

# This presentation premiered at WaterSmart Innovations

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





# Living within our means

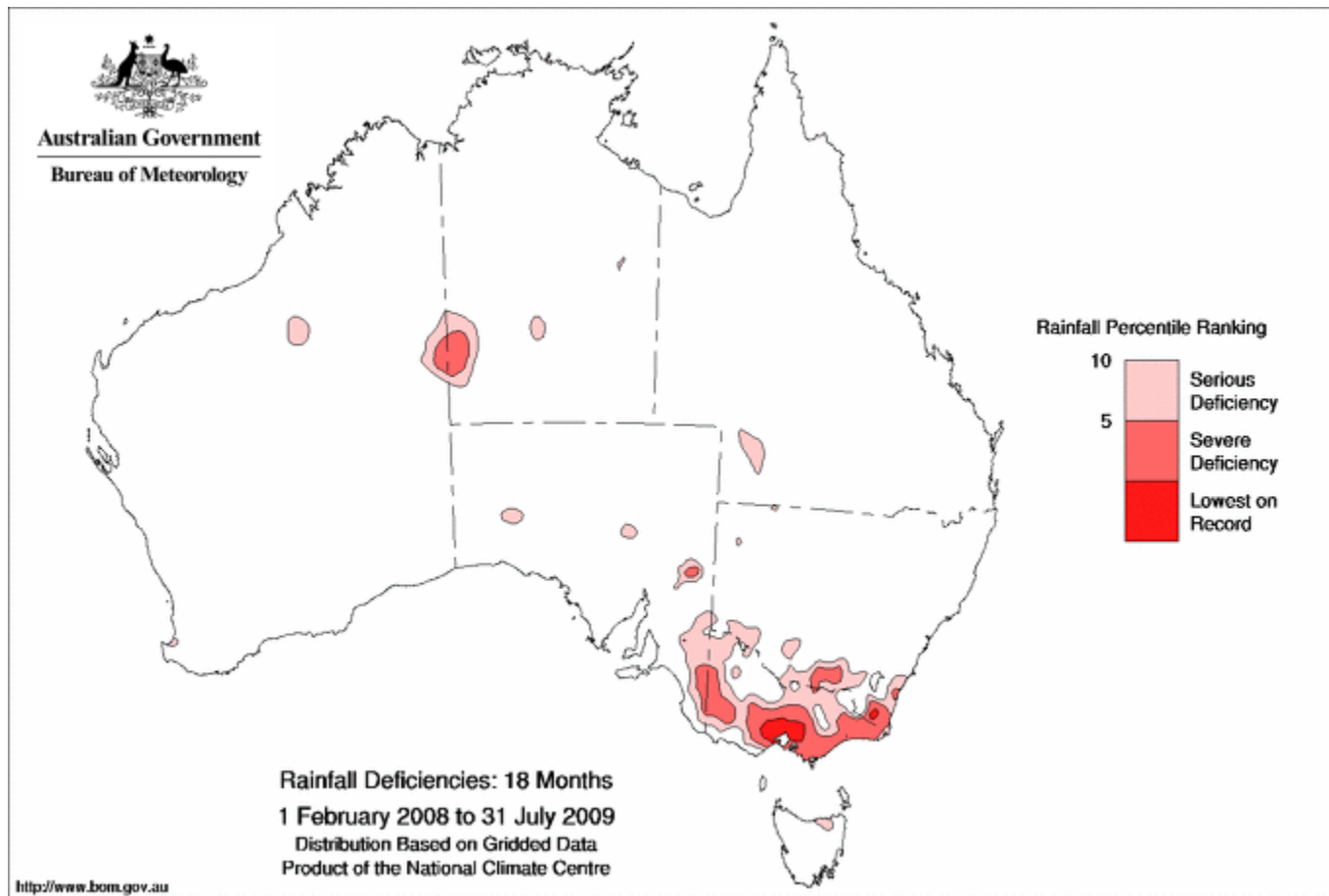
Case study of one household in Melbourne  
Broderick Street, Department of Sustainability and Environment

# Presentation

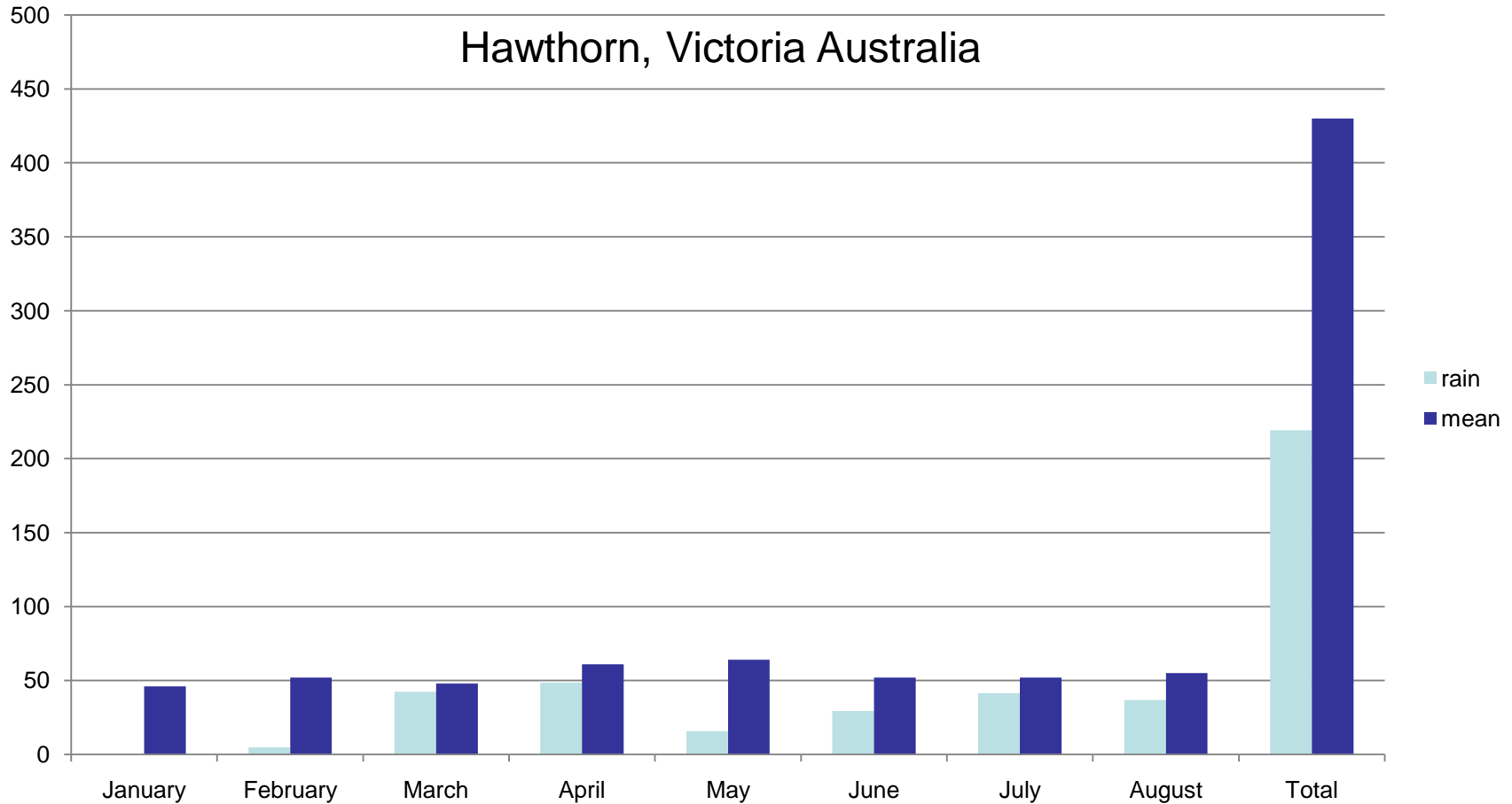
- 1) Background on water and energy use in Australian homes; building standards; targets; and consumption patterns (gal.)
- 2) An alternative model of water and energy use in a major building (plumbing) alteration.
- 3) Lessons and observations (monitoring).

# Background:

## Long term dry

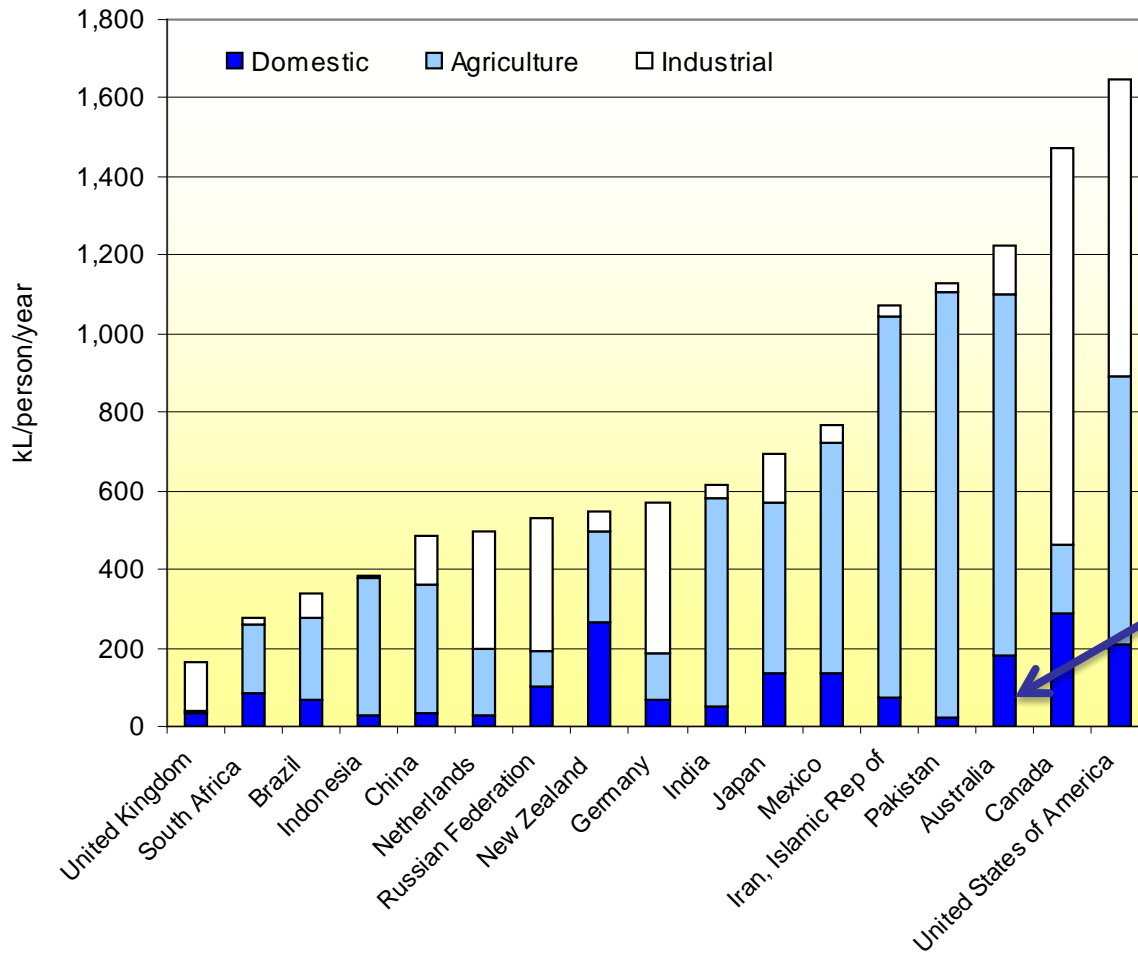


# 51% of mean rainfall (mm) January 1 to August 31, 2009



# Background:

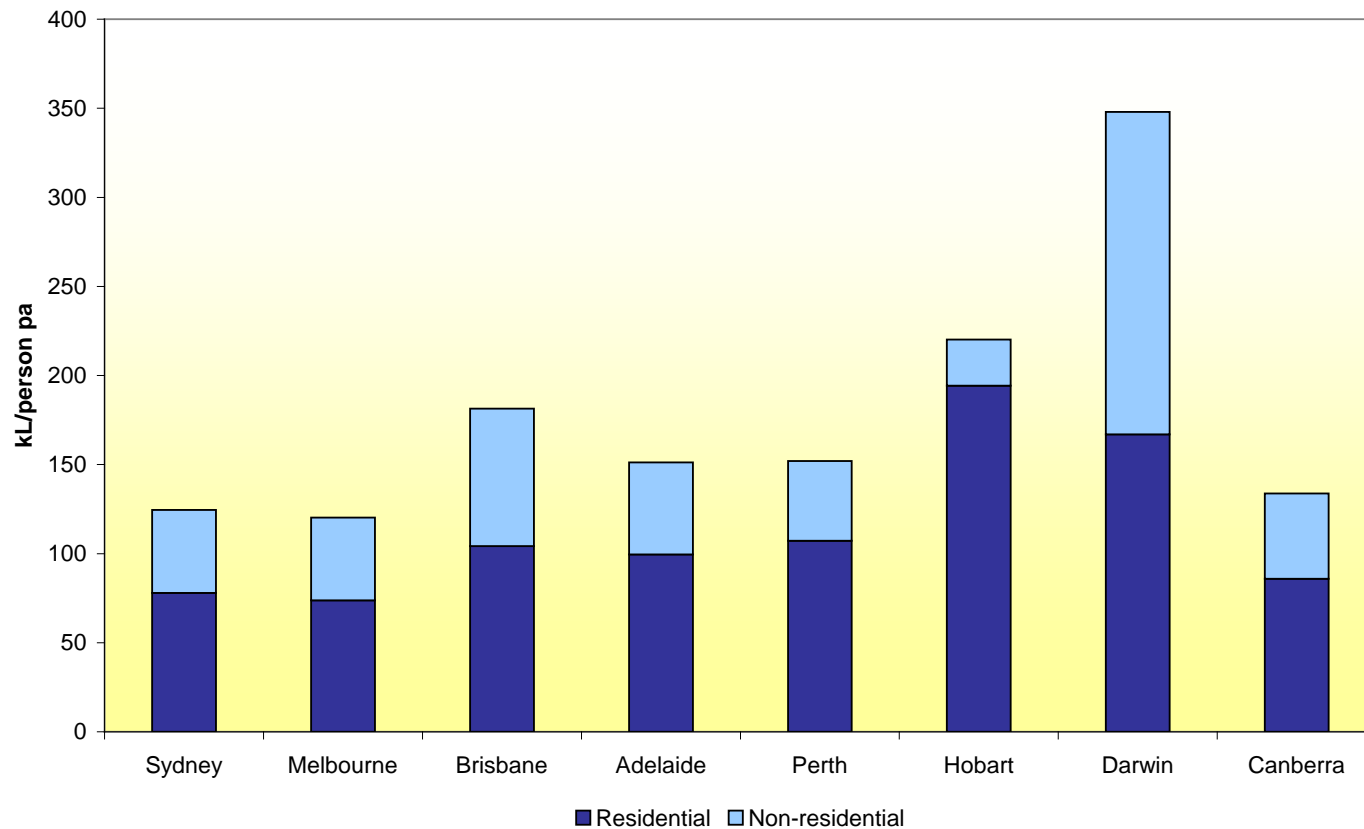
## Water use per capita 2005



Homes account for 16% of mains supplied water in Australia

# Background:

## National urban water use per capita, 2005



# Background:

## Mandatory house standards 2009

State	Building fabric Stars (1-10)	Solar HW	Rainwater tank	Shower (WELS Stars)	Toilet (WELS Stars)	Basin taps (WELS Stars)
Qld	5	No	Yes, 1,320 gal.	3	4	3
NSW	4	No	Optional	“---”	3	“---”
ACT	5	No	Yes, 530-2,640 gal	“---”	“---”	No
Vic	5	Optional	Optional, 530 gal.	“---”	“---”	3
Tas	4	No	No	“---”	“---”	No
SA	5	No	Yes, 260 gal.	“---”	“---”	No
WA	5	No	No	“---”	4	4
NT	3.5	No	No	“---”	3	No



# Background:

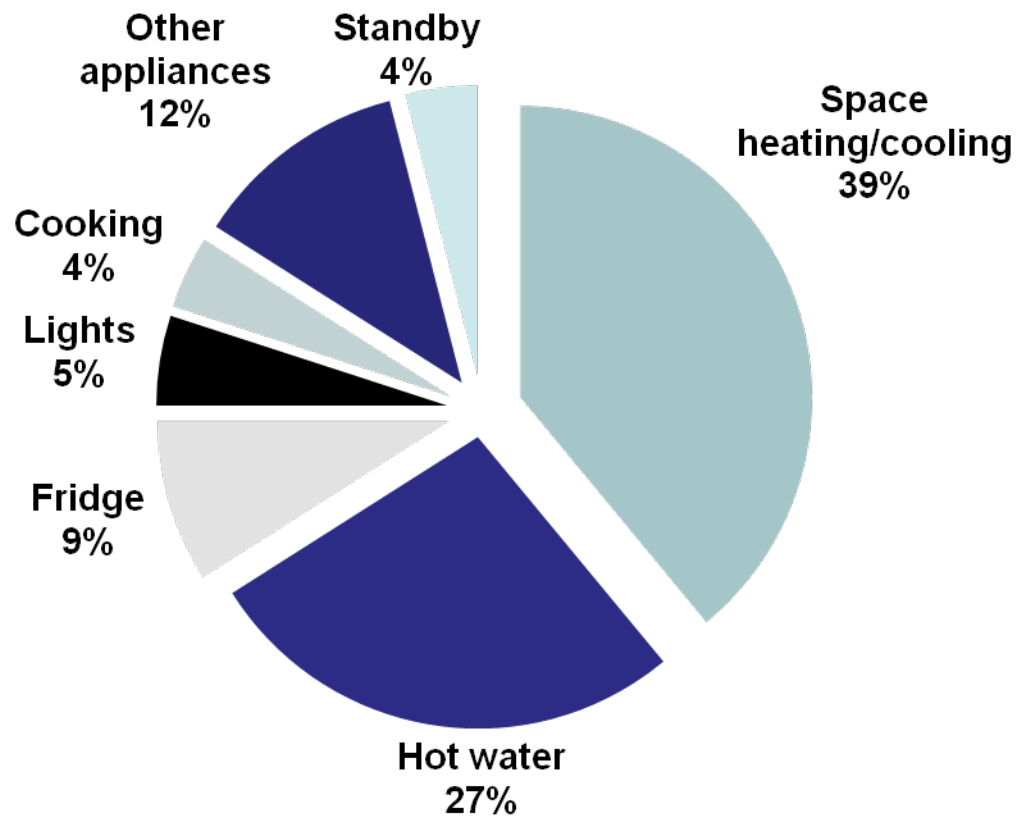
## National urban water targets

Capital city	Per capita annual consumption; Residential, Commercial and Industrial (gal/person/yr)	Change from 2001 consumption
Sydney	28,300 by 2020	-31%
Melbourne	28,530 by 2020	-27%
Brisbane	38,570 by 2010	-20%
Adelaide (per household)	By 2025	-22%
Perth	40,950	-20%
Canberra	34,550 by 2020	-21%

# Background:

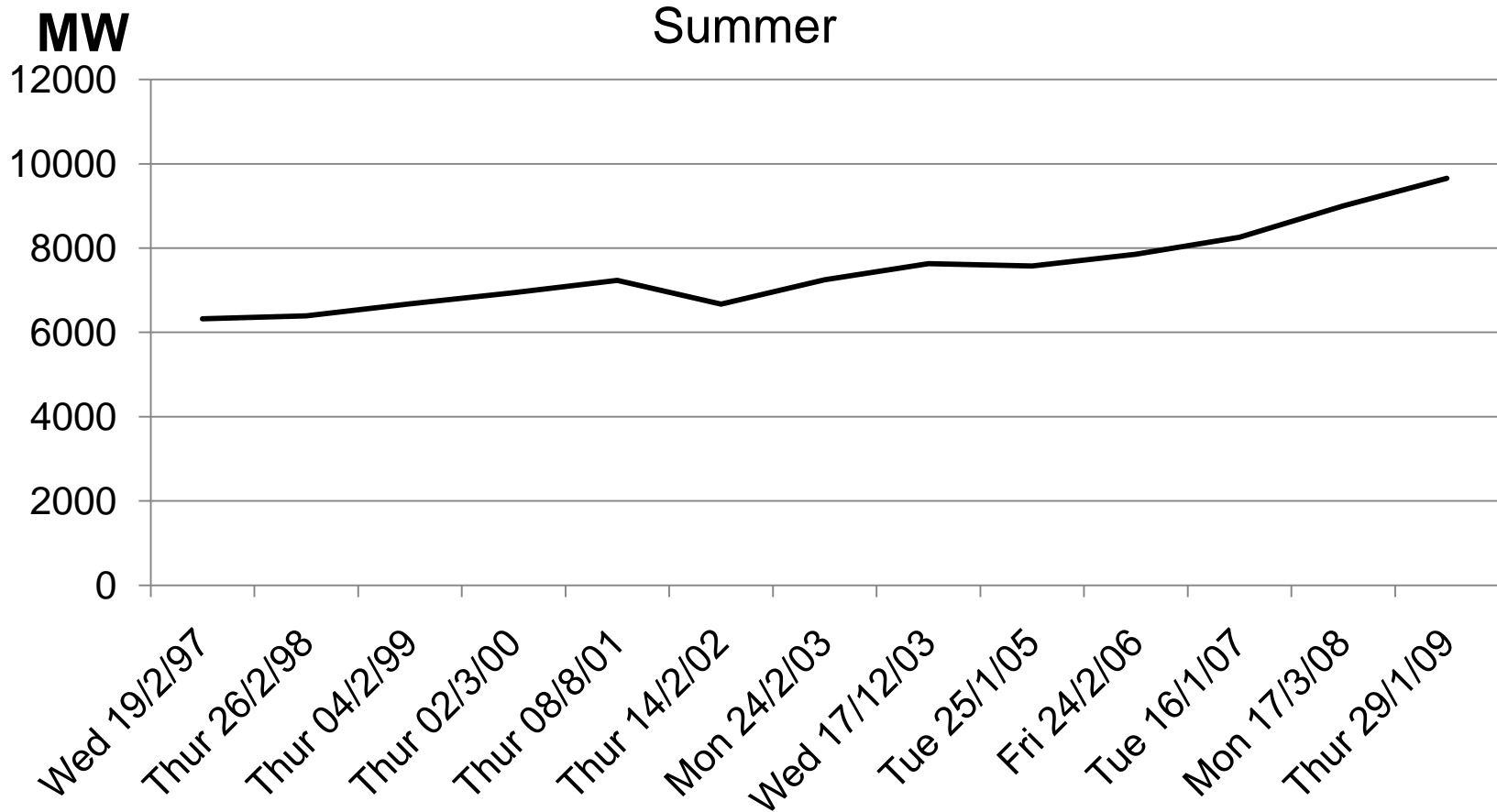
## Energy

Space heating and hot water are about 70% of average household energy use in Melbourne



# Background:

## Peak electricity demand - Victoria



# Alternative model:

## Our philosophy on water and energy

**To act on a good impulse and stick to it:** Old house was not a good home. For its size, it was energy and water intensive. With determination we continue to strive for a water self sufficient and 'zero-carbon' home.

**To take personal responsibility:** We did not dwell on how others are contributing to solve urban water/energy problems. They do not pay our water and energy bills!

**Take a large world view:** All waste is a burden on other people, other places and species.

# Alternative model:

## Our home

Roof area: 1,250 square feet



# Alternative model: House before alteration



# Alternative model: Appropriate water for needs

Our primary source of water	Service
Filtered rainwater	Drinking and food preparation
“-----”	Showering, bath and hand wash
“-----”	Washing clothes
Mains water	Backup for above
Treated greywater	Flushing of toilet
“-----”	Garden
“-----”	Considering in future for cold water supply to wash clothes

# Alternative model: Renewable energy

Primary source of energy	Service
Natural gas	Major cooking – cook top
Solar electricity	Other cooking – electric oven
“_____”	Appliances
Solar radiant energy	Winter heating
“_____”	Water heating
Mains power grid supply	During solar shortfall



# Alternative model: Major alteration



# Alternative model: Rainwater collection



# Alternative model: Greywater treatment

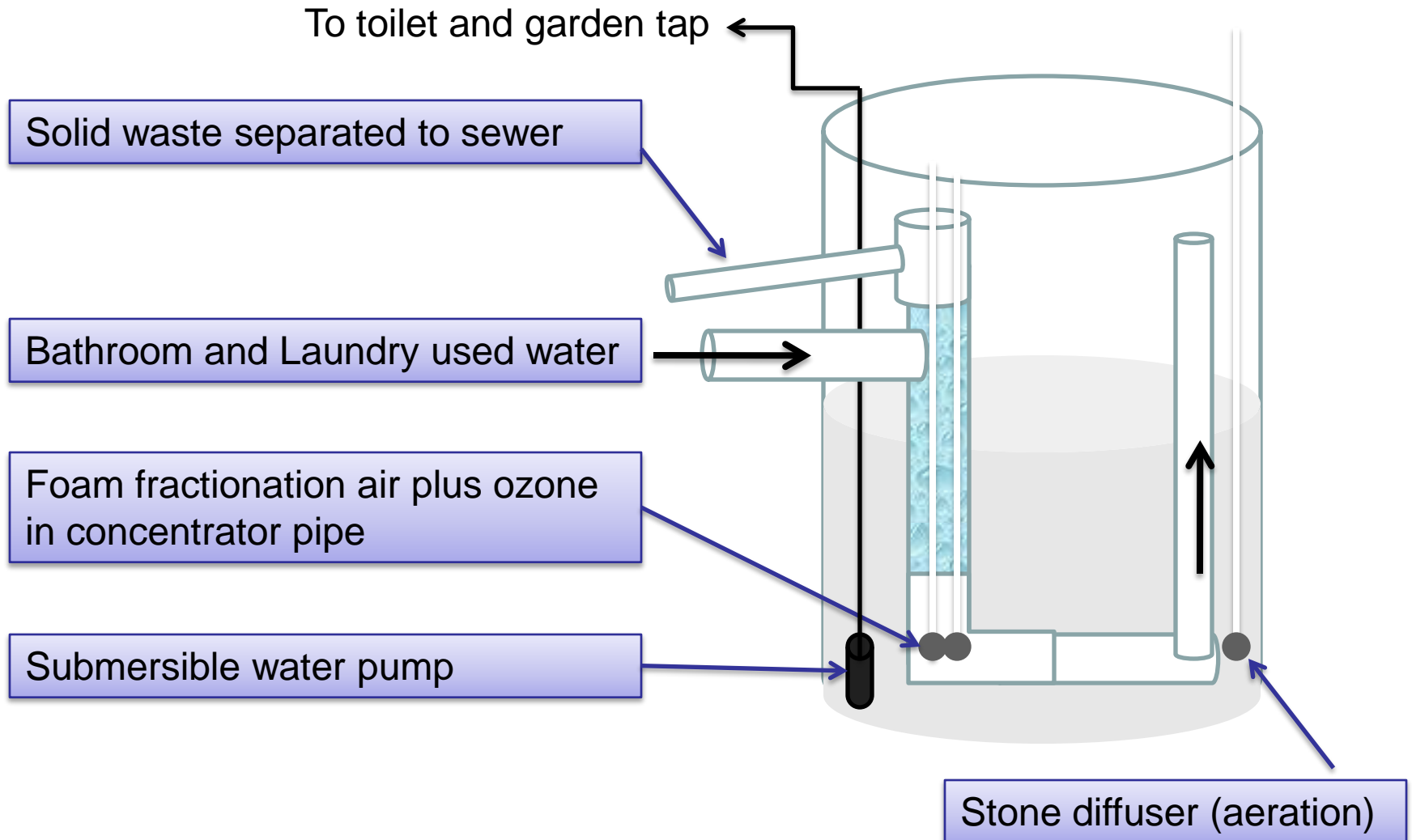


Primary filter



Treatment and storage tank 264 gal.

# Alternative model: Greywater system



# Alternative model: How we save 28,600 gal.



Everydrop  
SS, 528

HW  
Circulator,  
2,800

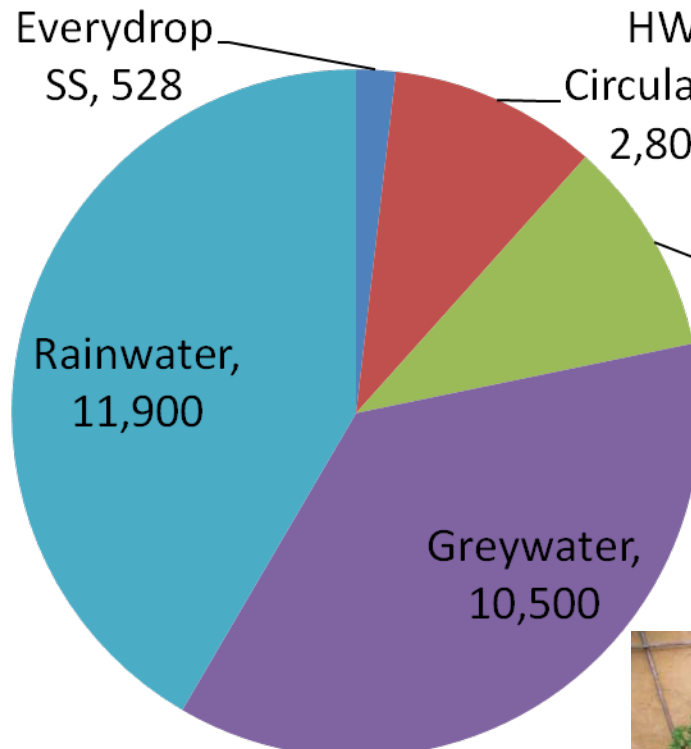


Dishwasher,  
2,900



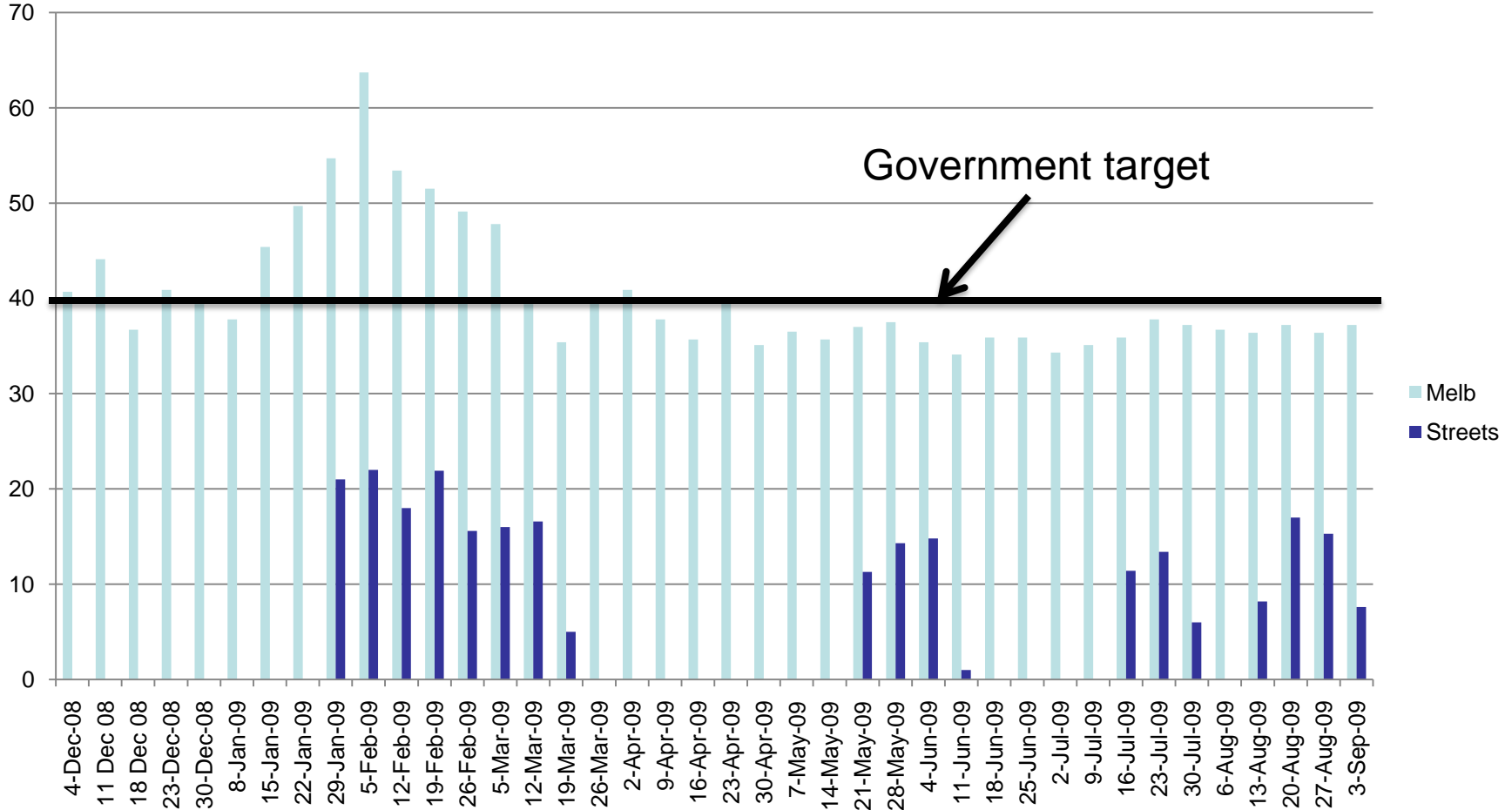
Rainwater,  
11,900

Greywater,  
10,500

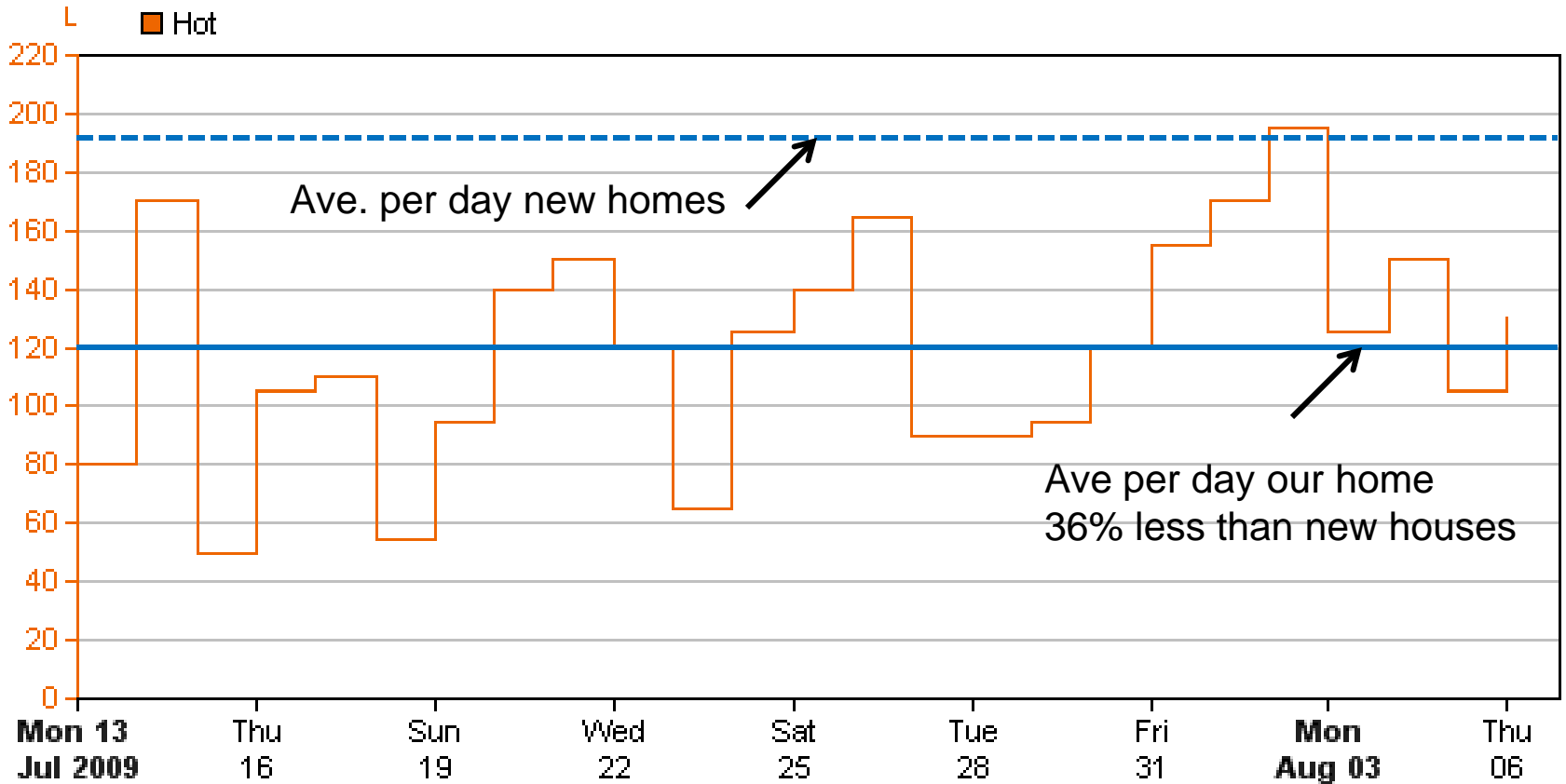


# Alternative model:

## How we compare (7 day ave.gal./person/day)



# Alternative model: Our daily hot water load



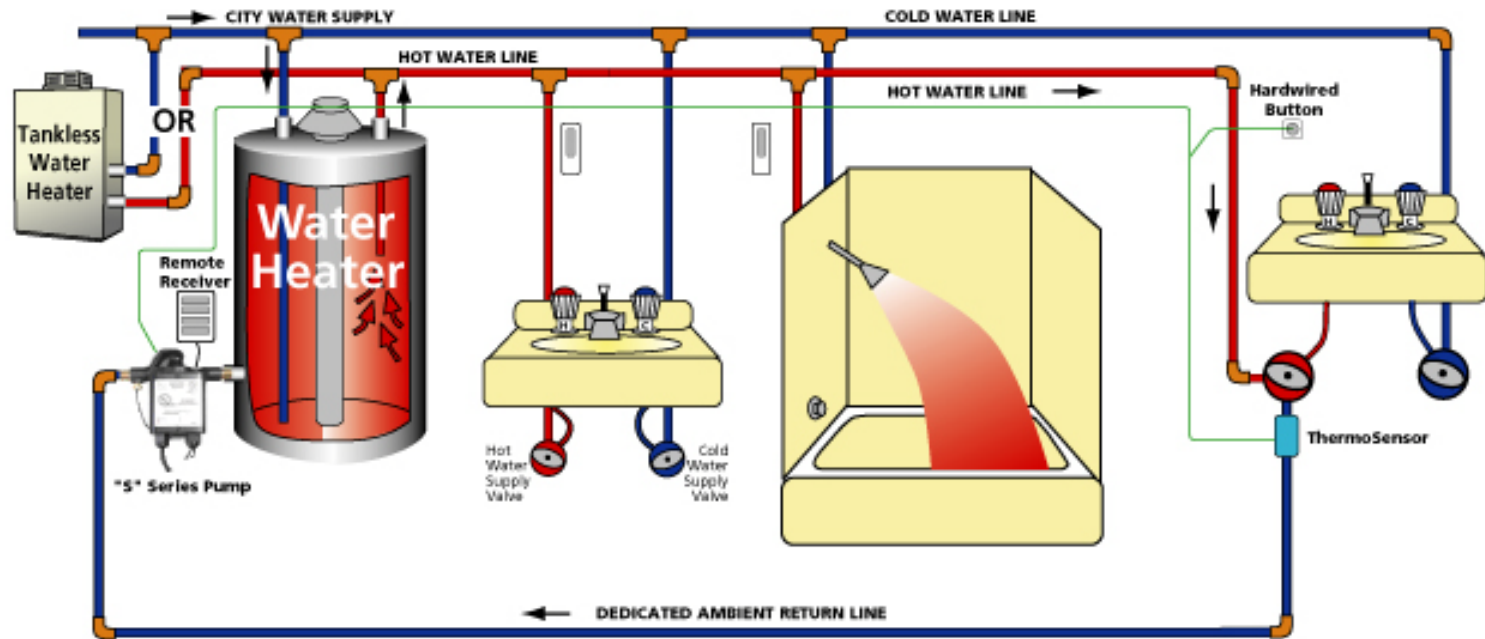
# Alternative model: Inefficient hot water delivery

Hot water outlet	Hot water draw off ALTERATION (gal)		Hot water draw off POST-ALTERATION (gal)	Saving from hot water circulator (gal/per cent)
	Per day	Yearly	Yearly	Yearly
Shower use (2/day)	1.84	672	172	500 (74%)
Kitchen use (6/day)	4.75	1,735	463	1,272 (73%)
Laundry basin (3/day)	2.8	1,012	Negligible	1,000 (99%)
<b>Total</b>	<b>9.39</b>	<b>3,419</b>	<b>635</b>	<b>2,784 (81%)</b>

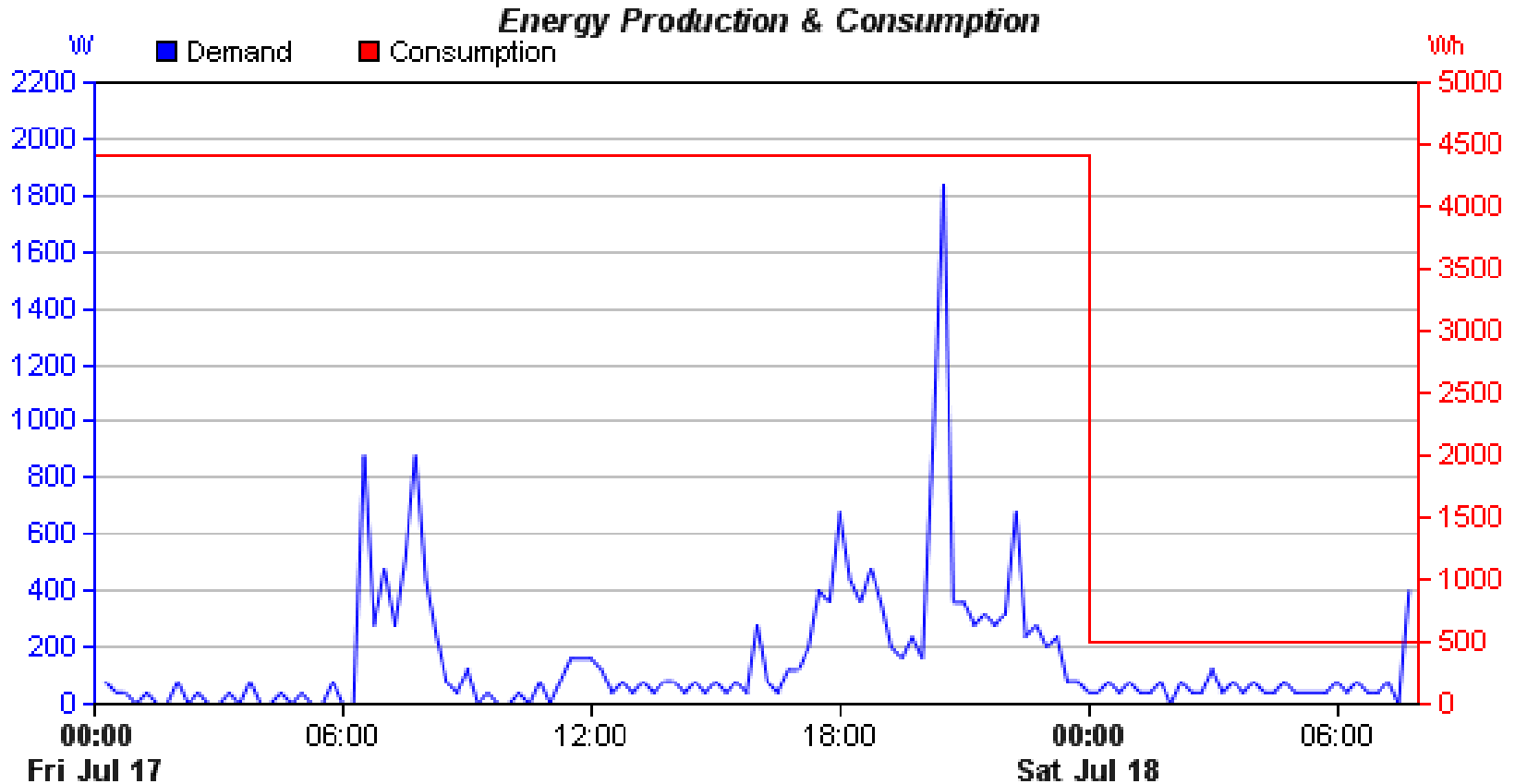


# Structured Plumbing

## Dedicated Return Line



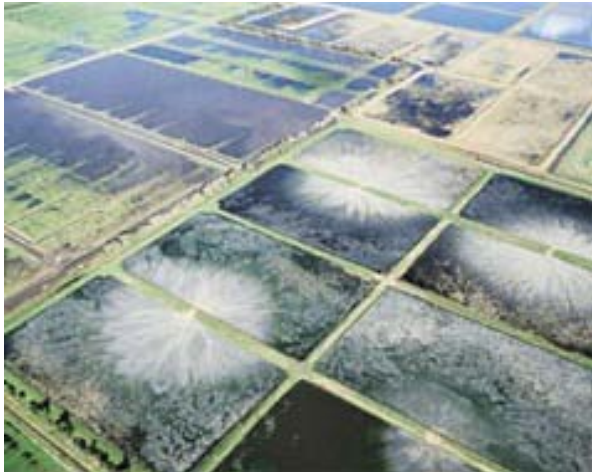
# Stand-by power



# Observations

## Alternative sources of water

Treating domestic greywater does use energy, but it captures this resource at source, before it is degraded in the sewer (mixed with liquid trade waste which is high in inorganic salts).



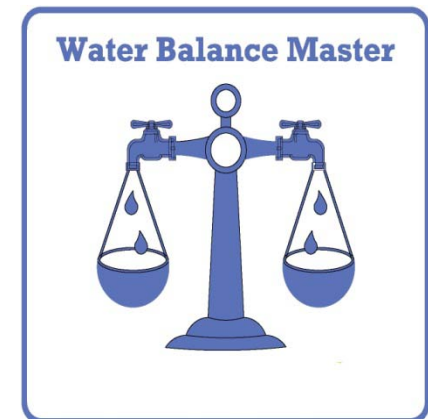
# Observations

## Alternative sources of water

Less water use in showers etc. results in stretching drinking water further.

However, there is less water flowing into greywater system (for garden & toilet).

Balancing water quality to use is very challenging, but not impossible.



# Observations

## Alternative sources of water

Water corporations provide only one quality of water. This is a major mismatch for the services we require from water.



# Observations

## Alternative sources of water

Existing homes are where most of us live and where most of the water solutions will need to crystallize.

As small scale alternative water storage and treatments systems evolve (low risk/maintenance) they will become a traditional feature in existing suburbs.

# Observations

## Hot water

Our average hot water use is 10.5 gallons per person/per/day. Payback on our solar water heater is well over 50 years based on the saved gas bills. High water efficiency homes will not benefit from large volume solar water heaters.





# Observations

## Hot water

Replicating the Melbourne Case Study to 6.3 million Australian houses equates to yearly water savings of about 53,825 acre-feet a year (17.5 billion gal.) from efficient hot water plumbing.



# Observations:

## Importance of monitoring



<http://www.metermate.com.au>

<a href="#">Home</a>	<a href="#">Home</a>	<a href="#">Links</a>	<a href="#">Info</a>	<a href="#">School login</a>	<a href="#">Login</a>
		<b>Login</b>	<input type="text"/>		
		<b>Username</b>	<input type="text" value="brod"/>		
		<b>Password</b>	<input type="text" value="brod"/>		
				<input type="button" value="Login"/>	