



How to Save over \$1000 a Year with Conservation and Efficiency



Dario Atallah - Ambassador

- Monarch High School Presentation
- Fairview High School Presentation
 - Fairview Parent Organization
 - December, 2009



Overview

- Introduction
- State of Energy - Big Picture
- Renewable Energies
- Home Initiatives
- Summary
- Discussion

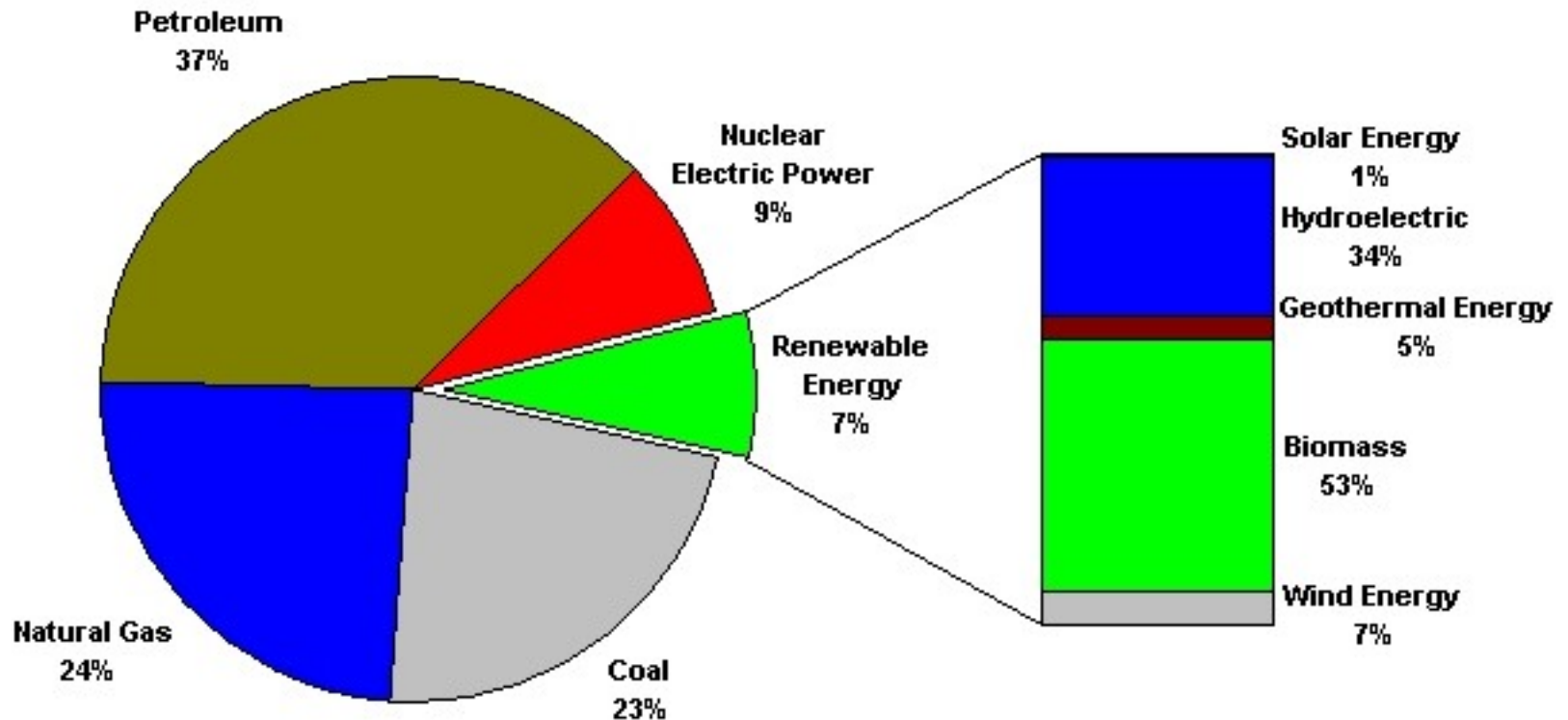


Energy Landscape

Renewable Energy Consumption in the Nation's Energy Supply, 2008

Total = 99.305 Quadrillion Btu

Total = 7.301 Quadrillion Btu

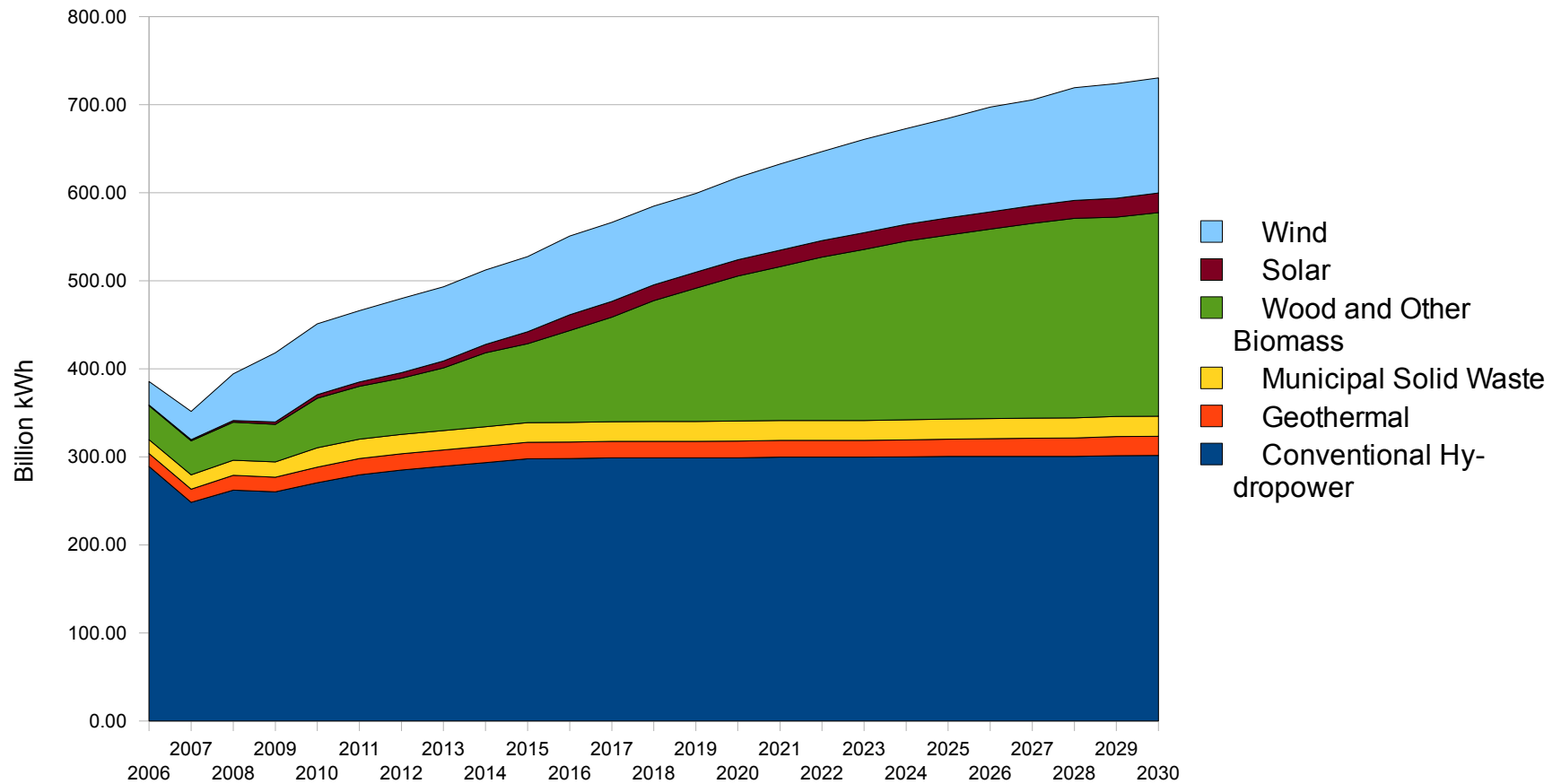


Source: WWW.EIA.DOE.GOV



Renewable Energy Projections

Renewable Energy Generation



Source: Energy Information Administration (EIA)



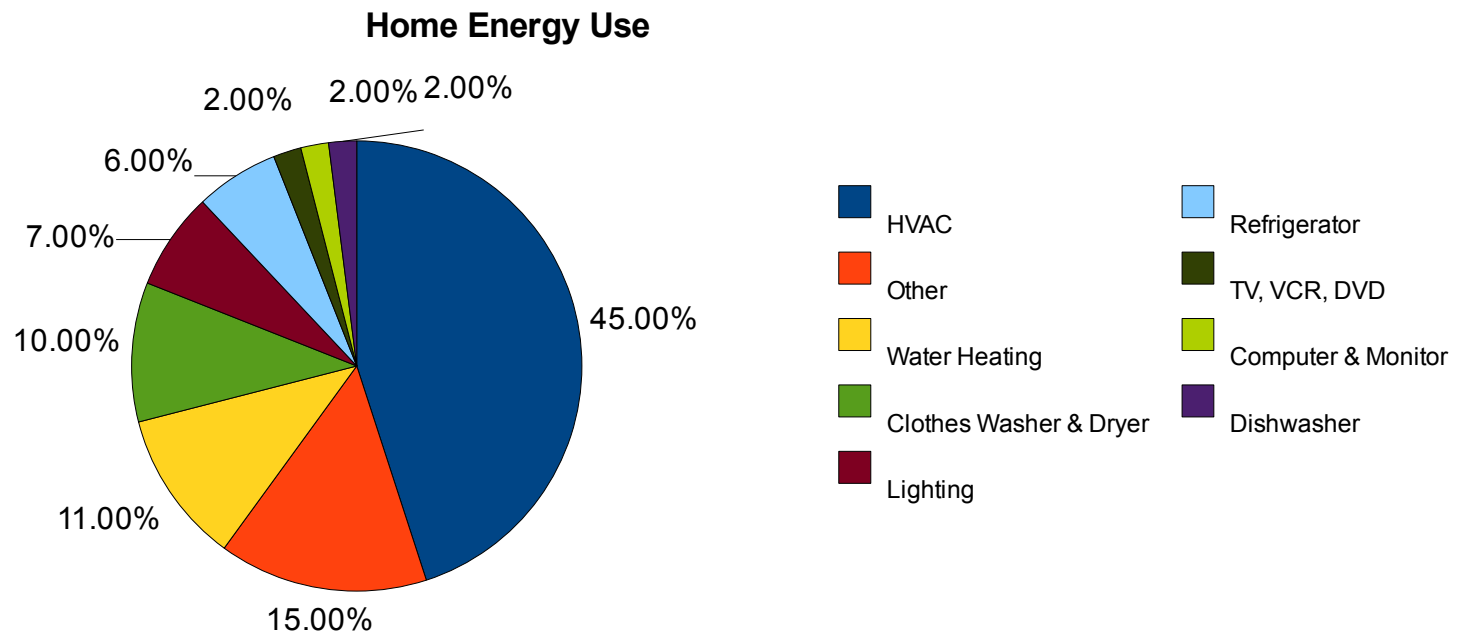
Residential Energy Use

Residential Energy usage is 22% of total
Average Colorado home (Source: Xcel Energy)

11,000 kWh per year (\$1,034/yr)

700 therms per year (\$623/yr)

150,000 gallons of water per year (\$755/yr)





Home Initiatives - Low Hanging Fruit

Electricity Use (\$200 - \$300/yr savings)



- Change incandescent bulbs to CFL's
- Kill phantom loads, turn off lights, monitors

Hot water heater (\$22-\$23/yr savings)



- Lower hot water heater temperature to 120 Deg F
- Insulate heater, insulate hot water pipe

Wash in cold water (\$10/yr savings)

Heating (\$100 - \$200/yr savings)



- Change furnace filter, turn down thermostat
- Seal leaks, close fireplace flue and turn pilot off (gas)

Windows (\$100 - \$250/yr savings)



- Seal cracks and close shades/blinds to increase R value

Carpool, combine errands, use public transportation (\$200 - \$300/yr savings)



Home Initiatives - Medium Hanging Fruit

Sealing (\$100 - \$200/yr savings)



- Seal cracks on doors and windows
- Seal duct system leaks
- Seal canned lighting & house fan orifice
- Insulate electrical boxes in outside walls (light switches, power plugs)
- Weather strip and/or adjust doors and windows

Insulation (over \$130/yr savings)



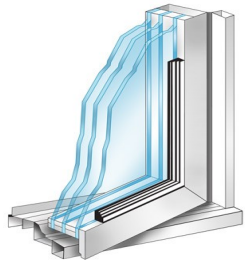
- Insulate the attic (16 - 18 inches)
- Condition crawl space with vapor barrier on ground

Water Savings (over \$500/yr savings)



- Buy faucet aerators, low flow shower heads
- Replace toilet with dual flush systems

Home Initiatives - High Hanging Fruit



Windows (\$100 - \$150/yr savings)

- Replace single pane or defective windows with low-e double pane with lower U-values

Appliances



- Replace HVAC systems with Energy Star components (don't oversize) (\$200 - \$300/yr)
- Replace old Plasma with Energy Star model (\$60)
- Replace refrigerator with Energy Star rated (\$80)
- Switch to gas dryer & front loader washer

Add Solar Panels (\$700 - \$800/yr savings)



- Best if facing south
- Best if angled at 40 degrees in Boulder County

Plant trees on east and west sides

Add overhangs on south facing windows



Home Initiatives - Services

- Zero Cost **T1 Audit** by Energy Core
 - Free House Energy Assessment
- **Energy Audit** from Center for Resource Conservation (\$100)
 - In Depth energy efficiency analysis
- Paid energy **upgrades** by Climate Smart Program
 - Free CFLs and more
- Free Consumer Energy Use **portal** by Symbiotic Engineering
 - Monitor energy usage year over year



Summary Savings - Low Cost

	Household Potential Yearly Savings (\$)	Household CO2 Lbs/Yr Savings	Boulder County Potential Yearly Savings (\$MM)	Bldr County CO2 Tons/Yr Savings	Colorado Potential Yearly Savings (\$MM)	Colorado CO2 Tons/Yr Savings
Summary						
Zero to low Cost initiatives (\$0 - \$100)						
Electricity						
Turn off CRT monitor	\$16.47	307	\$0.86	7,981	\$14.18	132,176
CFLs	\$216.15	4,029	\$14.05	130,937	\$232.69	2,168,510
Turn off phantom loads	\$62.04	1,156	\$2.42	22,549	\$40.07	373,442
Gas						
Lower Furnace 2 degrees	\$28.00	61	\$1.82	1,984	\$30.14	32,851
Hot water heater	\$22.67	293	\$1.47	9,530	\$24.40	157,828
Seal Cracks/Duct Leaks	\$142.80	311	\$1.86	2,023	\$30.74	33,508
Change Furnace Filter	\$100.80	220	\$6.55	7,141	\$108.51	118,265
Auto						
Driving	\$377.50	2,929	\$4.91	19,041	\$81.28	315,350
Water						
Water use	\$343.69	174	\$22.34	5,641	\$369.98	93,432
Wash in Cold Water	\$10.53	138	\$0.68	4,475	\$11.33	74,113
Total Savings Low Cost Initiatives	\$1,320.65	9,618	\$56.96	211,301	\$943.33	3,499,475



Summary Savings - Medium Cost

	Household Potential Yearly Savings (\$)	Household CO2 Lbs/Yr Savings	Boulder County Potential Yearly Savings (\$MM)	Bldr County CO2 Tons/Yr Savings	Colorado Potential Yearly Savings (\$MM)	Colorado CO2 Tons/Yr Savings
Summary						
Medium Cost initiatives (\$100 - \$500)						
Monitor	\$49.32	919	\$1.28	11,951	\$21.24	197,933
Insulation	\$136.00		\$5.30		\$87.84	
Total Savings Medium Cost Initiatives	\$185.32	919	\$6.59	11,951	\$109.08	197,933



Summary Savings - High Cost

	Household Potential Yearly Savings (\$)	Household CO2 Lbs/Yr Savings	Boulder County Potential Yearly Savings (\$MM)	Bldr County CO2 Tons/Yr Savings	Colorado Potential Yearly Savings (\$MM)	Colorado CO2 Tons/Yr Savings
Summary						
High Cost Initiatives (\$500 - \$50,000)						
HDTVs	\$66.52	1,240	\$0.86	8,059	\$14.32	133,468
Refrigerator	\$81.31	1,516	\$1.06	9,851	\$17.51	163,155
Efficient AC	\$168.96	3,149	\$2.20	20,470	\$36.38	339,011
Efficient Washer & Dryer	\$135.00	839	\$1.76	5,452	\$29.07	90,291
Window Shades	\$250.00	3,270	\$16.25	106,264	\$269.13	1,759,896
Efficient Furnace 70% to 90%	\$137.06	1,793	\$1.78	11,652	\$29.51	192,969
Energy Star Windows	\$155.10	2,891	\$2.02	18,791	\$33.39	311,202
Solar PV	\$775.50	14,454	\$5.04	46,977	\$83.48	778,004
Hybrid Car	\$1,444.44	11,209	\$9.39	36,429	\$155.49	603,318
Total Savings High Cost Initiatives	\$5,636.91	55,057	\$138	528,305	\$2,292	8,749,550



Questions

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Lightbulb/Monitor Savings

	Qty	Power (W)	Time ea (hrs)/day	Energy Used (kWh)/ day	Cost (\$)/day	Yearly Energy Cost/yr	Yearly Energy (kWh)	Monthly Energy (kWh)	CO2 Lbs/Yr
Light Bulbs Incandescent									
Light Bulb 100W	10	100	3	3.00	\$0.28	\$102.93	1,095	91.25	1,918
Light Bulb 60W	30	60	3	5.40	\$0.51	\$185.27	1,971	164.25	3,453
Total Incandescent	40			8.40	\$0.79	\$288.20	3,066	255.5	5,372
Light Bulbs CFLs									
Light Bulb CFL 100W eq	10	25	3	0.75	\$0.07	\$25.73	274	22.81	480
Light Bulb CFL 60W eq	30	15	3	1.35	\$0.13	\$46.32	493	41.06	863
Total CFLs	40			2.10	\$0.20	\$72.05	767	63.88	1,343
Savings - Light Bulbs						\$216.15	2,300	191.63	4,029
Monitors - CRT									
Monitor CRT active	1	150	8	1.20	\$0.11	\$41.17	438	36.5	767
Monitor CRT asleep	1	30	16	0.48	\$0.05	\$16.47	175	14.6	307
Total Monitors - CRT	1		24	1.68	\$0.16	\$57.64	613	51.1	1,074
Monitor - Flat Panel									
Monitor FP active	1	30	8	0.24	\$0.02	\$8.23	88	7.3	153
Monitor FP asleep	1	0.15	16	0.00	\$0.00	\$0.08	1	0.07	2
Total Monitors Flat Panel	1		24	0.24	\$0.02	\$8.32	88	7.37	155
Savings - Monitors						\$49.32	525	44	919

Driving & Window Savings

Driving	MPG	Times/Week	Miles/week	Miles/Year	Gals / Year	Cost/Year	CO2 Lbs/Yr
Trips to Market (3 miles)	20	3	18	900	45	\$112.50	873
Trips to School (5 miles)	20	5	50	1,800	90	\$225.00	1,746
Trips to Work (10 miles)	20	5	100	5,000	250	\$625.00	4,850
Combine market trips	20	2	12	600	30	\$75.00	582
Carpool to school	20	3	30	1,080	54	\$135.00	1,048
Carpool to work	20	3	60	3,000	150	\$375.00	2,910

Driving savings			66	3,020	151	\$377.50	2,929
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Replacing Car	MPG	Miles/ Year	Gals/Year	Gas Cost	CO2 Lbs/Yr
Old SUV	15	12,000	800	\$2,000.00	15,520
Super efficient Hybrid	54	12,000	222.22	\$555.56	4,311
Car Replacement Savings			577.78	\$1,444.44	11,209

Windows Replacement	Savings %	Savings \$	Number	#CO2 Saved	Cost ea	Cost	
# Windows	15.00%	\$155.10		6	2,891	350	\$2,100.00



Heating Savings

Water Usage	Minutes/Times Use each person/day	People in Household	Gals/Min or Gals/Flush	Gallons Used / day	Gallons Used / Year	Cost/yr	CO2 Lbs/Yr
Old shower heads	5.00	4	5.5	110	40,150	\$201.95	
Low flow shower heads	5.00	4	2.2	44	16,060	\$80.78	
Savings Shower Heads				66	24,090	\$121.17	61.2
Old Toilet use	5.00	4	5	100	36,500	\$183.60	
Low flow (dual flush) toilet	5.00	4	1.04	21	7,592	\$38.19	
Savings Toilet				79	28,908	\$145.41	73.44
Faucet w/o aerator	3	4	5	60	21,900	\$110.16	
Faucet w/ aerator	3	4	1.5	18	6,570	\$33.05	
Savings Faucets				42	15,330	\$77.11	38.95
Total Water Savings				187	68,328	\$343.69	174

Insulation & Water Savings

Insulation	Savings/Yr	Cost	Payback	SF
Attic R11 to R38 (4" - 16")	\$136.00	\$400	2.94	800
Window Shades (R-5)	\$400.00	\$1,200	3	300

Water Usage	Minutes/Times Use each person/day	People in Household	Gals/Min or Gals/Flush	Gallons Used / day	Gallons Used / Year	Cost/yr	CO2 Lbs/Yr
Old shower heads	5.00	4	5.5	110	40,150	\$201.95	
Low flow shower heads	5.00	4	2.2	44	16,060	\$80.78	
Savings Shower Heads				66	24,090	\$121.17	61.2
Old Toilet use	5.00	4	5	100	36,500	\$183.60	
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Assumptions

Energy Costs and Savings

\$/kWh	\$0.094
\$/1000 Gal of water	\$5.03
\$/Gal Gasoline	\$2.50
\$/Therm	\$0.89
BTU/kWh	3,412

For CO2 calculations, assume:

1 kWh ->	1.75 Lbs CO2
1 CF Natural Gas -> 1000 BTU	0.12 Lbs CO2
1 Gal Gasoline - >	19.4 Lbs CO2
1 Therm - >	11.64 Lbs CO2
1000 Gals Water ->	1.45 kWh
	2.54 Lbs CO2