

# Reducing the Carbon Footprint of Water

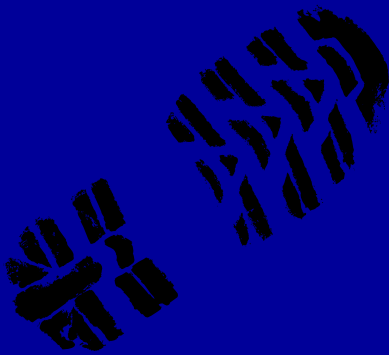
Wendy L. Wilson

520 SW 6th Ave, Portland, Oregon 97204

1-503-241-3506

[www.rivernetwork.org](http://www.rivernetwork.org)

wwilson@rivernetwork.org



If just 2% of the earth's water is fresh...

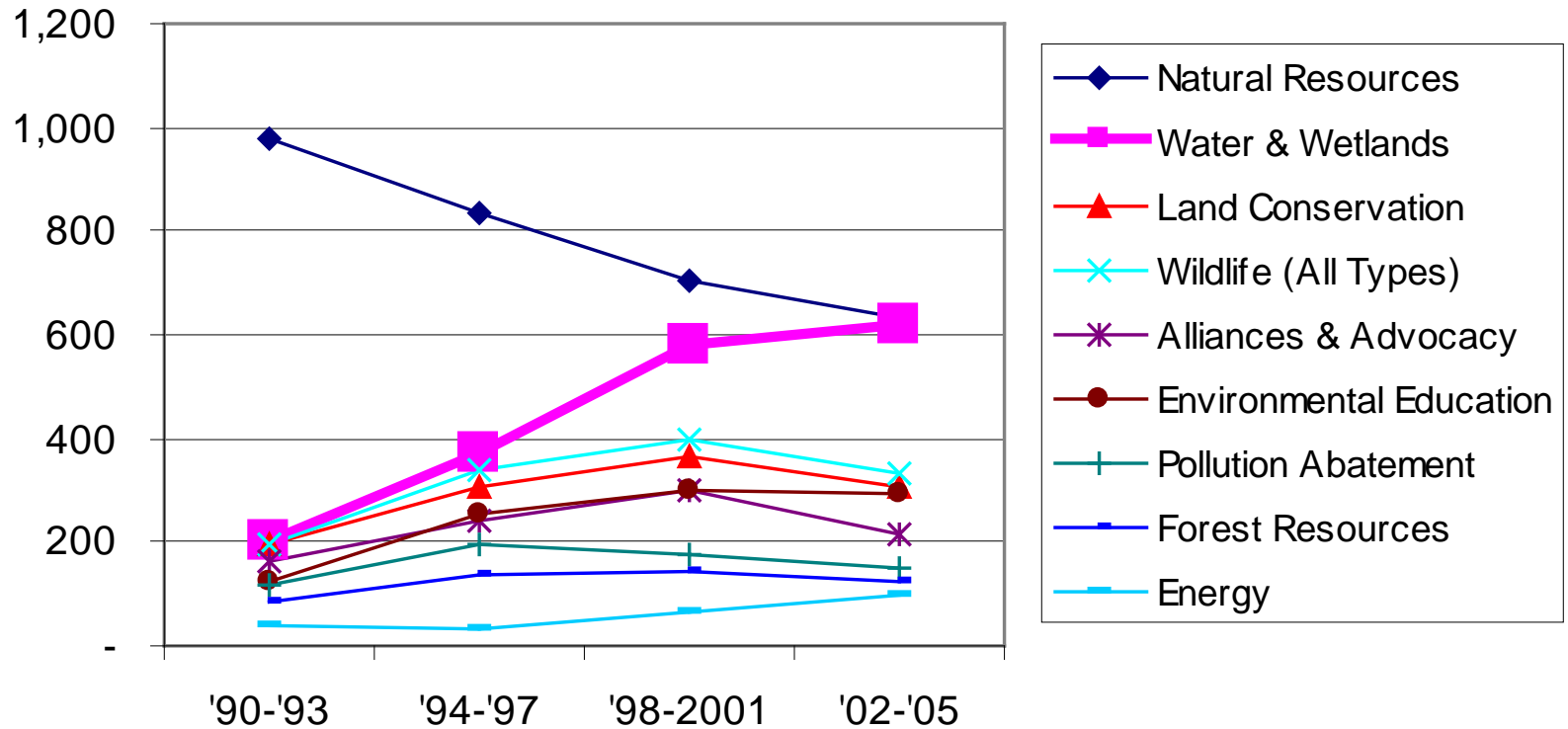


# Then why are we using it to do this?



# Watershed groups are a rapidly growing nonprofit sector

Number of new org's registered with IRS



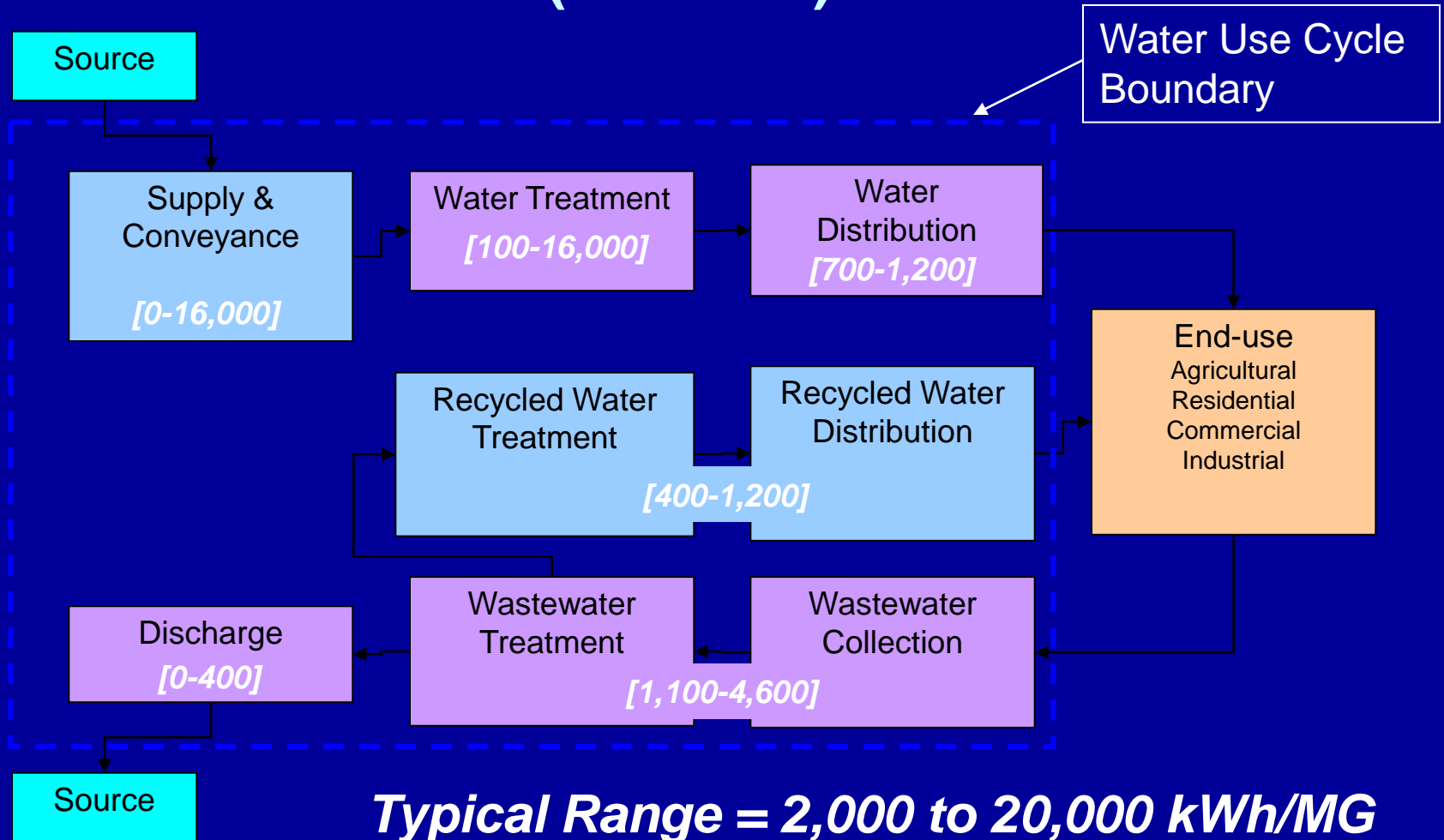
Source: Straughan & Pollak, "The Broader Movement," 2008.

# Potential Watershed level actions:

1. Maintain ground water/ stream flows through conservation
2. Reduce energy used for public water supplies
3. Reduce water-use impacts of energy development
4. Reduce local temperatures/ heat island effects
5. Sustain watershed functions and water yields
6. Create “Climate-resilient” communities - floodplains, wildlife corridors, water quality



# Water Use Cycle Energy Intensities (kWh/MG)



# Source water matters

- A pristine river
- A healthy aquifer
- Stormwater
- Greywater
- Leachate from septic tanks
- Treated wastewater



# Waste water matters

- 75 billion kilowatt hours per year
- 3% of electricity
- More than pulp/paper and petroleum sectors *combined*
- Public bill = Already \$4B/yr.



\* 60,000 drinking water treatment plants +  
15,000 sewage treatment plants

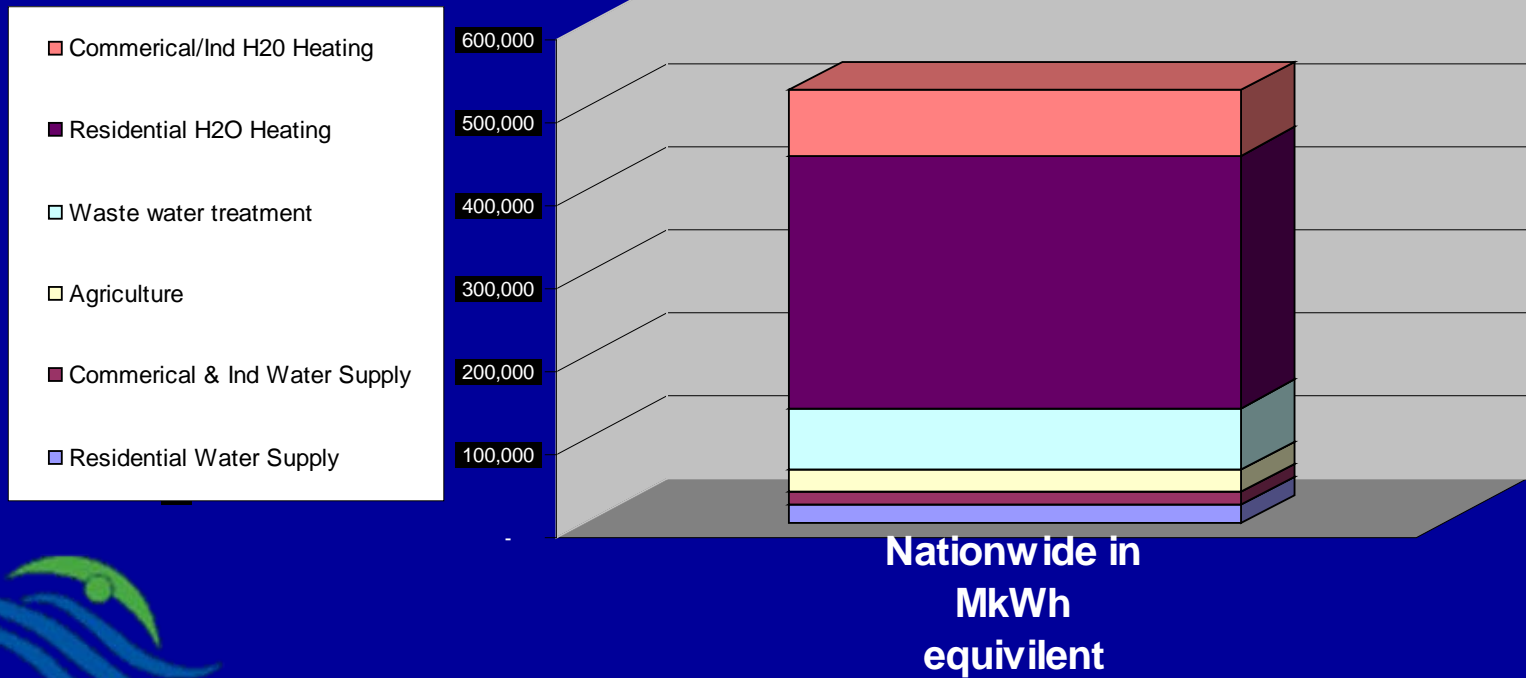


# Total Water-Related Energy Use

<b>System inputs:</b> Groundwater pumping, inter-basin transfers, pumping to drinking treatment plants and to homes, sewage treatment plants and discharge. (Typical range: 1,250 – 6,500kWh/MG)	<b>137,864 MkWh</b>
<b>End use residential:</b> Water heating	<b>304,200 MkWh</b>
<b>End use commercial:</b> Businesses and institution water heating, (no data on industrial heating & cooling)	<b>79,100 MkWh</b>
<b>Indirect inputs:</b> Concrete production, new pipelines, etc.	<b>0</b>
<b>Total:</b>	<hr/> <b>521,164 MkWh</b>

# Energy in our Water

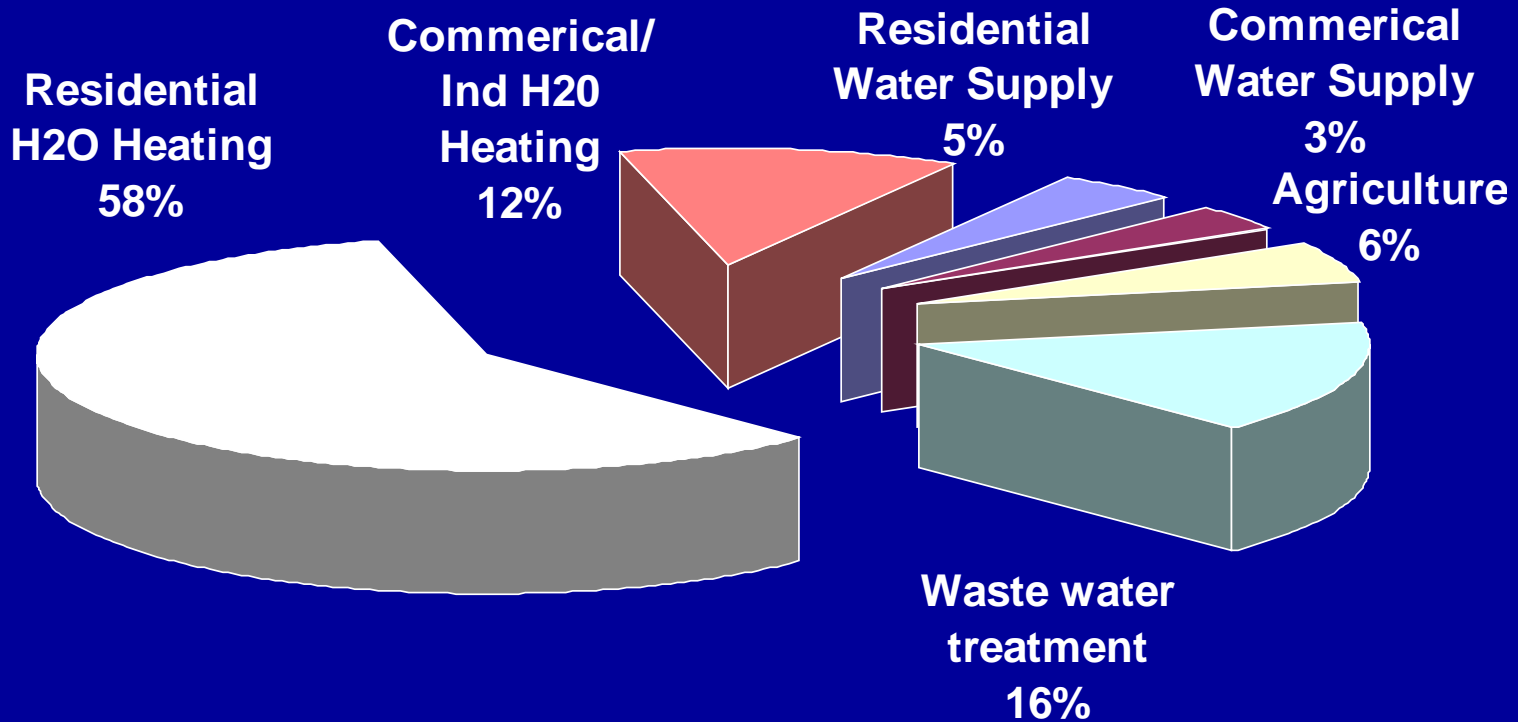
Estimated Water-Related Energy Use, 2005



Nationwide in  
MkWh  
equivilent



# Where is the carbon?

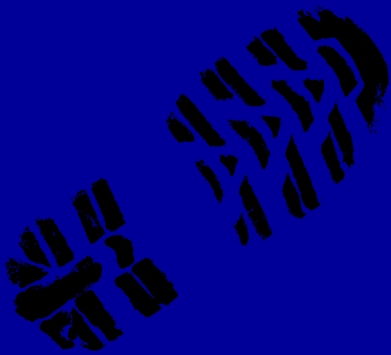


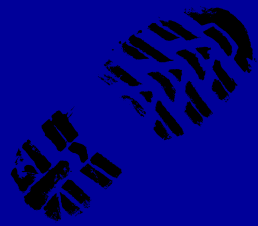
**National Water-Related Carbon Emissions**  
(290 million metric tons)



...a carbon footprint of *290 million metric tons of CO2* is equivalent to 13% of U.S. electrical production.

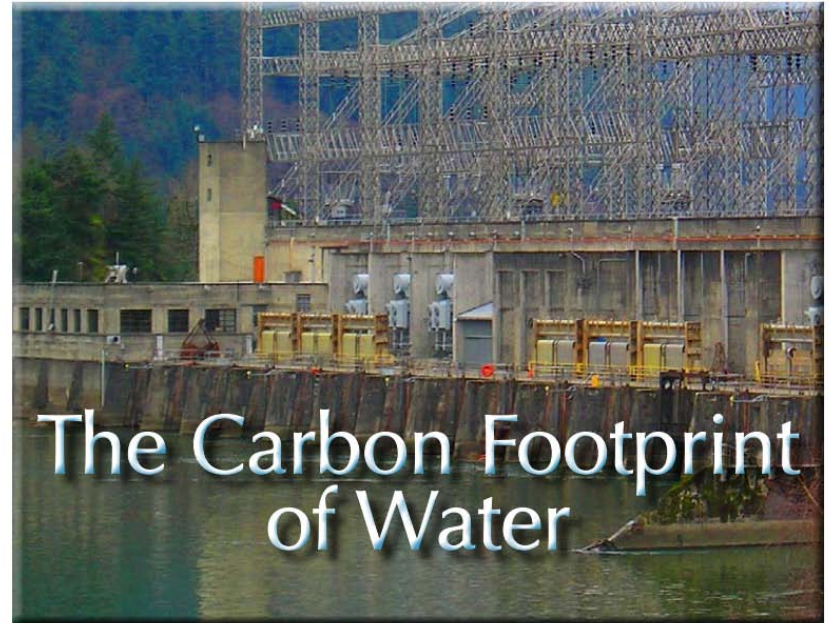
*(Total production 3.92 Trillion kWh)*



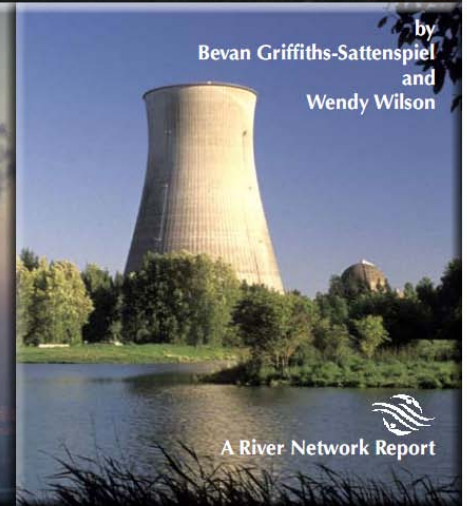


River Network

[http://www.rivernetwork.org/  
resource-library/carbon-  
footprint-water](http://www.rivernetwork.org/resource-library/carbon-footprint-water)



# The Carbon Footprint of Water



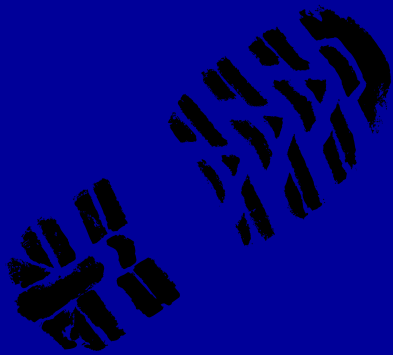
by  
Bevan Griffiths-Sattenspiel  
and  
Wendy Wilson

A River Network Report



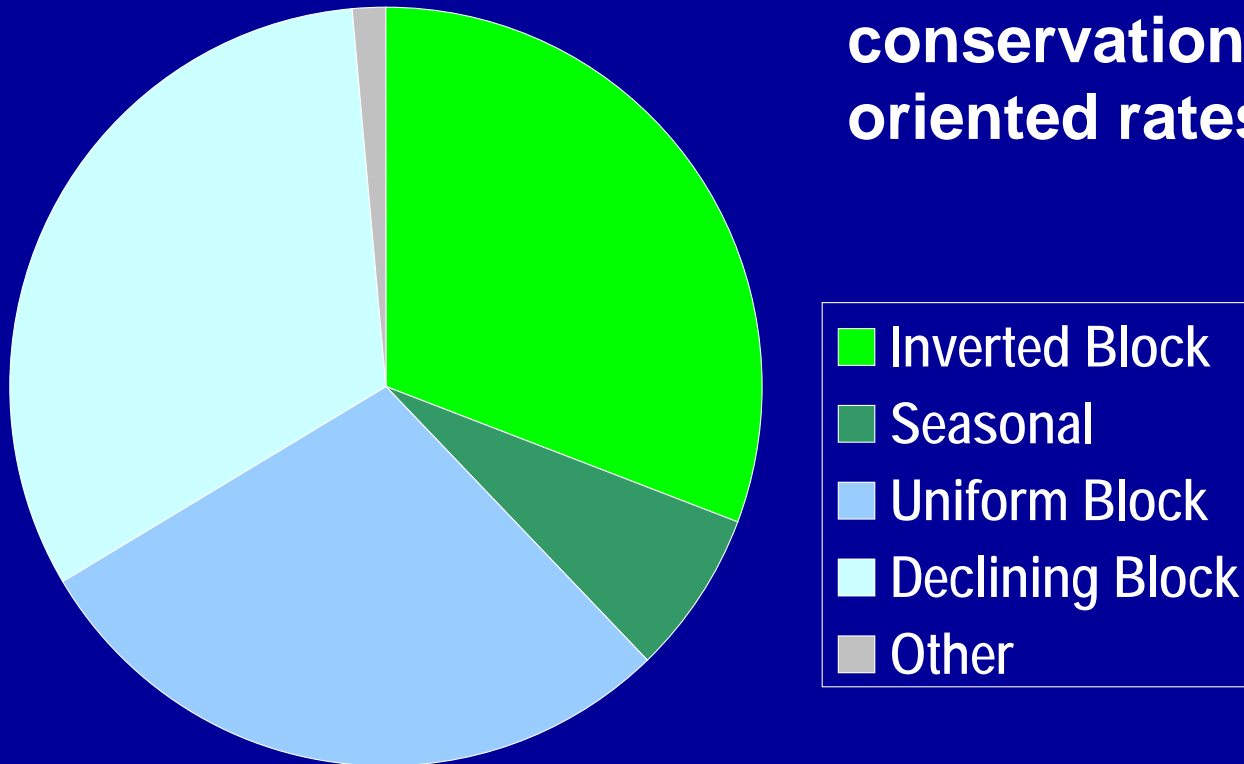
# Steps to Reduce the Energy Intensity of Public Water Supplies

- Assure energy-use data is collected from water utilities.
- Train nation's water supply and wastewater leaders
- promote conservation/ efficiency/ reuse through state policies, revolving fund projects and local programs.



# Nationwide survey of water utilities

**38% have  
conservation-  
oriented rates**



Source: Adapted from the 2002 RFC Water and Wastewater Rate Survey; 148 systems surveyed

# Residential Indoor Savings

- Toilets
- Faucets
- Showerheads
- Washing machines
- Dishwashers
- Hot water heaters\*

\* Tankless models save little water, but a lot of energy





# Saving water reduces carbon

- **Indoor water efficiency** could save much of the current water-related energy use ....but...
- **Outdoor conservation** strategies could reduce need to develop new energy-intensive water sources.

# Different priorities in each watershed



**Commercial sector** can provide significant energy savings by targeting most energy intensive uses.

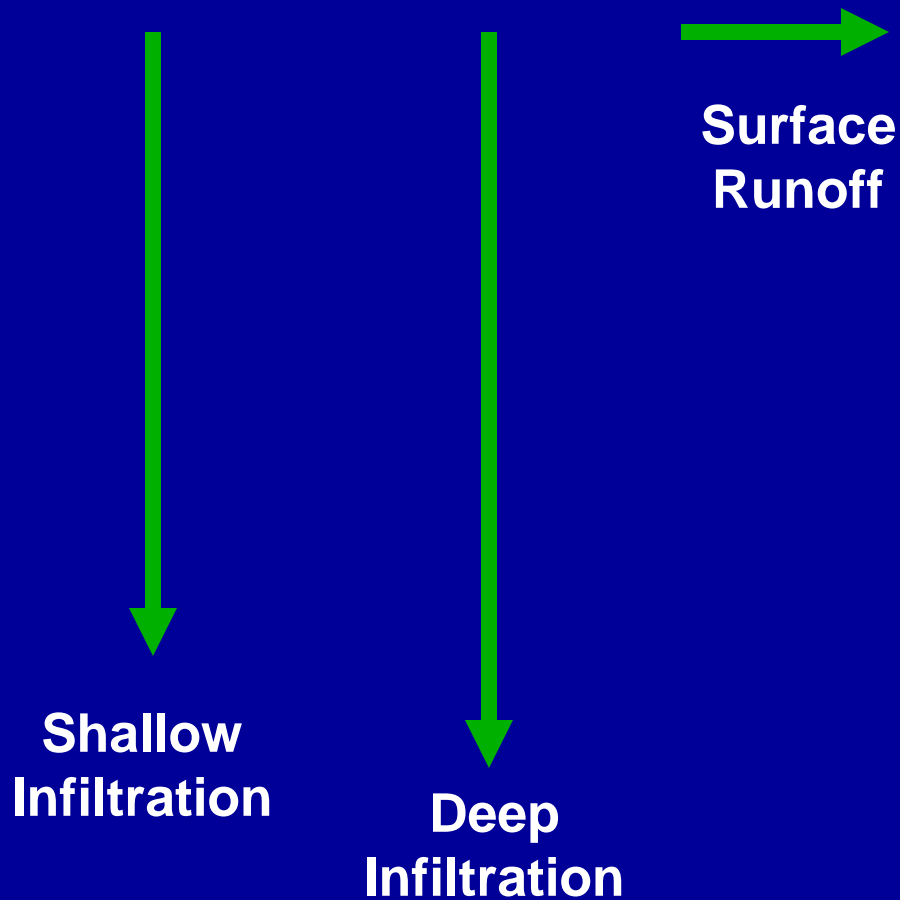
**Leakage reduction** can have high water conservation impact but less energy savings.

# Building Climate Resilient Communities

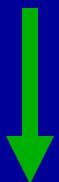
- **LID and reuse strategies** reduce wastewater treatment, increase groundwater and reduce pollution.
- Accelerate investments that create blue-cities
- **Community-based green-jobs**
- Reduce flooding, public health and safety hazards.



# Forested before development



# After typical development

  
**Shallow  
Infiltration**

  
**Deep  
Infiltration**



**Surface  
Runoff**



# An Emerging “Perfect Storm”



**Watershed Degradation + Climate Change = Loss of groundwater recharge and less reliable water supplies.**

# Water wasted by development

  
**Shallow  
Infiltration**

  
**Deep  
Infiltration**



**Surface  
Runoff**



# Future Development Impacts?

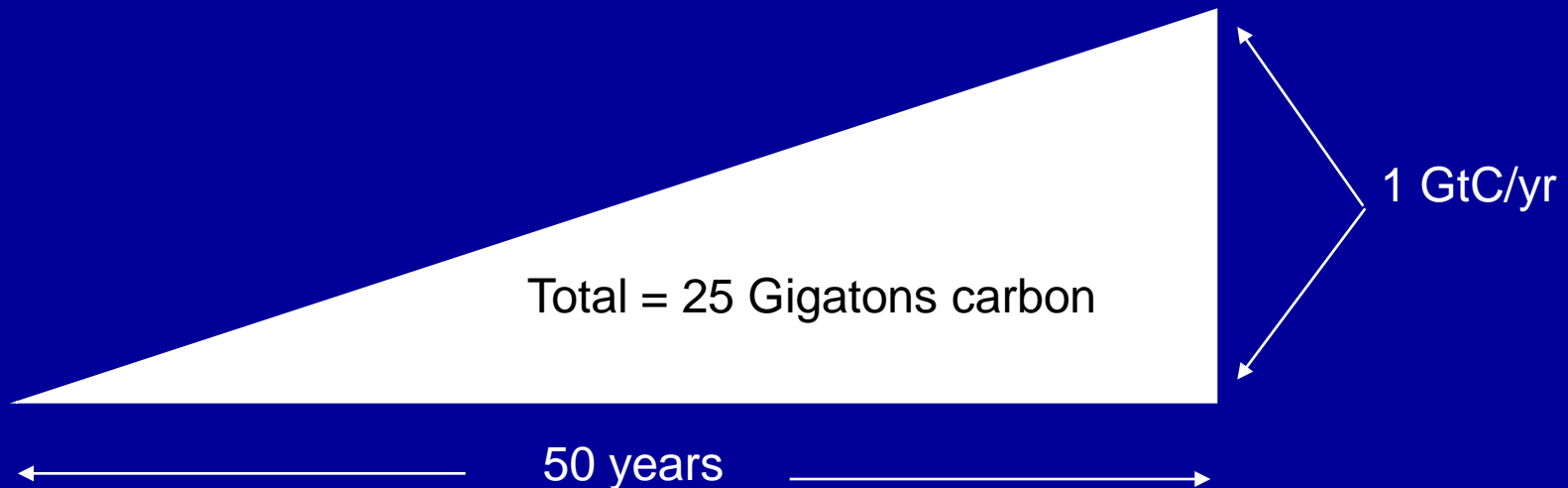
A 10 foot drop in groundwater levels nationwide could:

- Increased energy used to pump groundwater by over 1.5 billion kWh
- Costs increase by \$150 million for pumping-related energy
- Emissions increase of 2 billion pounds of CO<sub>2</sub>



# What is a “Wedge”?

A “wedge” is a strategy to reduce carbon emissions that grows in 50 years from zero to 1.0 GtC/yr. **The strategy has already been commercialized at scale somewhere.**



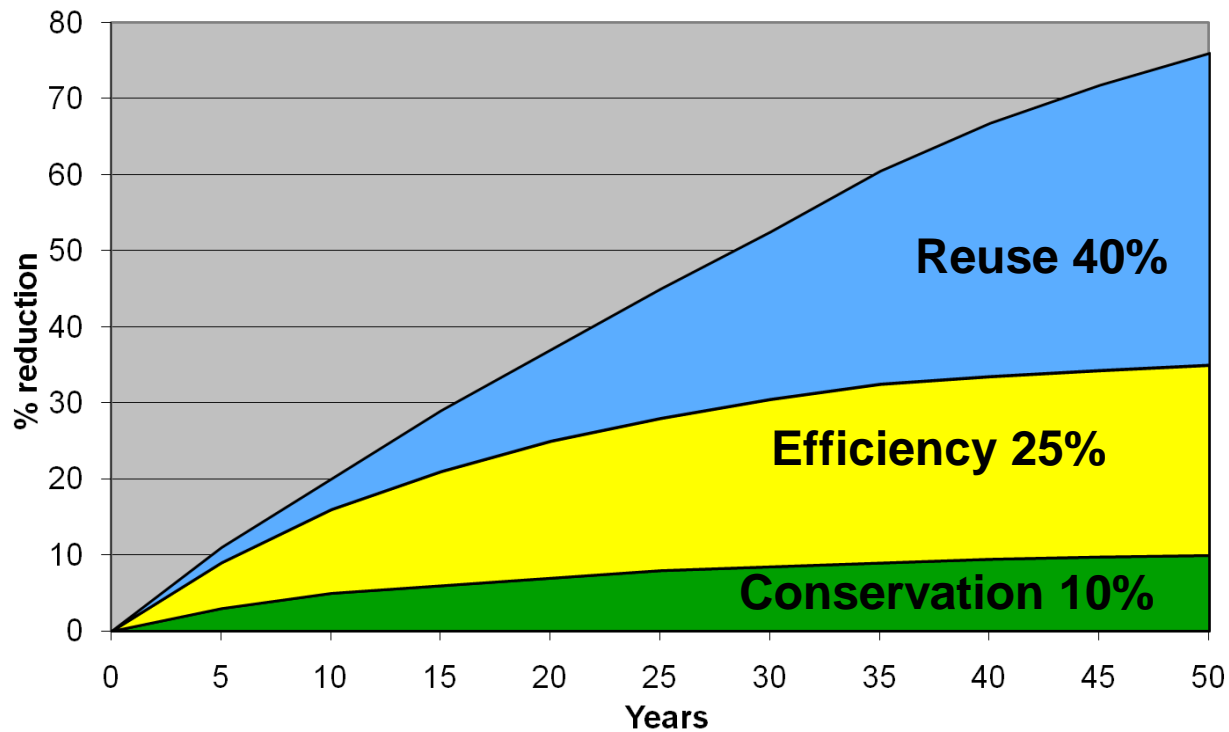
Cumulatively, a wedge redirects the flow of 25 GtC in its first 50 years. This is 2.5 trillion dollars at \$100/tC.

A “solution” to the CO<sub>2</sub> problem should provide at least one wedge.



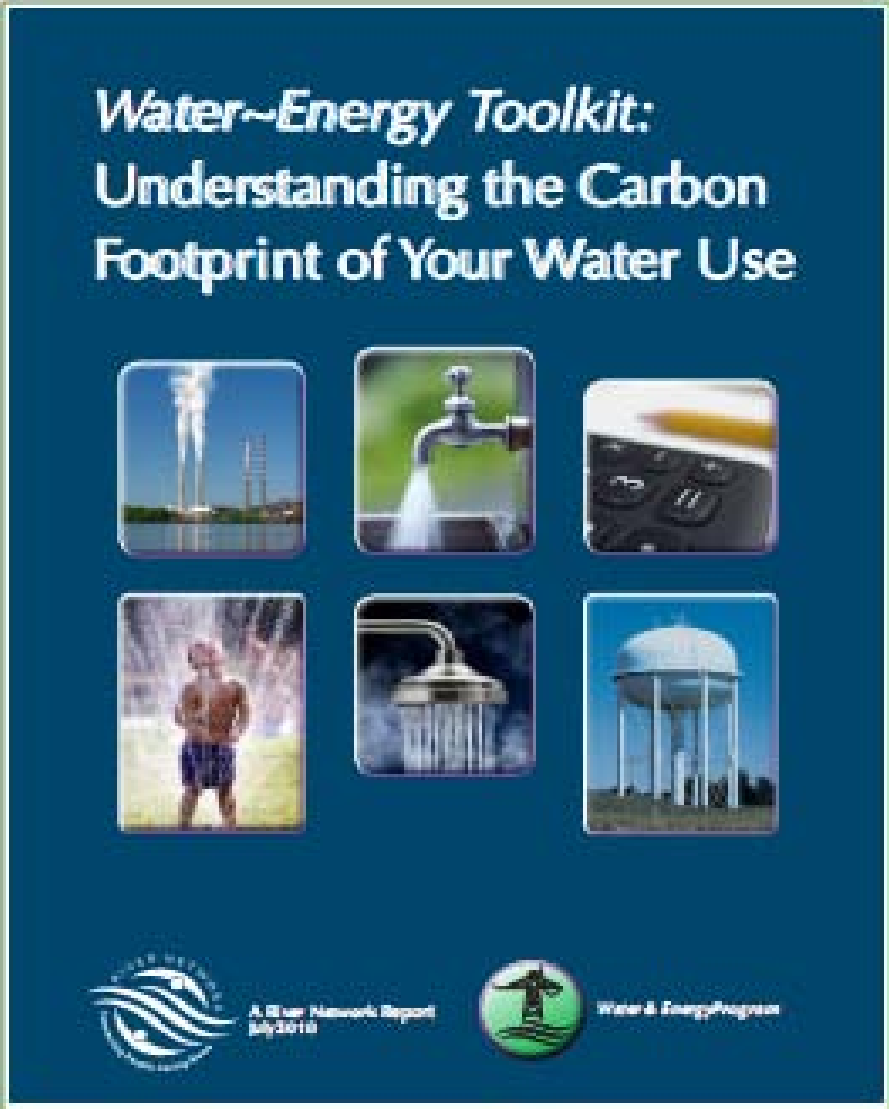
# The “Blue Wedge” ??

**Per capita drinking water use reduction potential at least 75% over 50 years**





# Cross sector efforts:

1. Share results of “pilots” and “at scale” practices.
2. Policy incentives to break vicious cycle
3. Share training resources
4. Develop cross-sector leadership groups



*Water-Energy Toolkit:*  
Understanding the Carbon Footprint of Your Water Use

The toolkit cover features six small images arranged in a 2x3 grid: a power plant, a running faucet, a coffee machine, a person in a field, a showerhead, and a water tower.

 A Blue Network Report July 2010  Water & Energy Program