



Saving Water and Energy with WaterSense for New Homes

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NESEA

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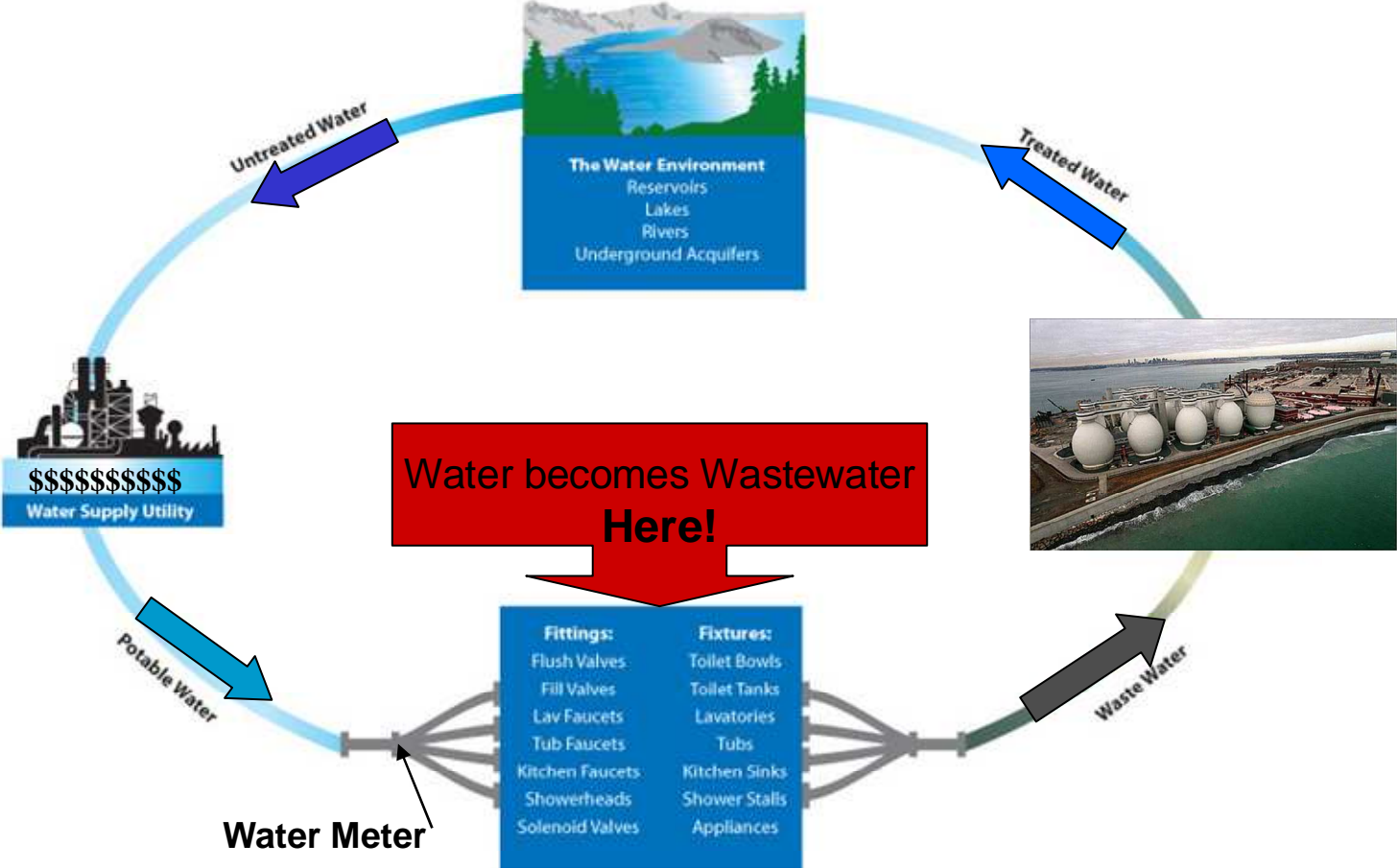
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Learning Objectives

Upon completion of this course the architect/designer will be able to:

- List reasons for water efficiency requirements and incentives
- Explain:
 - The EPA's WaterSense program
- Compare Modern Toilet Technology to traditional plumbing
- Explain what "sustainable" plumbing means in the future

Is this Cycle Sustainable?

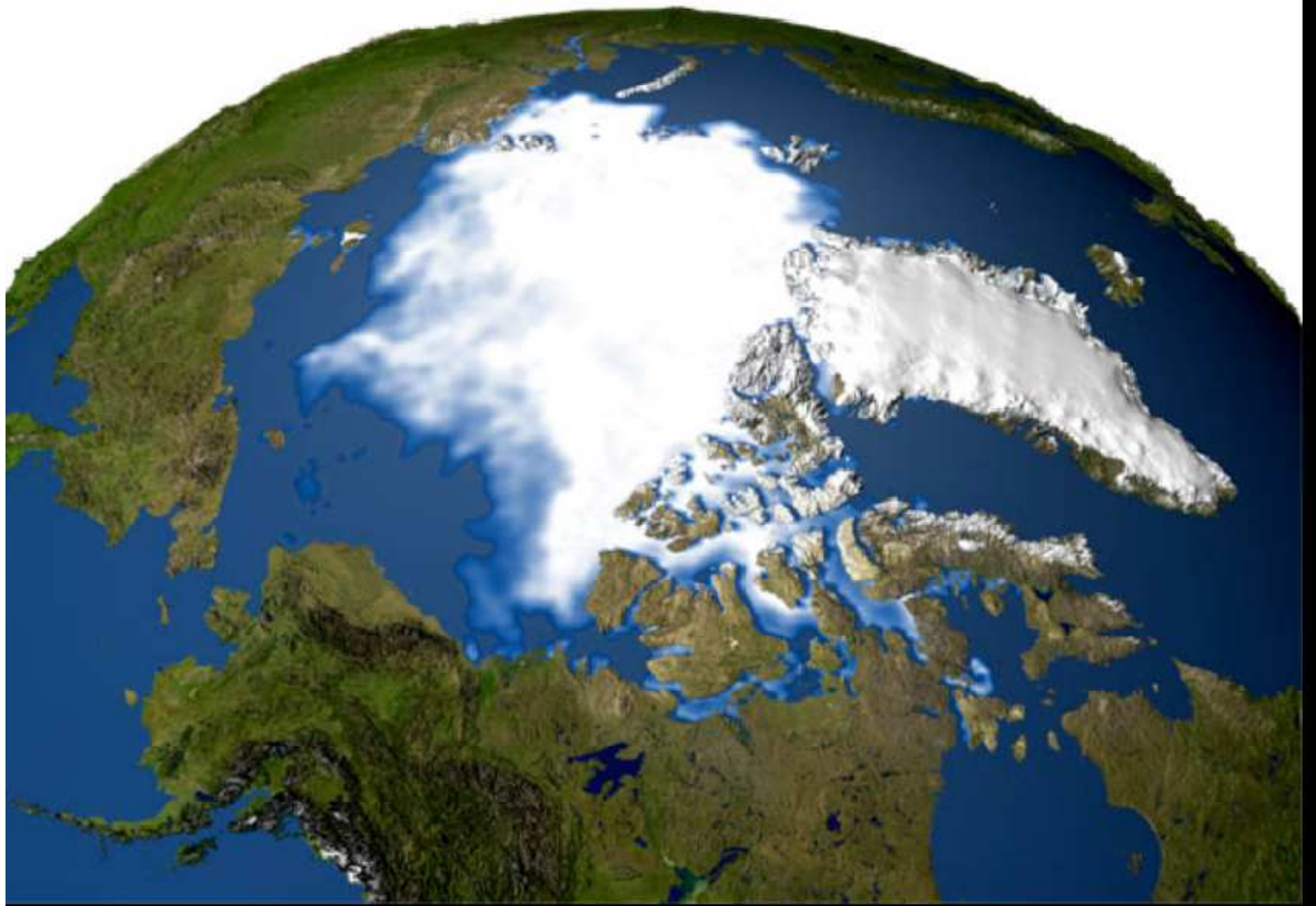




**Before we start:
Is our climate changing?
Is there energy consumption imbedded in water use?**



1979



2003

Are You Aware That:

- About **13%** of the electricity used in the U.S. is for the delivery and treatment of potable water.
- In CA **19%** of the electricity is used for delivering Water! **32%** of the natural gas consumption is for treating water and wastewater!
- **Saving Water Saves Energy!**

Saving water also reduces one's



And more...

Water and energy are closely linked.

- Running a hot water faucet for five minutes consumes as much energy as using a 60-watt light bulb for 14 hours. (EPA WaterSense factoid)

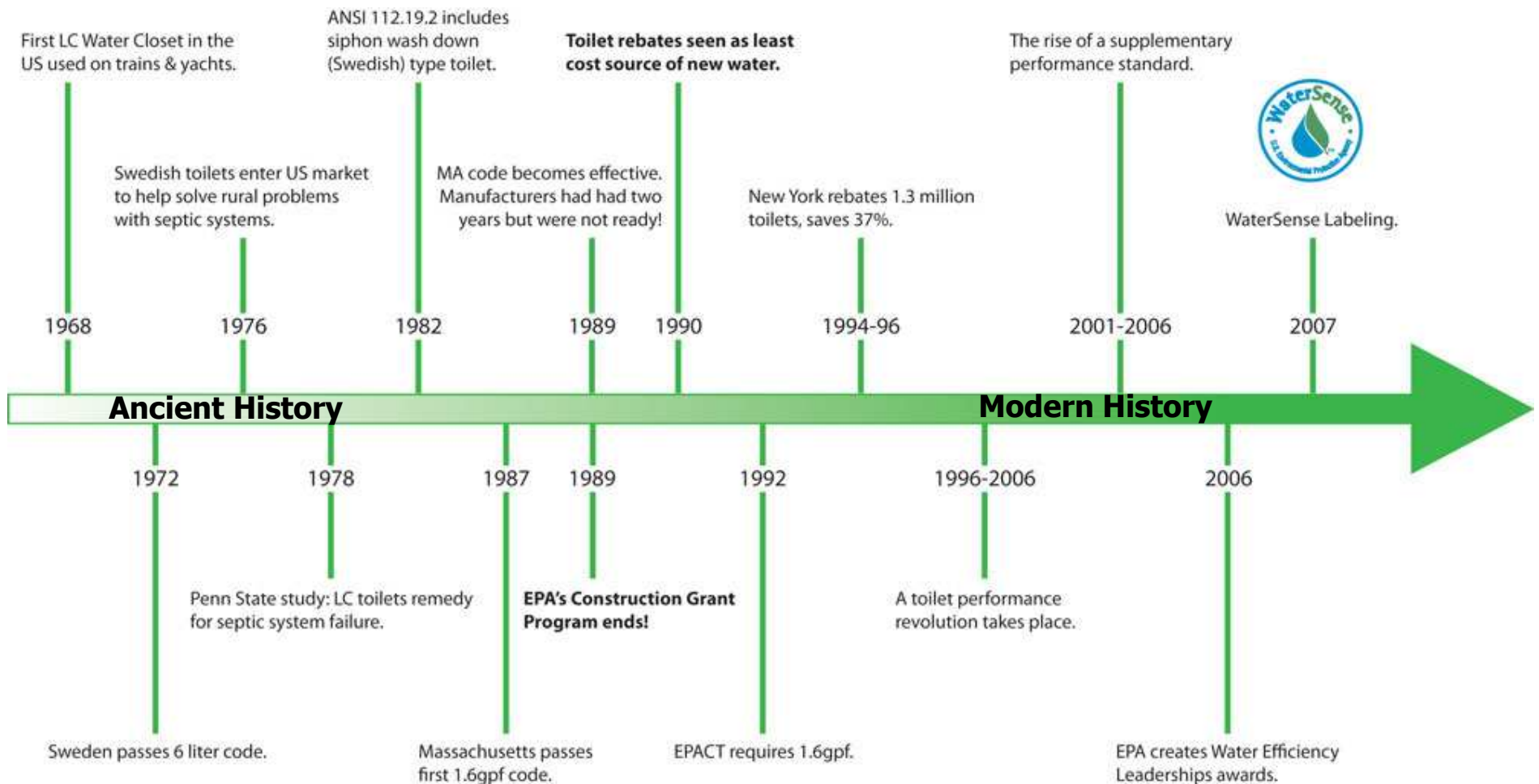




Why do we have Water Efficiency Requirements and Incentives?

A Brief History

A Brief Recent History of Water Efficiency



What does EPACT require?

- The following **may not be manufactured for sale in the USA** which have an average consumption of over the amount indicated:
 - Toilets 1.6 gpf
 - Faucets 2.2 gpm (reduced from 2.5 in 1998)
 - Showerheads 2.5 gpm
 - Commercial Faucets: .25 gals. per cycle **or** 0.5gpm
 - Urinals 1.0 gpf
 - Spray rinse valves: 1.6 gpm (2005)
- Toilets and urinals must meet ASME/ANSI Standard 112.19.2 revised

Low Volume Toilets



- They started out poorly because of very weak Performance Standards

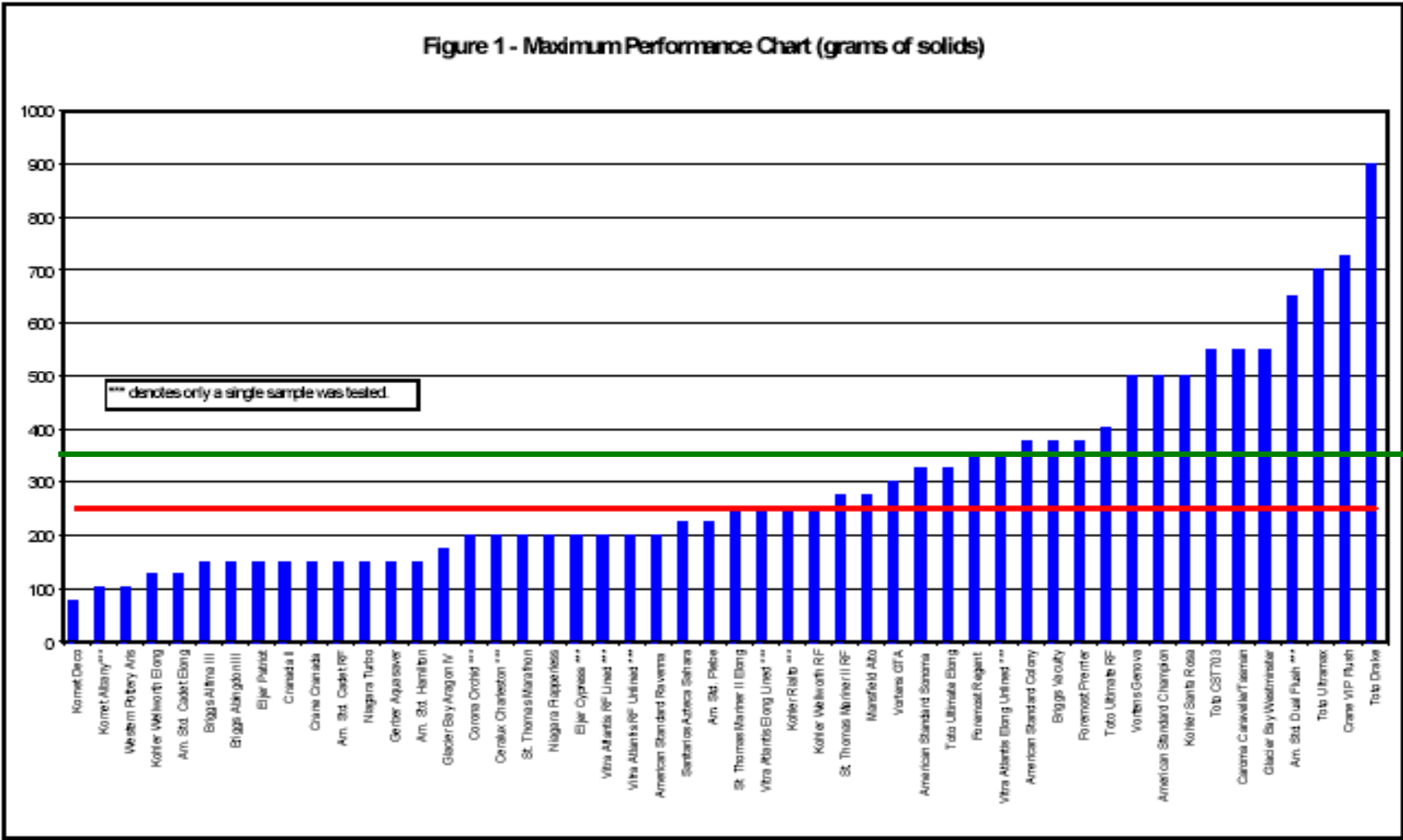
So the Maximum Performance (MaP) Test protocol was developed in 2003

- Original MaP test:
 - Soybean Curd Paste
 - Starting with 50 grams
 - Flush
 - Add another 50 grams
 - Flush
 - Add another.....
 - Flush, flush, until clog
 - Record Max. flushed



What the City of Toronto discovered in 2003


Figure 1 - Maximum Performance Chart (grams of solids)




But the MaP Test is Very Limited in Scope

- The MaP test only measures the ability to evacuate **one** of the several forms of waste.


- So, unfortunately, **specialized products** are being designed that **only** do well on a sinking, encased media test!

- 
- Very high MaP test scores beg a question:
 - What other type of media have been omitted to achieve such a result?

- 
- Marketing emphasis on the high MaP test score is becoming common.
 - Consumers don't understand.
 - Everyone simply wants a “winner”!

Performance needs validation!





The reason for all of this performance testing is to ensure
Water Efficiency

Water Efficiency should be defined in terms of gallons needed to do the job instead of gallons per minute or gallons per flush.



WaterSense



EPA's WaterSense Program

- The program was created with the assistance of many stakeholders such as water utilities, manufacturers and environmentalists.
- Manufacturers of labeled products need to sign a Partnership Agreement with EPA.
- A WaterSense label will be put on products from partnered manufacturers which meet the WaterSense specification for that product.



IAPMO R&T

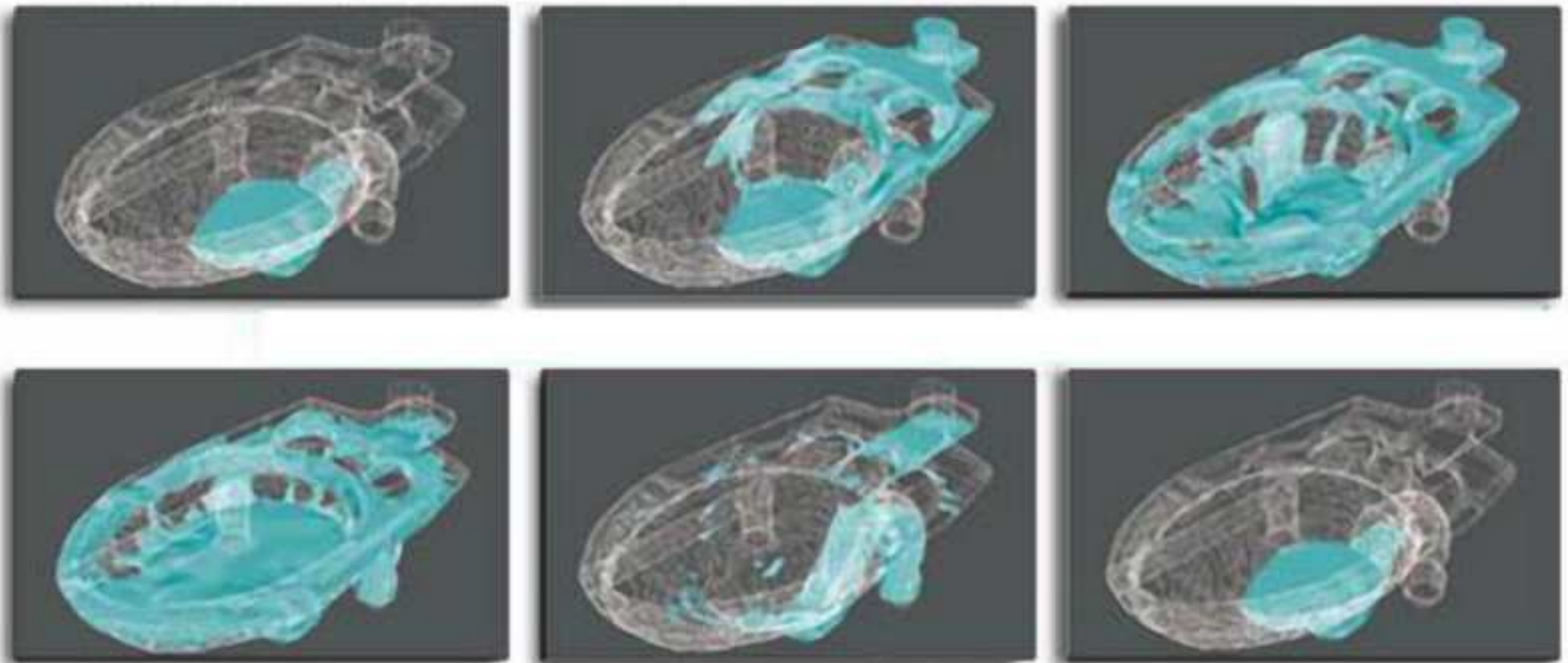
EPA HET Specifications

HET = High Efficiency Toilet

- Water Consumption of *1.28Gpf / 4.8Lpf* or less at original factory setting
- Water Consumption of *1.68Gpf / 6.8Lpf* or less with the following tank trim adjustments:
 - a) Fill Valve set to highest setting (1/2 inch below over flow tube)
 - b) Pilot style fill valve or ballcock with minimum fluctuation in WL
 - c) Extra buoyant after-market flapper
- 350g **uncased** MaP type waste removal with Trap seal restoration
- Must meet all ASME/ANSI performance requirements

Innovations in technology are improving performance.

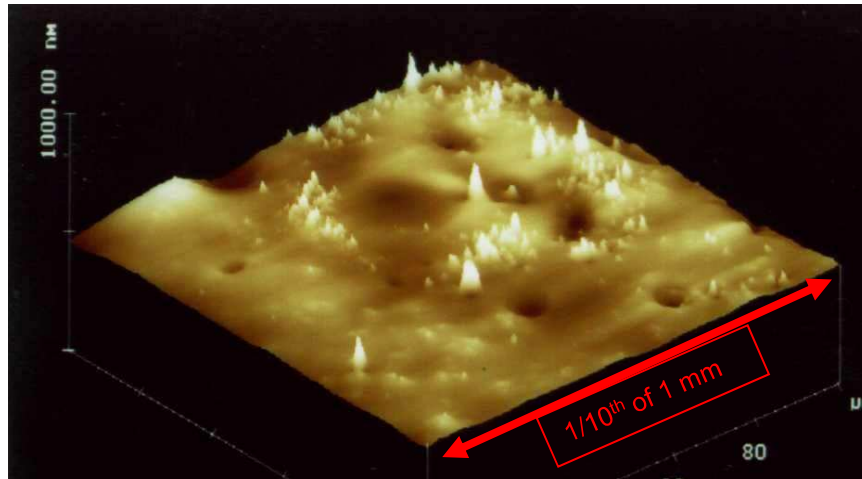
Computer Modeling and Optimization of Hydraulic Performance



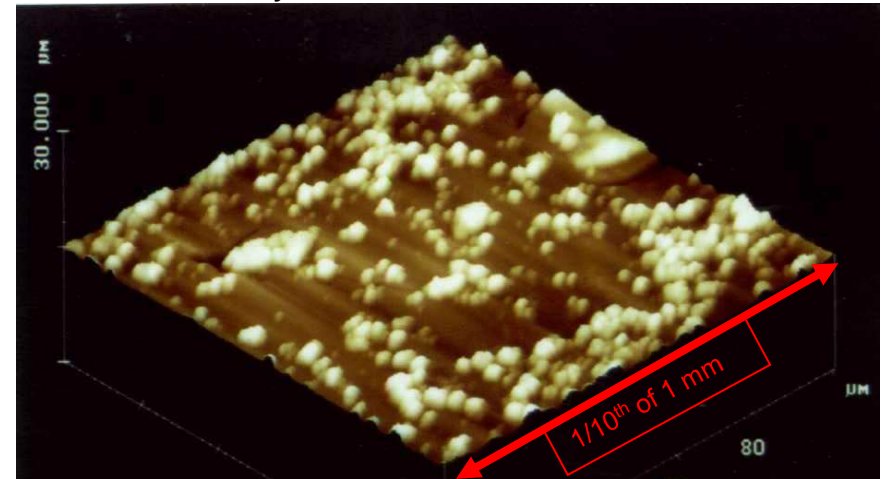
Innovations in Technology

Super smooth glaze

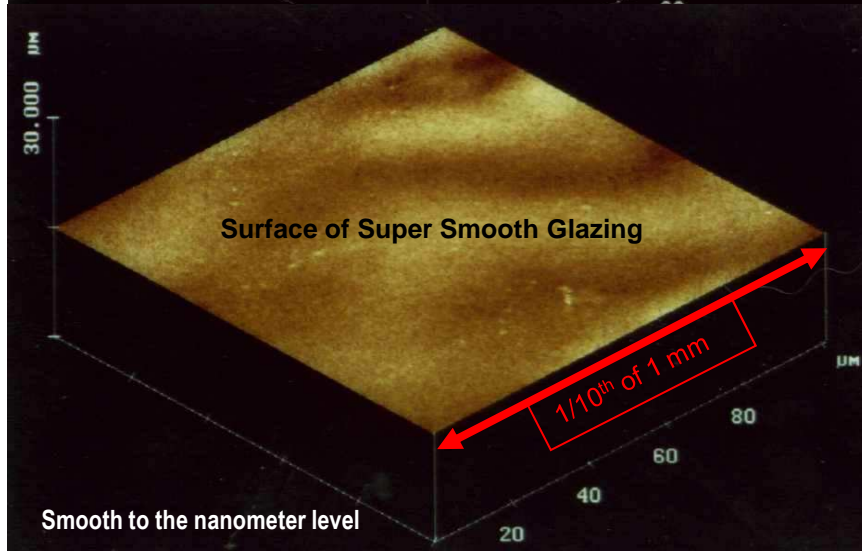
Surface of typical glazed china under magnification



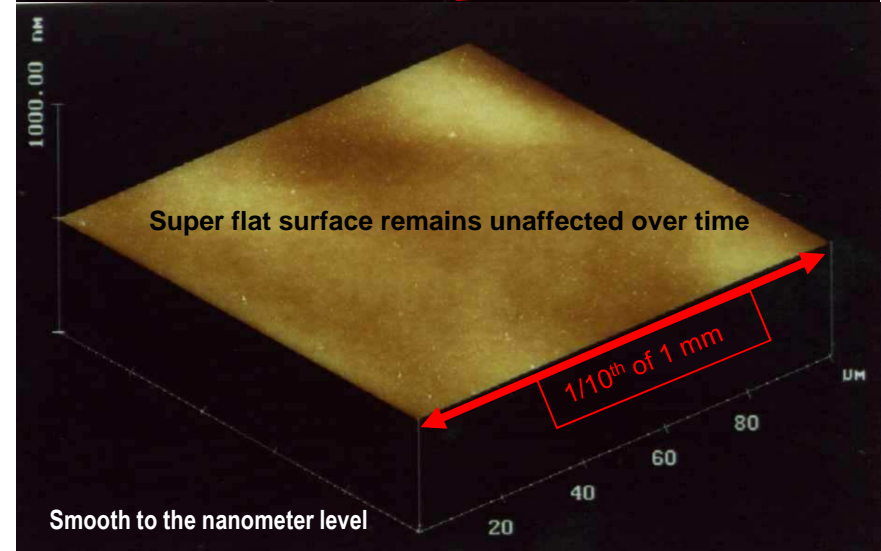
Surface of typical glazed china under magnification after 2 to 3 years of use



Surface of Super Smooth Glazing



Super flat surface remains unaffected over time



Green Faucets

- **WaterSense™ Labeled high efficiency lav faucets (HEFs) flow at 1.5 gpm max.**
 - These will save 32% of the water used by conventional faucets
 - **1.5 gpm feels little different than 2.2 gpm**



- **EPACT requirements:**
 - Residential Lav Faucets
 - Flow must be controlled by aerators or laminators to 2.2 gpm
 - Kitchen Faucets
 - Flow rate limited to 2.5 gpm



But Don't forget your mathematics!

Volume = Flow Rate X Time

Remote controls Time factor



**Remote
on/off
Control**

Green Kitchen Faucets

- **No WaterSense™ specification yet**
- Residential Kitchen Faucets need to fill pots, 2.5 gpm is minimum to satisfy this function
- BUT there are ways to save water other than by using lower flow rates:
 - Foot pedal operation for rinsing
 - Sensor operation
 - Remote wireless on/off
 - Spray controls are important for effective performance
- They are only **water efficient** if they do their job with less water!
- We should be looking at total consumption not “flow rate.”

Remote Controlled Kitchen Faucet



**Foot Pedal
Remote
control**

Volume = flow rate X time



Water Efficiency Credits in LEED™ for homes

LEED for Homes Indoor Water credits

- High Efficiency Fittings & Fixtures (1 Point each)
 - All toilets must have ave. flow ≤ 1.3 gpf or be WaterSense labeled
 - Faucets must have ave. flow ≤ 2.0 gpm
 - Showers with Ave. flow ≤ 2.0 gpm **per stall**

LEED for Homes Indoor Water credits cont.

- Very High Efficiency Fittings and Fixtures (2 pts. each)
 - Very High Efficiency toilets using ≤ 1.1 gpf
 - Very High Efficiency Showers using ≤ 1.75 gpm **per stall**
 - Very High Efficiency Faucets shall be **WaterSense labeled** using ≤ 1.5 gpm

Cautions

- High efficiency toilets (HETs) are well tested and perform well enough to meet the WaterSense™ specification.
- **Very high** efficiency toilets have a shorter history.
- What goes into a green home should be able to **stay there** for the life of the home and not just be put there temporarily to earn LEED points!

HETs

- High Efficiency Toilets (HETs) offer the most conventional, well tested toilet option to contribute to reducing the potable water use by 30% for LEED™ WE Credit 3.1
- Should bear a WaterSense™ label



Though there are many new technologies, of these the most proven are the class of toilets falling into the definition of HETs which use 20% less than the baseline 1.6 gpf. More aggressive designs using significantly less than 1.28gpf have very little history from which to predict their performance success and therefore involve some risk. It is important that the building occupants are comfortable with these products for them to be successful. There are those who would rather not and make excuses to go elsewhere where they can feel comfortable. Efficient toilets only save water if they are used and not avoided.



Future Solutions

What about Alternative Sources of Water?

Some Promising alternatives to using potable water:

Rainwater Harvesting Systems

“Greywater” Reuse Systems

But be careful:

Toilet warranties are voided. No Quality standard for “flush water”!

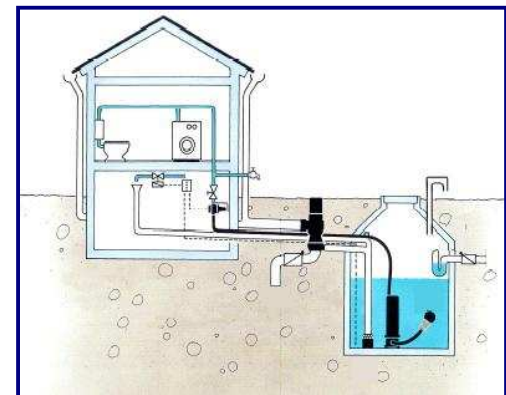
Over use of chlorination creates carcinogens

UV treatment uses energy and

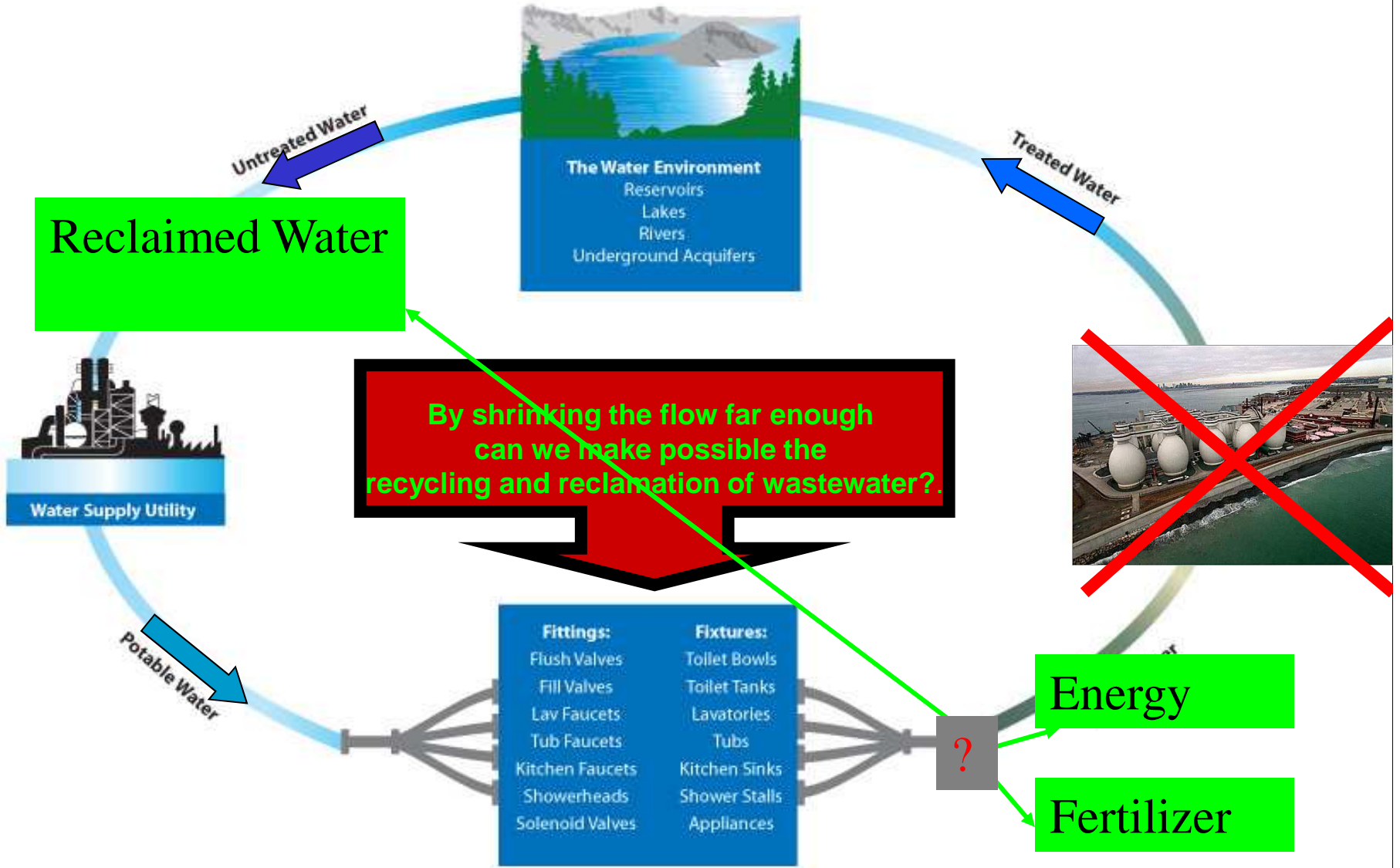
Irrigation of landscape:

Does not need potable water

Makes use of nutrients



What does our Distant Future look like?



The Sewerless City of the future

- All buildings or building clusters with similar use will have independent waste treatment systems having no off site discharge.
- Human waste will be recycled safely as energy, fertilizer or water and become a marketable resource..
- “Grey” water will be used for irrigation.
- Storm water will be filtered, used or returned to the underlying aquifer.
- Potable water will be expensive!
- **Large** central sewer systems will gradually become obsolete.
- Wastewater will be deleted from the dictionary!



Thank You

Questions?

If you would like a copy of this, please leave me your card.