Retrofits-188 members reporting

- Since 1999-SF/MF
  - 933,000 million showerheads
  - 170,000 toilet displacement devices
  - 65,000 flappers
  - 1.2 million faucet aerators

Santa Cruz, CA

Plumbing Fixture Retrofit Regulation

• All residential, commercial, and industrial buildings receiving water from the City of Santa Cruz are required to be retrofitted completely with low consumption plumbing fixtures at the time of sale of the property. Under new City and County regulations, the seller is responsible for:

• 1. Replacing any toilets, urinals, and showerheads that do not meet the following low consumption standards:
  – Toilets 1.6 gallons per flush
  – Urinals 1.0 gallons per flush
  – Showerheads 2.5 gallons per minute maximum

• 2. Having the plumbing fixtures inspected and obtaining a Water Conservation Certificate from the Water Department, and

• 3. Disclosing retrofit requirements to the buyer of the property, before the property changes ownership.
### Percent of Structures Built Before 1990

<table>
<thead>
<tr>
<th>County</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kendall</td>
<td>30%</td>
</tr>
<tr>
<td>Will</td>
<td>30%</td>
</tr>
<tr>
<td>McHenry</td>
<td>30%</td>
</tr>
<tr>
<td>Boone</td>
<td>30%</td>
</tr>
<tr>
<td>Lake</td>
<td>30%</td>
</tr>
<tr>
<td>Kane</td>
<td>30%</td>
</tr>
<tr>
<td>Grundy</td>
<td>30%</td>
</tr>
<tr>
<td>DeKalb</td>
<td>30%</td>
</tr>
<tr>
<td>DuPage</td>
<td>30%</td>
</tr>
<tr>
<td>Kankakee</td>
<td>30%</td>
</tr>
<tr>
<td>Cook</td>
<td>40%</td>
</tr>
</tbody>
</table>

Chicago Metropolitan Agency for Planning

3/27/2008
Rent vs. Own

Median Year Structure Built
By Tenure By County

3/27/2008
Residential Plumbing Retrofit

Summary

• Toilets, showerheads and faucets > 50% water use

• Retrofit Kits

• Significant water savings

• Target = Pre1994 homes

• Not behavior just more efficient
Sample Recommendation Statement
Sample Recommendation Statement

• Every utility will collect relevant data (ex. Pre-1994 build date) on housing stock within its service area in order to estimate the number of potential units in need of plumbing retrofits.

(1 of 3)
Residential Plumbing Retrofit

Sample Recommendation Statement

• Develop a marketing strategy to reach and provide 50% of those potential units (within 5 years) with retrofit kits and some form of installation assistance.

(2 of 3)
Residential Plumbing Retrofit

Sample Recommendation Statement

- Track the type and number of retrofits completed, devices distributed, program costs and estimated water savings.

(3 of 3)