

Sustainability

A personal perspective

A Conserver Society

An Overview

- Concern for the future
- Economy of design
- Diversity, Flexibility, Responsibility and Decentralization
- Recognition of total costs
- Respect for the regenerative capacity of the biosphere
- Three transitional phases: CS1, CS2 ,CS3

Conservator Society

CS1: Doing More with Less

- Growth with non-waste industry
- Goal: Efficiency
- Key Characteristics:
 - Industrial growth is assumed as is economic growth
 - Maximum efficiency enables reduced resource use
 - Wasteful practices are minimized
 - Waste production is greatly reduced

Conservator Society

CS2: Doing the Same with Less

- A stable-state industrial society
- Goal: Stability at a selected level
- Key Characteristics:
 - Zero growth in industrial output
 - Throughput stabilized at a chosen level
 - Priorities shifted to accommodate decisions on what should be produced and which resources should be conserved
 - Reduced effect of income inequality
 - Optimum city size determined and physical growth halted
 - Zero population growth

Conservator Society

CS3: Doing Less with Less

- A people-focused society
- Goal: Satisfaction of individual needs without excessive consumption or environmental disruption
- Key Characteristics:
 - Satisfaction of true needs by freezing creation of wants
 - Small scale activities and institutions
 - Minimum throughput- an economy of stock
 - Sustainable economy over a indefinite period
 - Stable population
 - Optimal development of human resources

Personal Response

Decrease ecological footprint

- Live in a housing co-op with passive solar heating, super insulated.
- Move to downtown to a turn of the century house.
 - Reuse existing housing, small lot
 - move to one car from two (bicycle, walk, bus)
- House is insulated and has high efficiency gas furnace. Use about 40% of heating energy neighbours use.
- Gas dryer

Personal Response

- Replace basement windows and seal sills. (\$2000)
- Upgrade electrical system, decreases electricity consumption by half. (\$2500)
- Two composters (from region)
- Compact fluorescent and fluorescent daylight for all lights which remain on. (\$200)
- Change to gas medium efficiency hot water heater (rented, medium efficiency).
- Replace leaky side door (\$400)

Personal Response

- Low flush toilets (\$300)
- New high efficiency dishwasher (\$1300)
- Replace all windows with low e argon. (\$4000)
- New fridge (\$1600)
- Gas fireplace to replace wood fireplace.
(Eliminates electrical heat + plugs hole) (\$1900)
- Fly less, bicycle more

Doing the same with less

Sophisticated Modesty

Results (as measured)

Meter	Gas (100 Cu ft)	Water (100 Cu ft)	/day	Electricity / day (kw-hr)	
90-91	721	79	0.21	15548	43
91-92	814	79	0.22	15927	44
92-93	946	76	0.21	11228	31
93-94	1031	60.4	0.18	12475	34 COLD!
94-95	929	51.4	0.14	11643	32

Base electrical load= 13.8 KW-hr (43%)

GAS = Heating + DHW + Clothes Dryer

Dryer+ DHW= 265 (100 cu ft)

Results (DHW change, GJ)

Meter	Gas	Electricity	/ day	Total
Giga				
Joules				
90-91	78	56		134
91-92	88	57		145
92-93	102	40		143
93-94	111	45		156
94-95	100	42		142

Switch to NG DHW

GAS= Heating + DHW + Clothes Dryer

Dryer+ DHW= 29 GJ

Results in \$\$\$

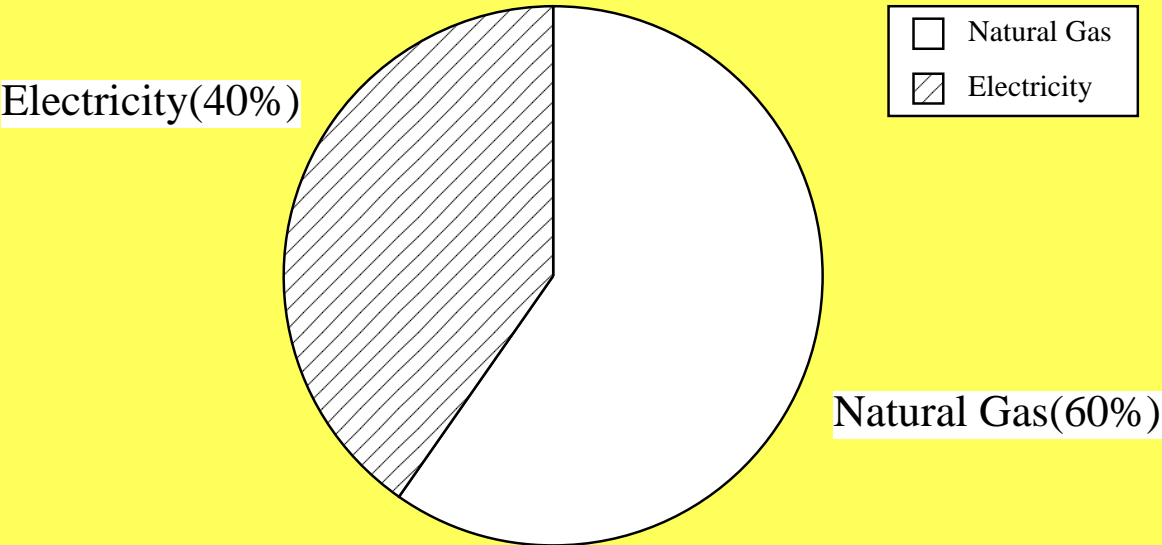
Dollars	Gas	Water	/day	Electricity	/ day	Total
90-91	\$462	\$302	\$0.83	\$992	\$2.72	\$1,756
91-92	\$471	\$302	\$0.83	\$1,123	\$3.08	\$1,896
92-93	\$547	\$294	\$0.81	\$867	\$2.38	\$1,708
93-94	\$597	\$258	\$0.71	\$923	\$2.53	\$1,778
94-95	\$537	\$200	\$0.55	\$867	\$2.38	\$1,604

GAS= Heating + DHW + Clothes Dryer

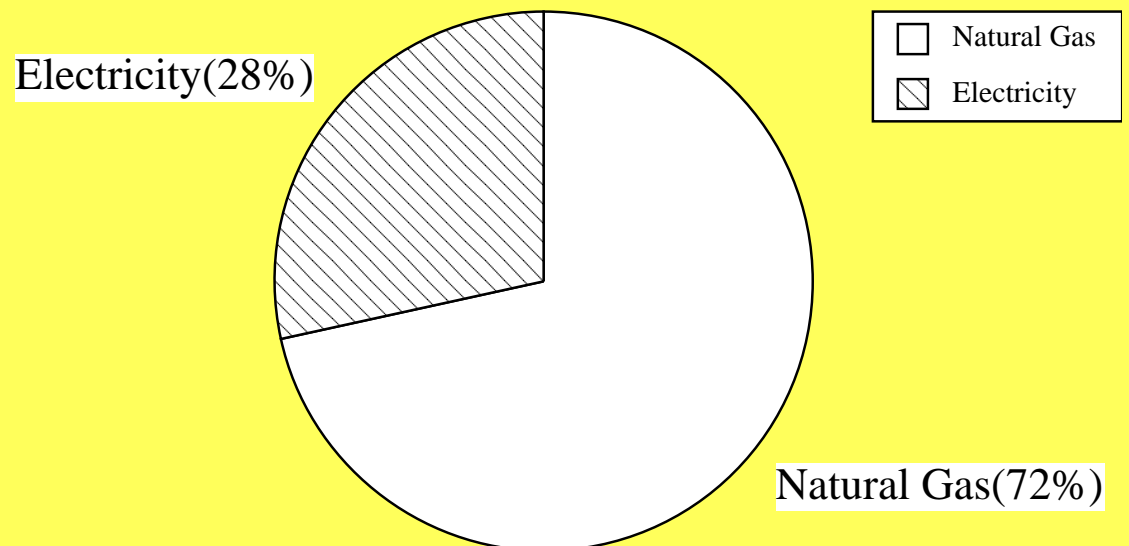
Dryer+ DHW= \$53 + \$100

Change DHW

Electric DHW
(139 GJ)



Natural Gas DHW
(149 GJ)

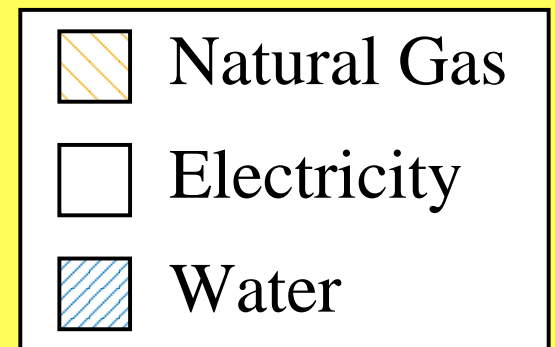
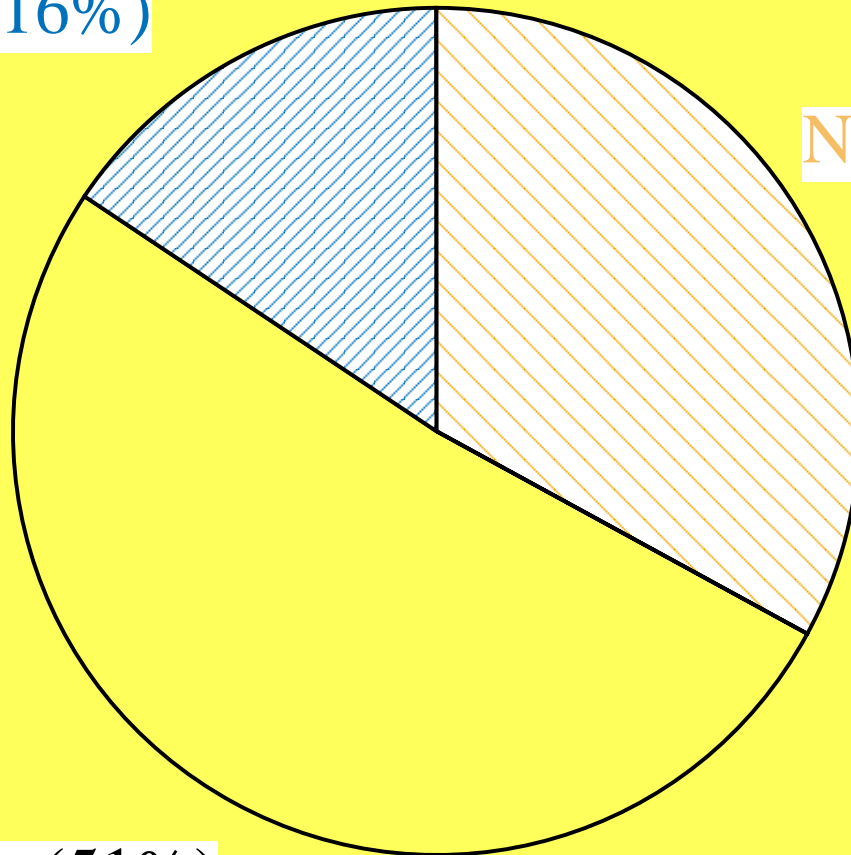


Utility \$\$

Natural Gas DHW (\$)

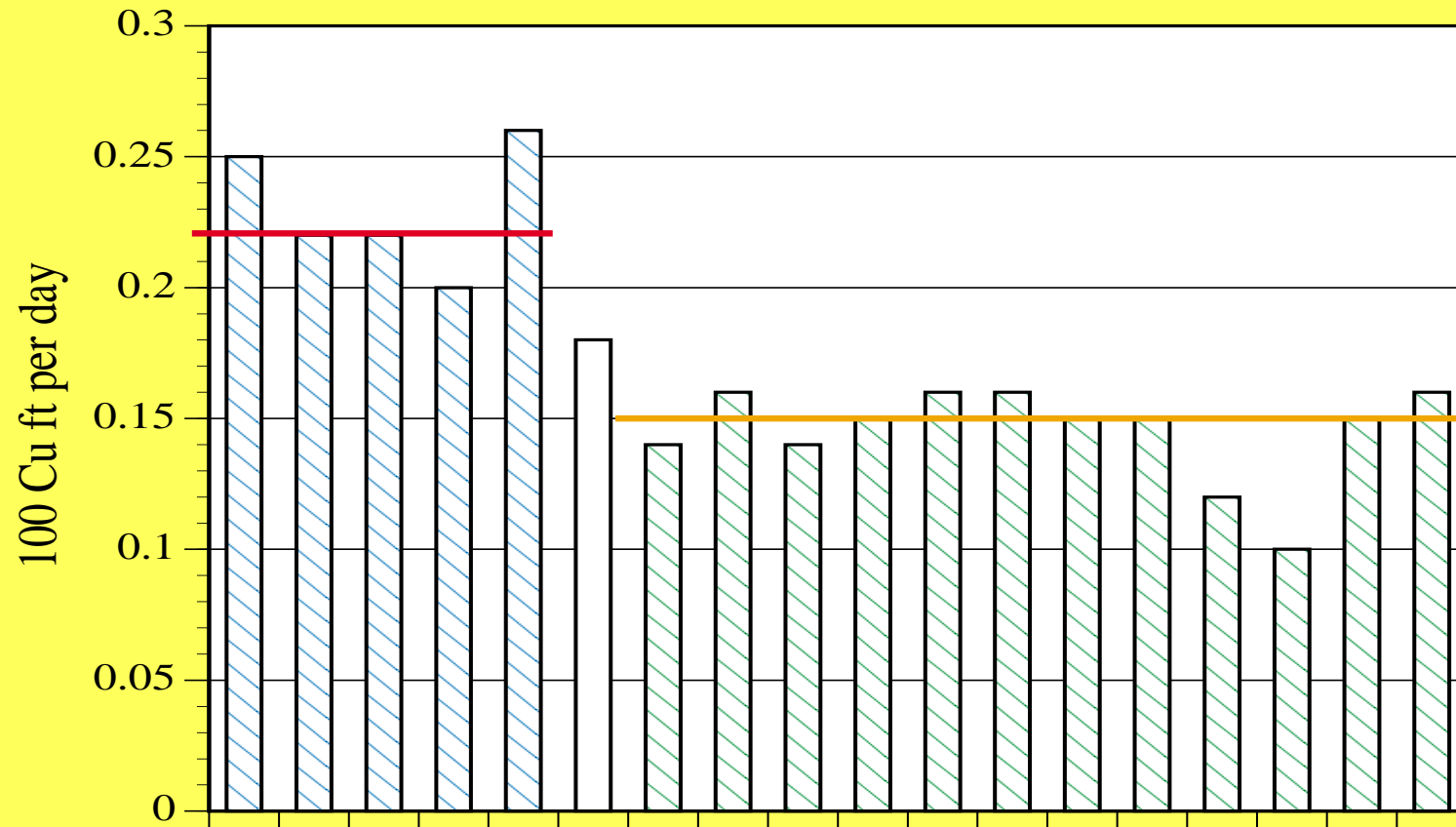
Water(16%)

Natural Gas(33%)

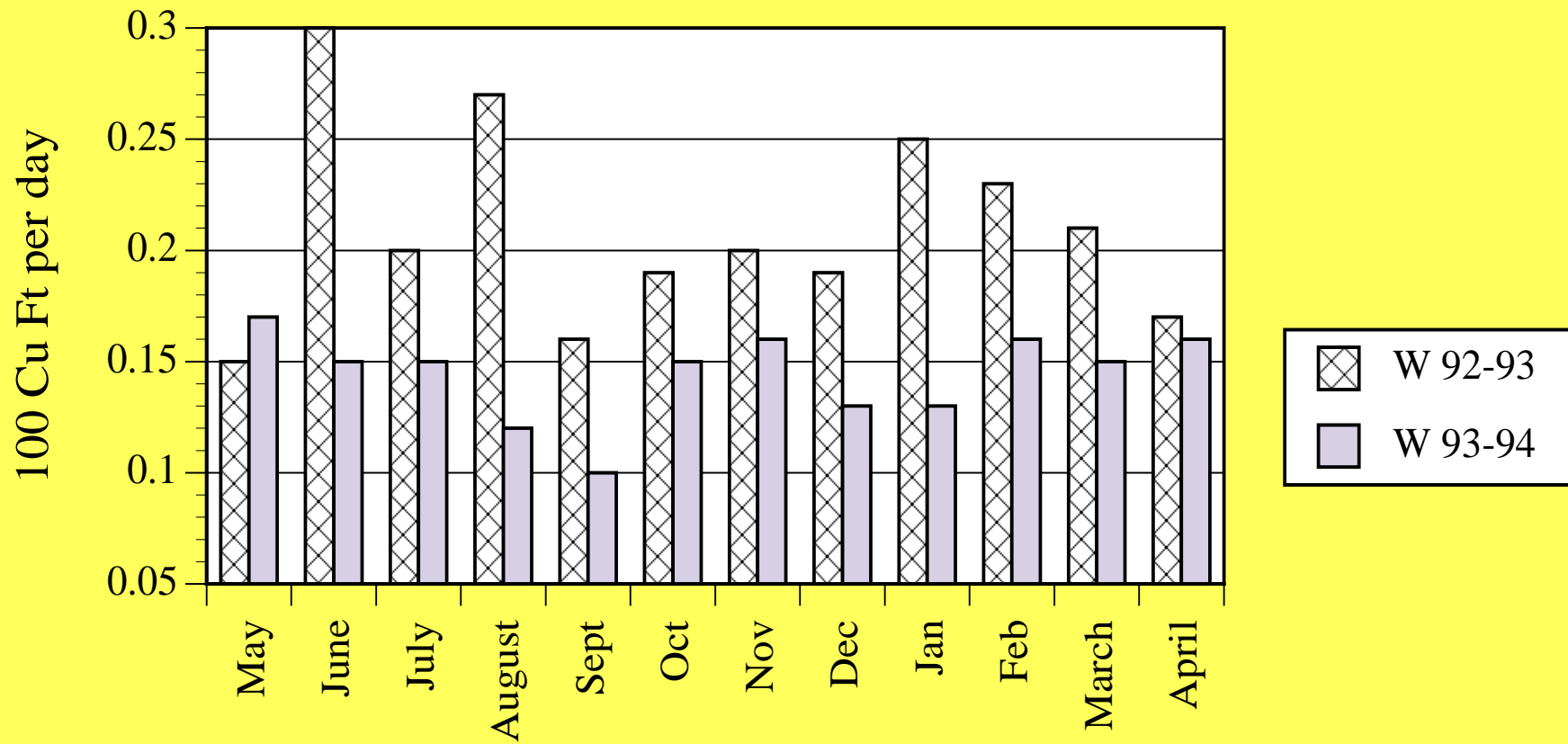


Electricity(51%)

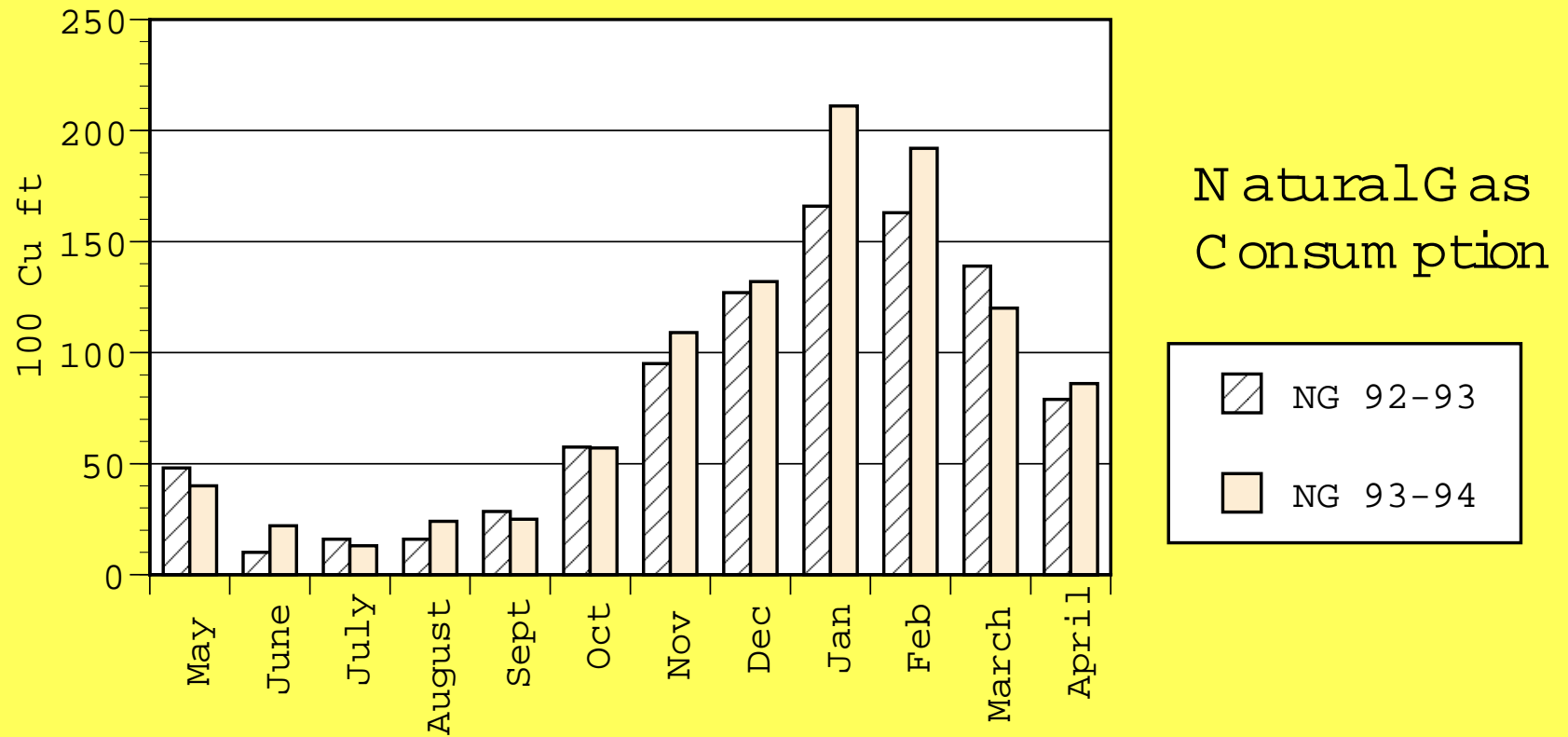
Retrofit: Low Flush Toilets



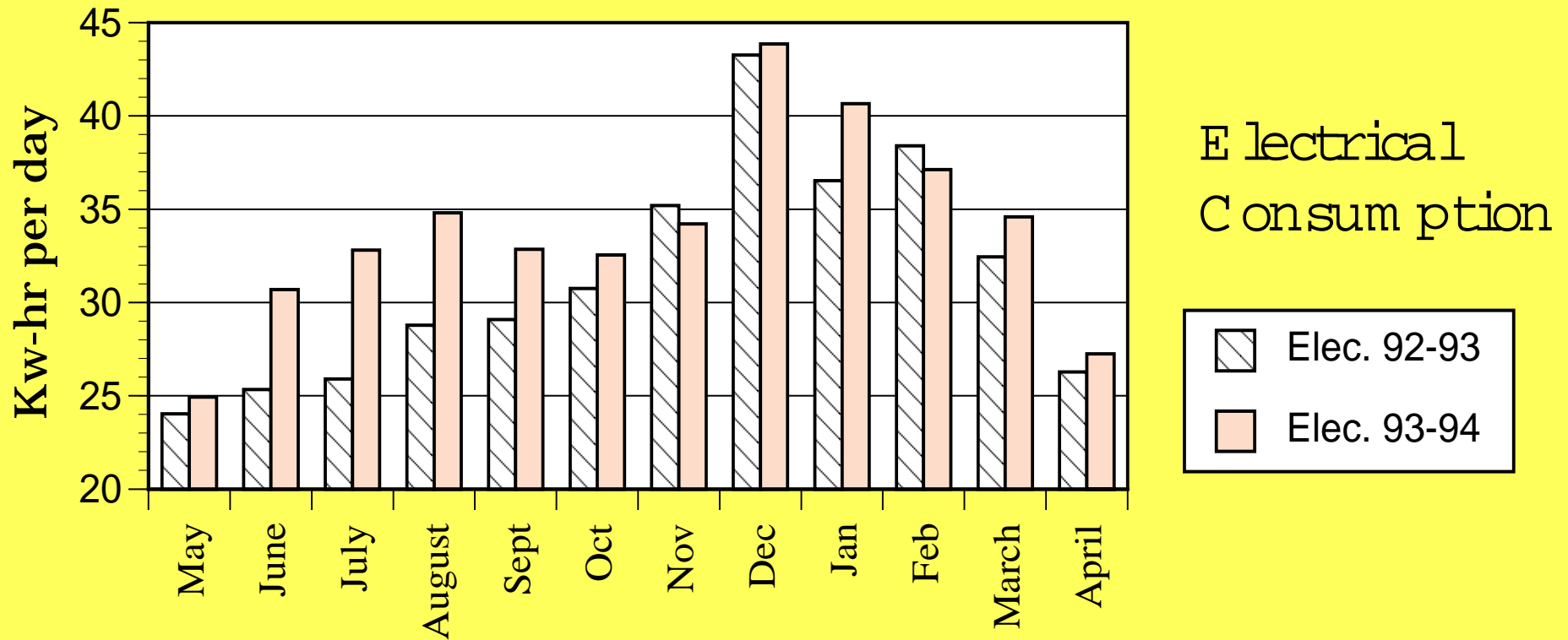
Water Consumption



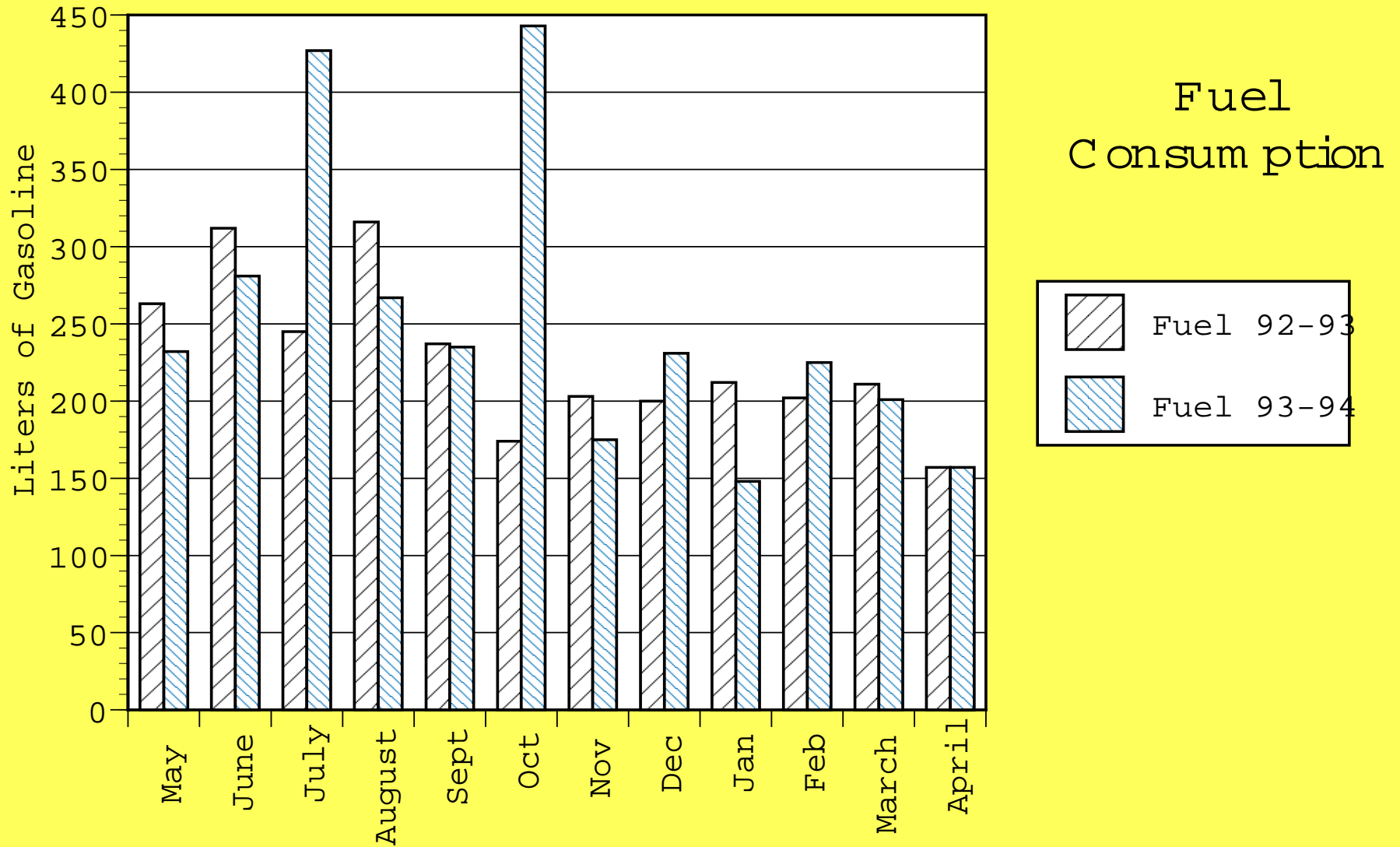
Natural Gas Consumption (Cold Year)



Electrical Consumption



Automobile Fuel Consumption



Improvements (House)

- Water: 600 liters /day to 400 liters /day
- Electricity
 - 88 to 41 to 33.5 kWh-hr/day
 - Baseload reduction from 13.8 to 10, suggests 30 kWh-hr/day
- Natural Gas: 2160 to 2770 to 2200 Cu M per year
- Energy overall (GJ-year):

MOVE IN	Electric Upgrade	DHW	Current
199	137	150	124

Transportation vs. House

- House uses about \$1700, 124 GJ, of utilities per year (including \$200 for water)
- Use about 2800 liters, \$1800, 98 GJ per year to drive about 21,000km. (One vehicle + bicycles)

Effect of conservation?

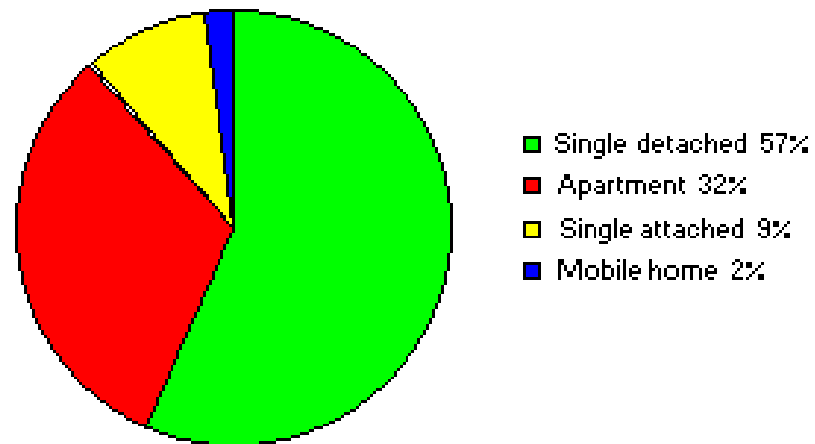
GJ/Year	NORTH AMERICAN	JK	JK Scaled	DANISH	MODEST	GREEN
Electric	50	39	28	20	19	0.3
Heat	87.6	84	60	82.3	75.6	23.2
Transport	219.7	98	98	83.7	7.3	0.6
TOTAL	357.3	221	186	186	101.9	24.1
WATER	1300	400		600		
(liters per day)						

What next?

- Further change not possible without structural change
 - Train to Toronto or airport
 - District heating
 - Walk to stores
 - Bus system
 - Different housing structures
 - Better bikeways and storage
 - Access to efficient appliances
 - Shared equipment

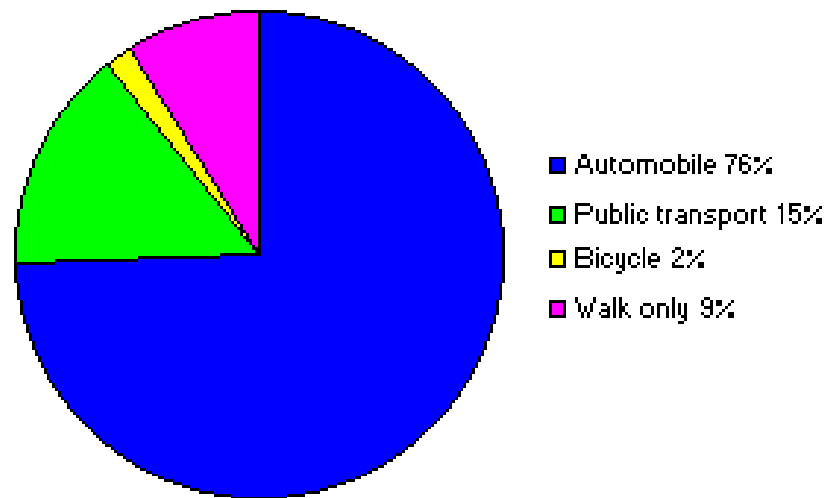


Distribution of Canadian households by dwelling structure, 1992



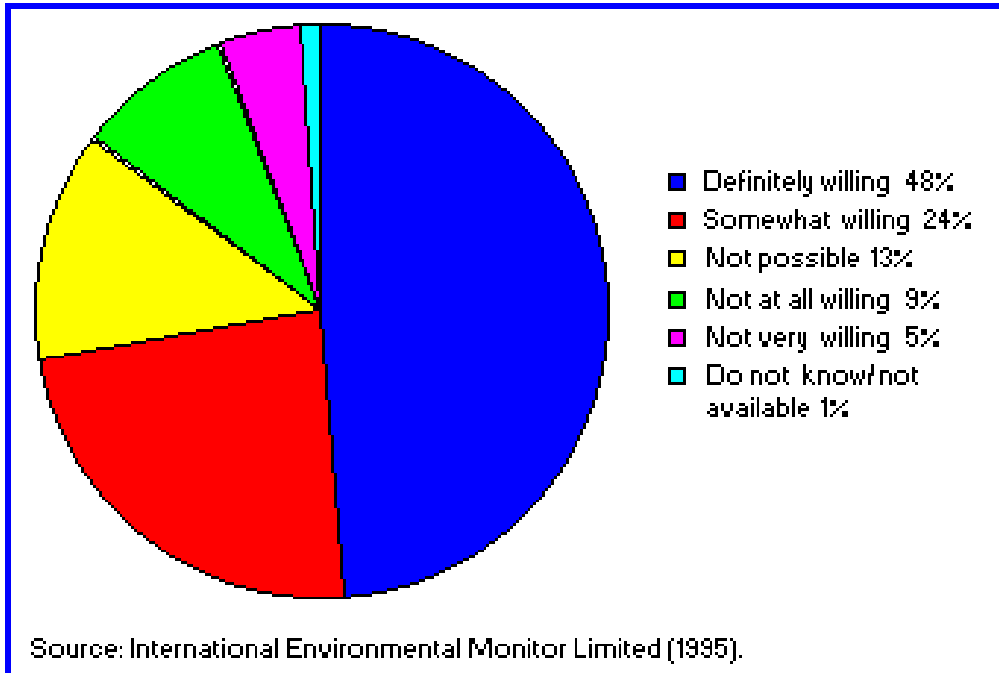
Source: Statistics Canada (1994a).

Primary modes of commuting between home and work in Canada, 1991



Source: Statistics Canada (1994a).

Willingness to walk or bike (instead of drive) twice more per week



Appliance	Energy use (kWh/year)		Lifetime of appliance (years)	Comparison between most efficient and least efficient	
	Most efficient appliance	Least efficient appliance		Amount less energy used by most efficient (%)	Savings over lifetime of appliance (\$)
Refrigerator	564	972	17	42	502
Electric range	720	828	18	13	141
Dishwater	648	1 034	13	37	363
Washing machine	780	1 308	14	40	535
Freezer	348	420	21	17	109
Clothes dryer	828	1 128	18	27	391

Source: Natural Resources Canada (1993b).

change in
ENERGY CONSUMPTION
 for major appliances



Source: Pew Center on Global Climate Change

In Canada....

- Use available techniques (including technology) combined with life cycle and quality analysis to improve efficiency and decrease footprint.
- Work to make new options available to people through structural change, new products and technology.
- Work on equity.
- Maintain ecological integrity.
- Continue transition to CS1, CS 2, and CS3.

**So my challenge to you is:
What are you personally going to
do about sustainability?**