OPALCO

Perspectives on Energy in San Juan County

What problems are we trying to solve?

Low Carbon Footprint

Affordable Energy

Energy On Demand

Reduce Waste

Sustainable

Load Match

Peak Shave

Zero Load Growth…

"The problems drive the solutions."

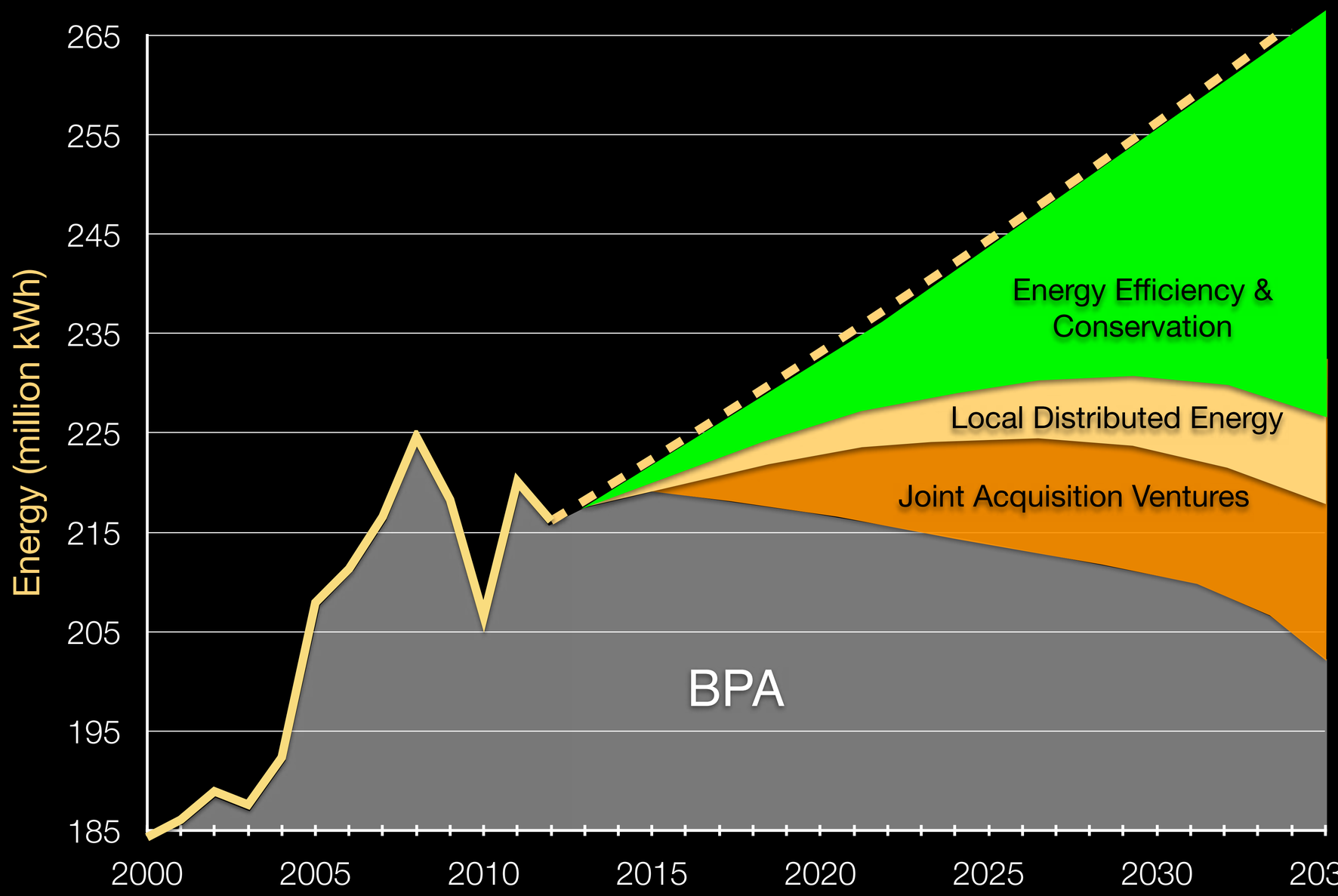
"Incentives drive innovation."

Board Directive #2

OPALCO will maintain a longterm evolving strategic power supply resource plan to provide safe, adequate, reliable, advantageously priced power including appropriate mitigation of source risk, economic, climate and energy policy uncertainty.

- Maintain BPA as our primary longterm power supplier.
- Investigate and form relationships with alternate suppliers of power.
- Implement energy efficiency and conservation programs as a cost effective power resource. These include member projects, BPA programs, and OPALCO infrastructure improvements.
- Encourage local generation installations consistent with our OPALCO grid operations.

Power Supply Resource Strategy



Notes

- Schematic illustration, not to scale
- Range starts at 185 million kWh

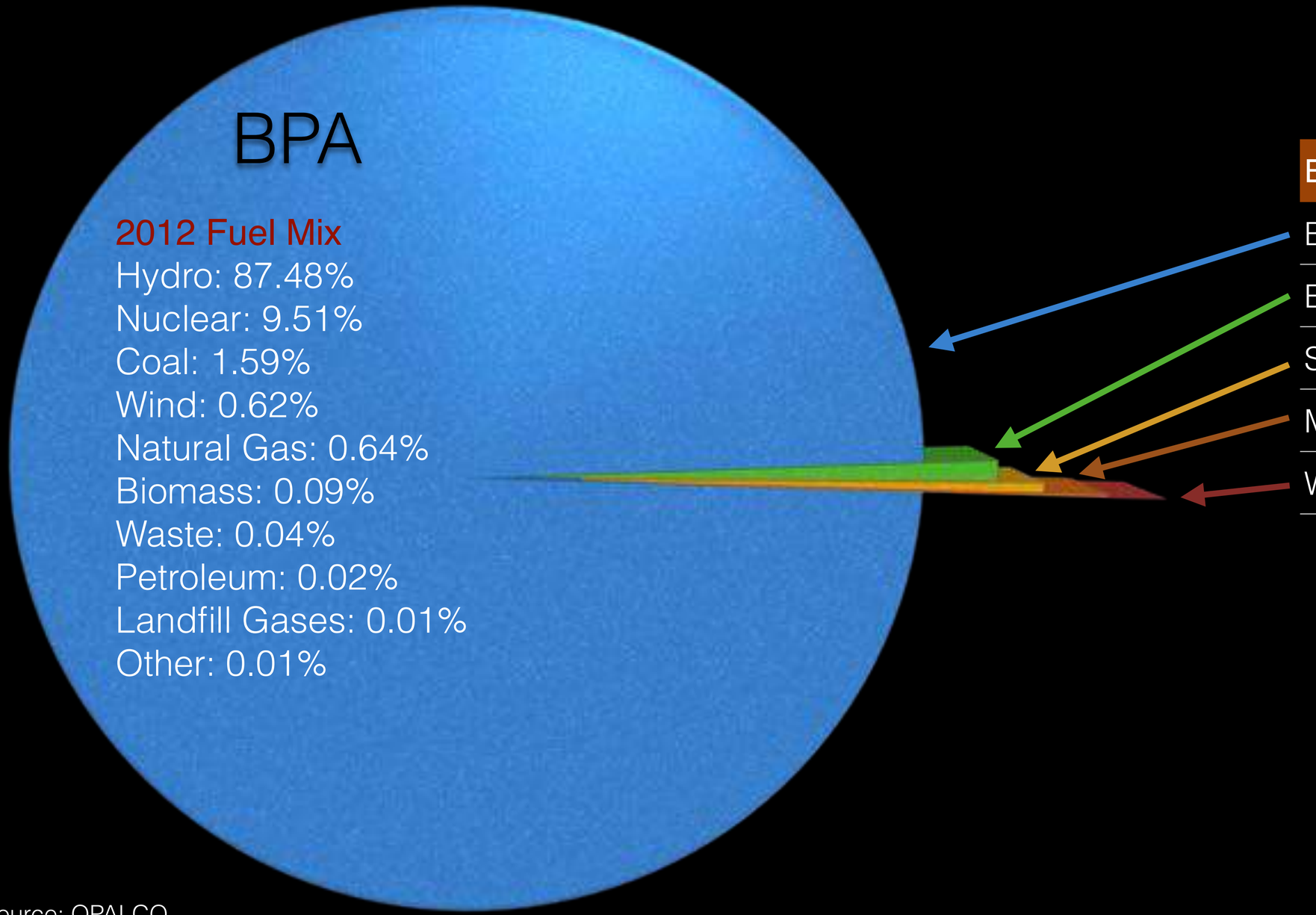
2¢ per kWh

varies with source

cost mitigation, supply diversity

3.5¢ per kWh

OPALCO Energy Sources: 2014



Energy Source	Production (kWh)
BPA	205,000,000
Energy Efficiency	1,418,000
Solar	624,723
Micro-Hydro	142,027
Wind	5,167
Total	207,189,917

Source: OPALCO

Each energy resource has its pros and cons….

Energy Source	Production (kWh)	Storage	On Demand	Load Fit
BPA	205,000,000		✔	✔
Energy Efficiency	1,418,000		✔	✔
Solar	624,723		✘	✘
Micro-Hydro	142,027		✔	✔
Wind	5,167		✘	✔
Tidal			✘	✔
Biogas			?	?
Anaerobic Digester			?	?
Pumped Hydro		✔	✔	✔
Electric Vehicles		✔	✔	✔
Demand Response		✔	✔	✔

firm versus intermittent

low cost versus expensive

clean versus dirty

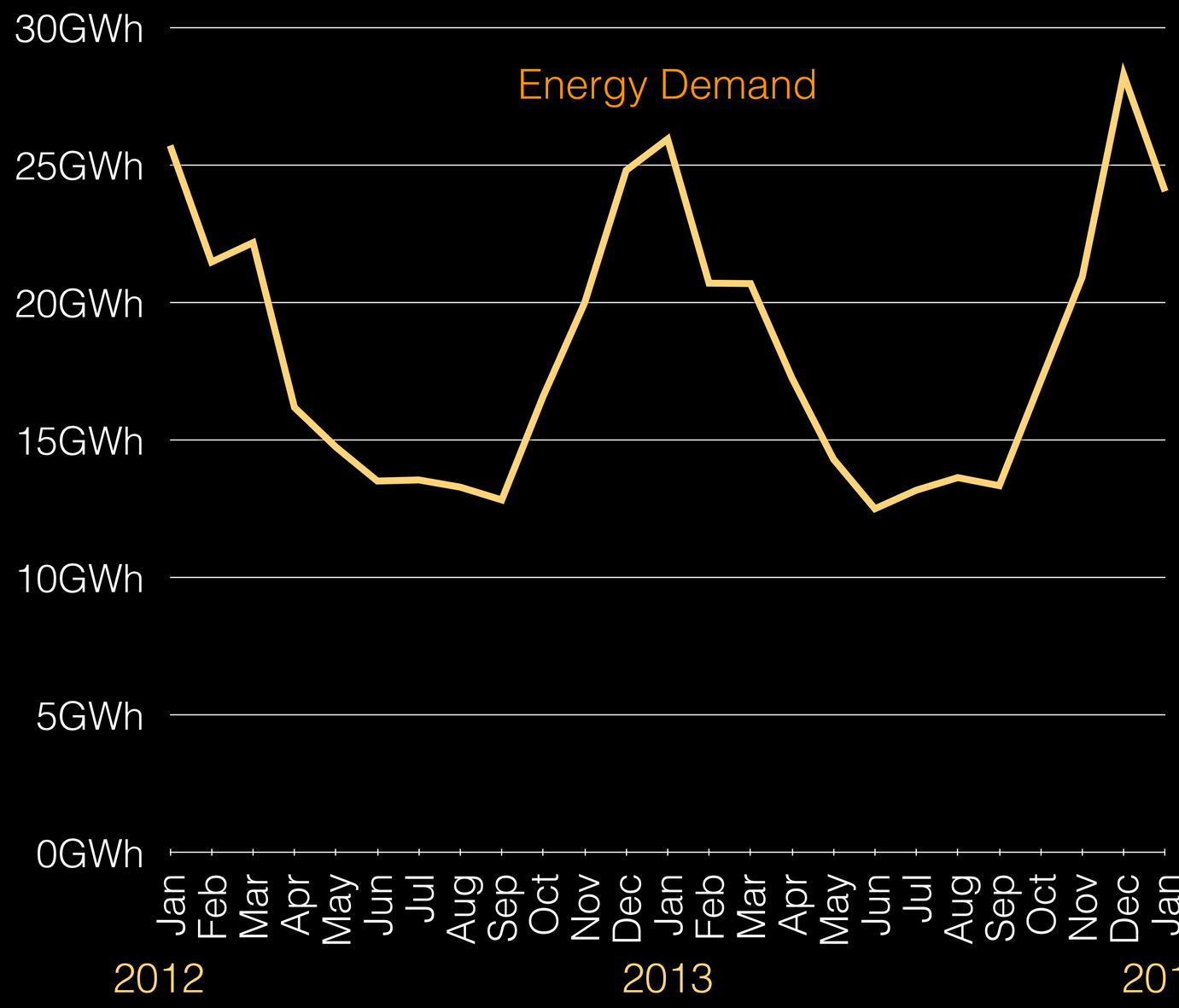
load following

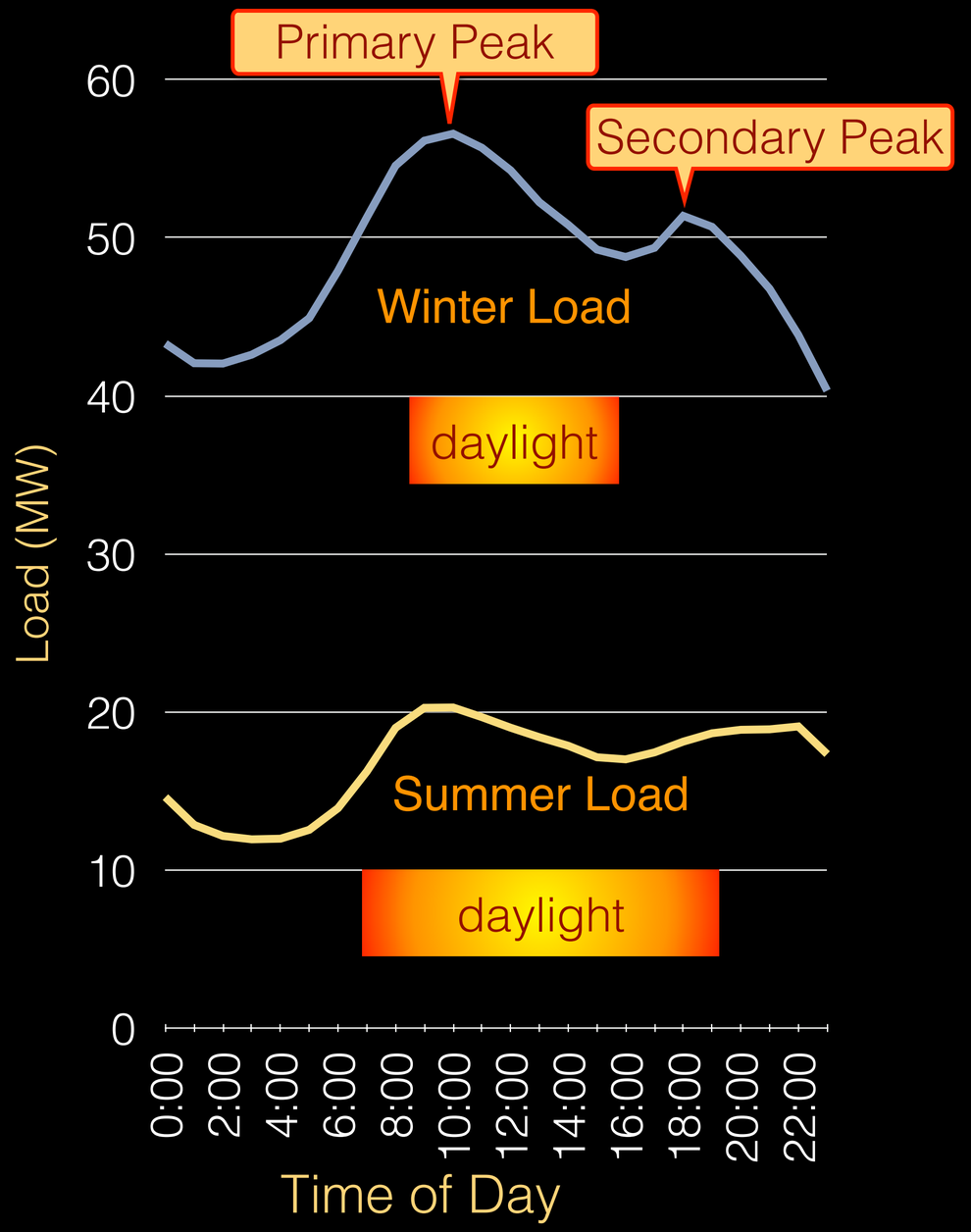
seasonal

available on demand

….

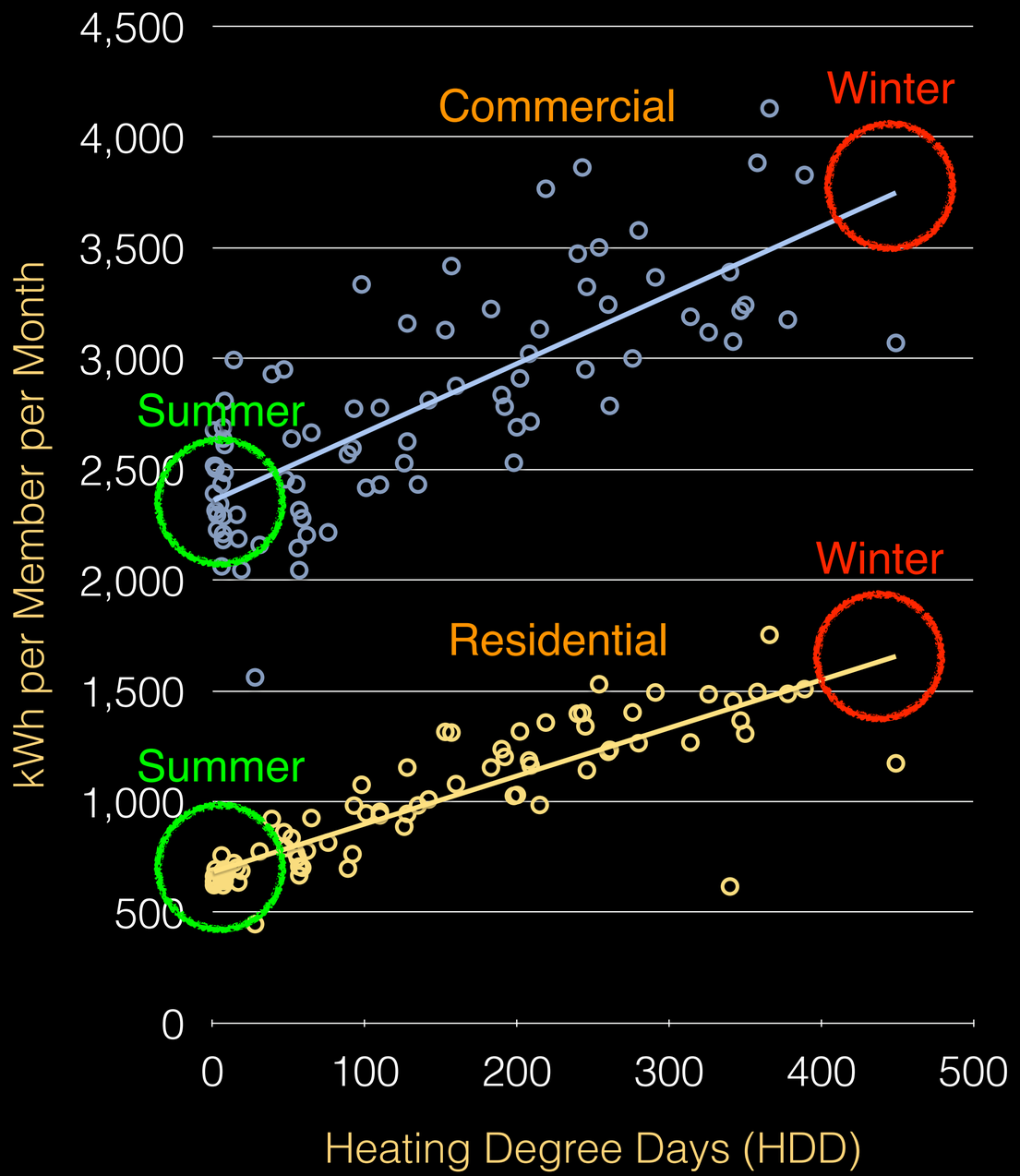
OPALCO Seasonal Load

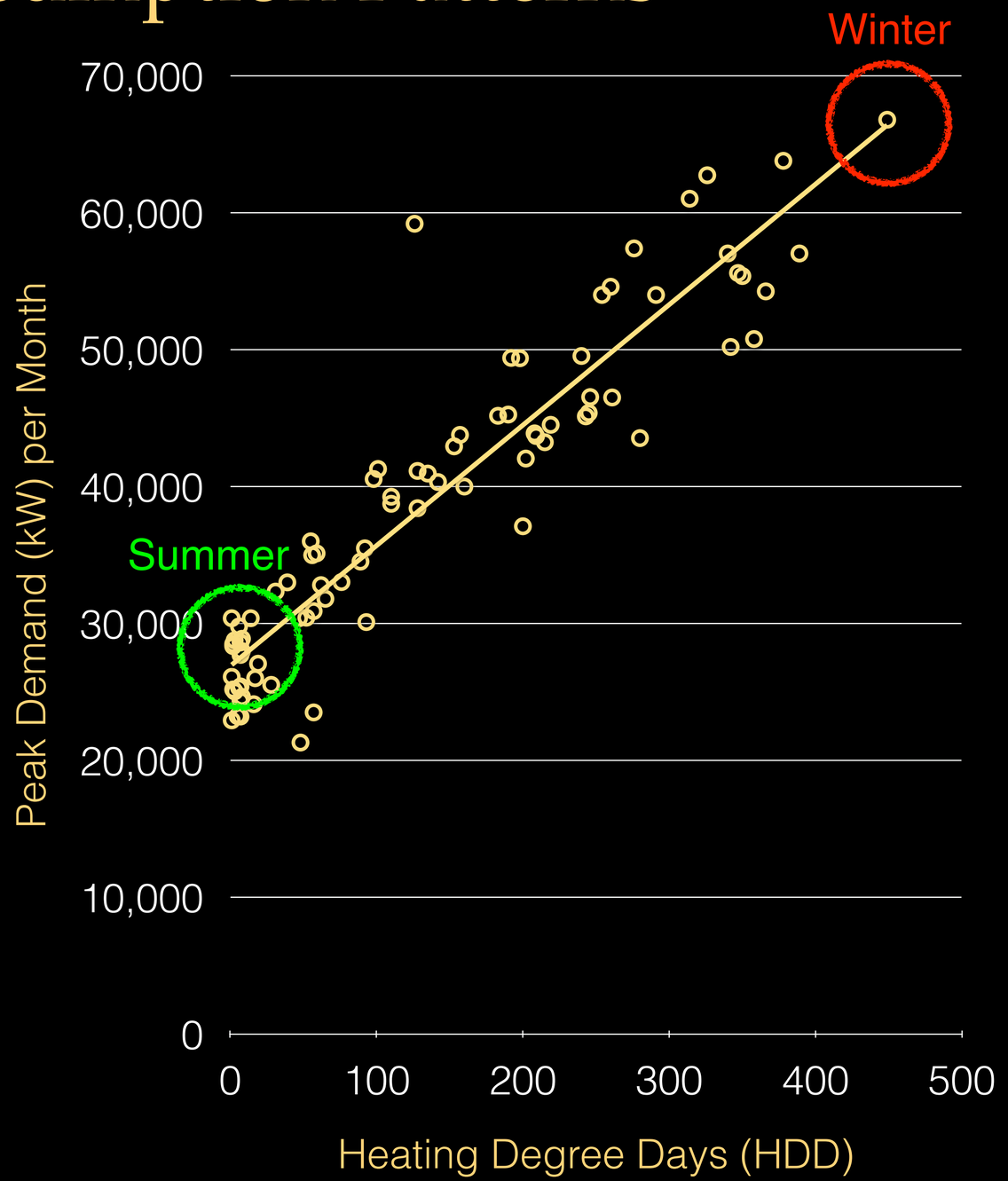




Source: OPALCO

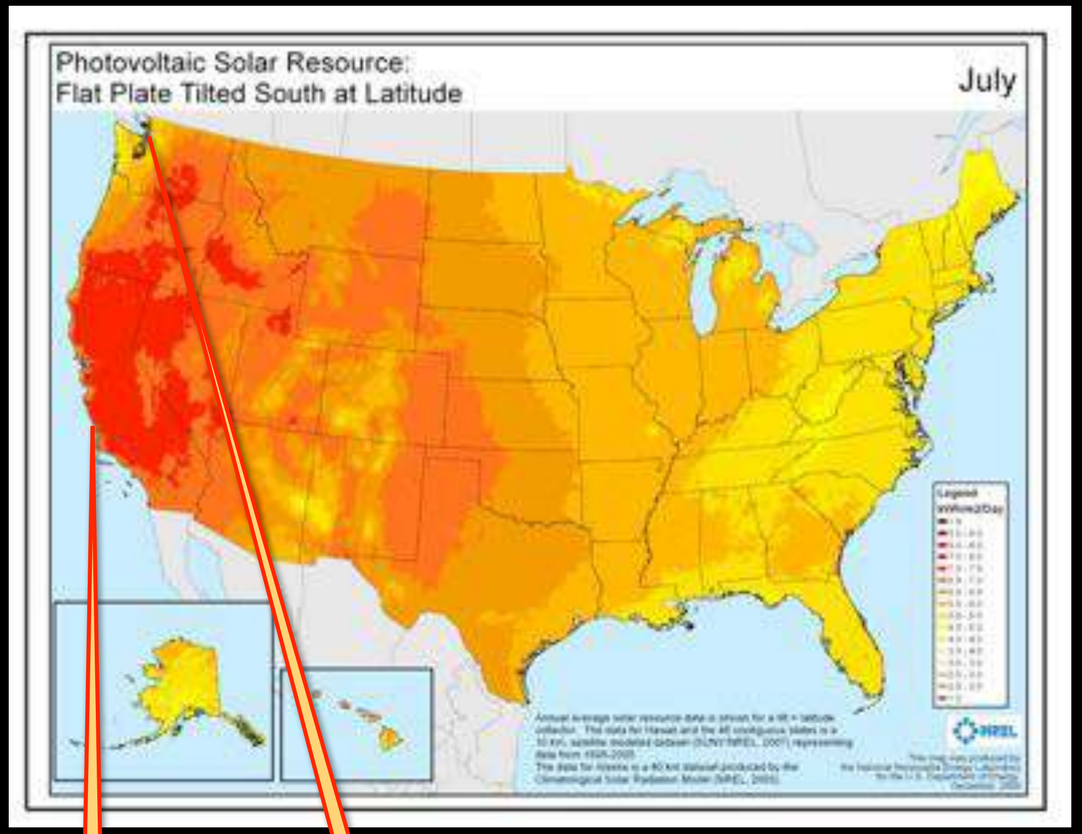
Seasonal Energy Consumption Patterns





Solar Production: Seasonal Variance

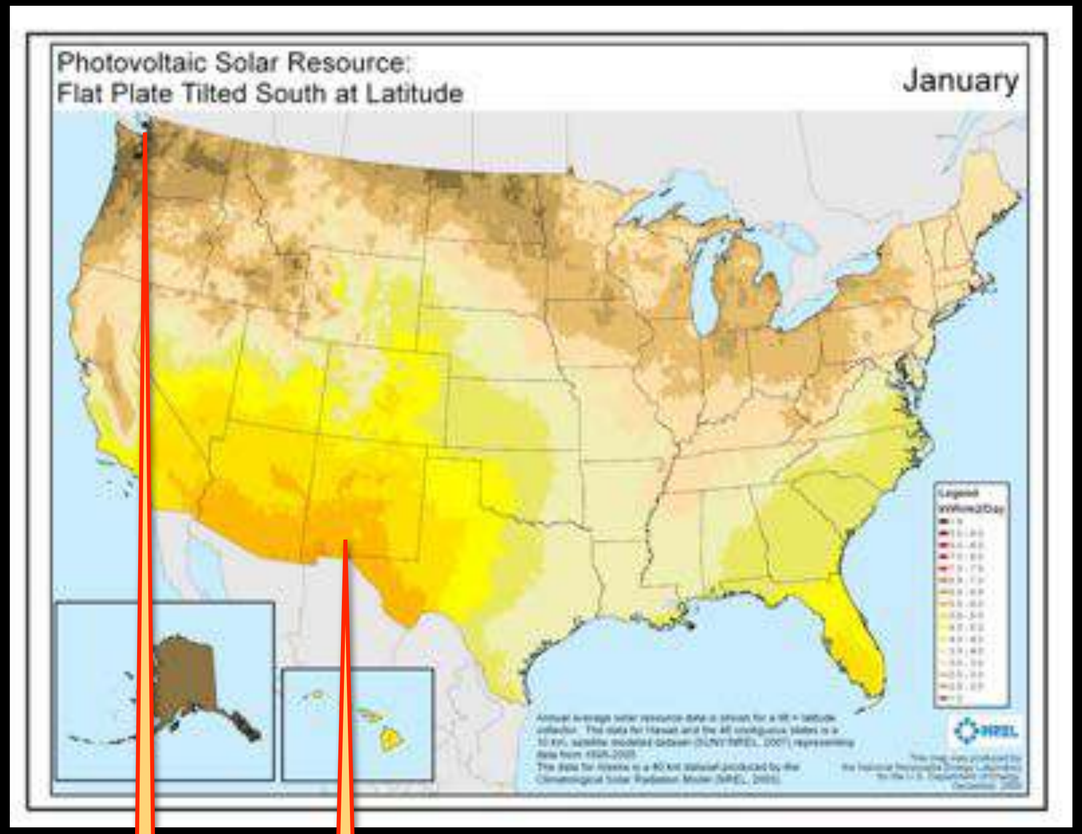
July



7.5 kWh/m²/day

6 kWh/m²/day

January

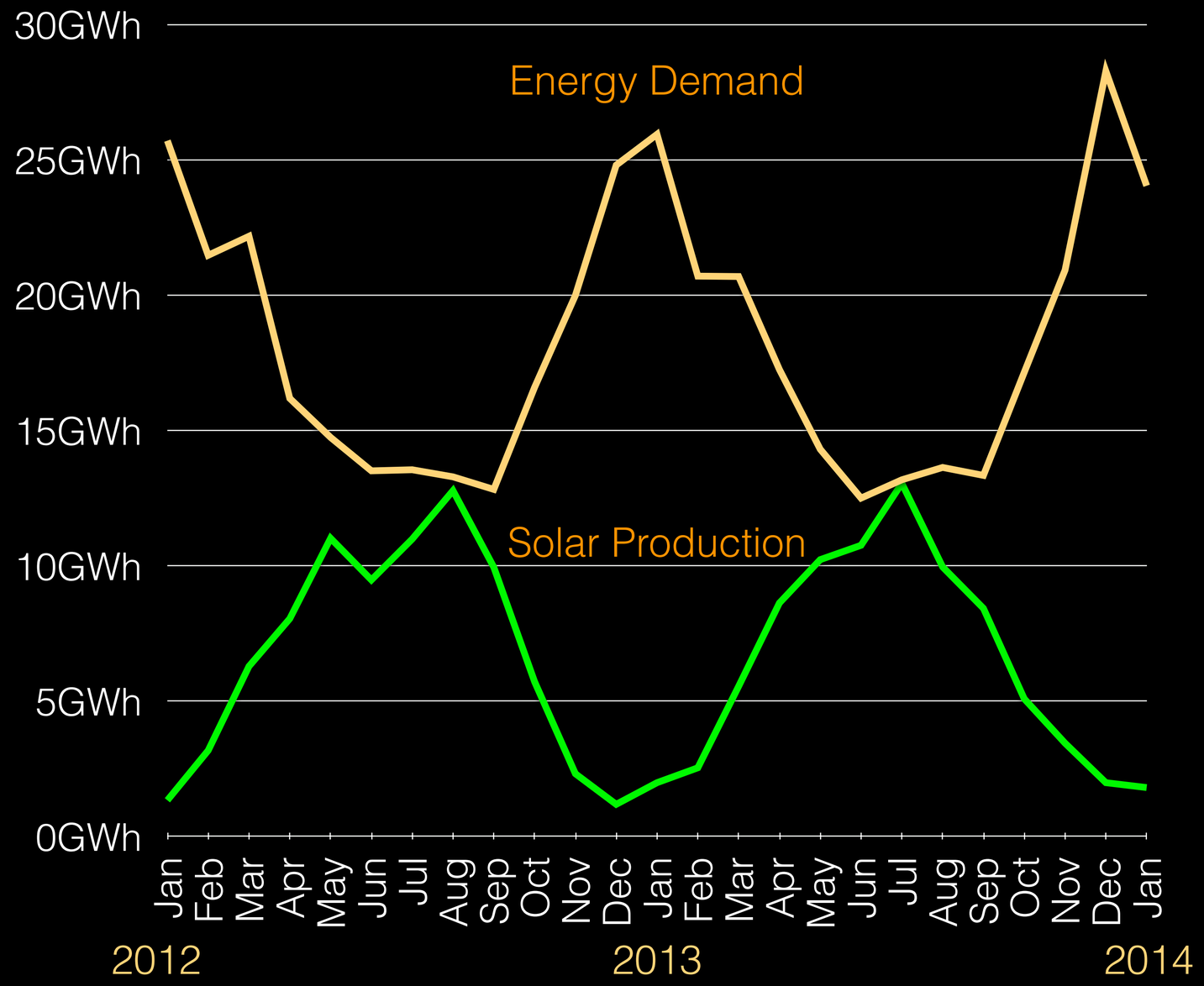


< 2 kWh/m²/day

6 kWh/m²/day

Source: NREL

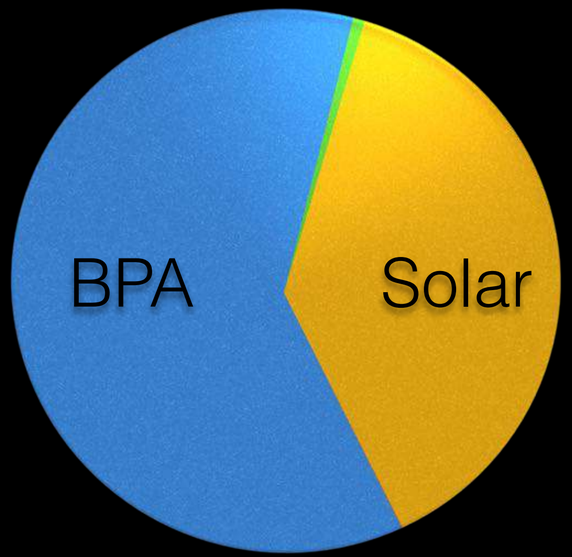
Load Fit and Demand Example: Seasonal Load and Solar Production



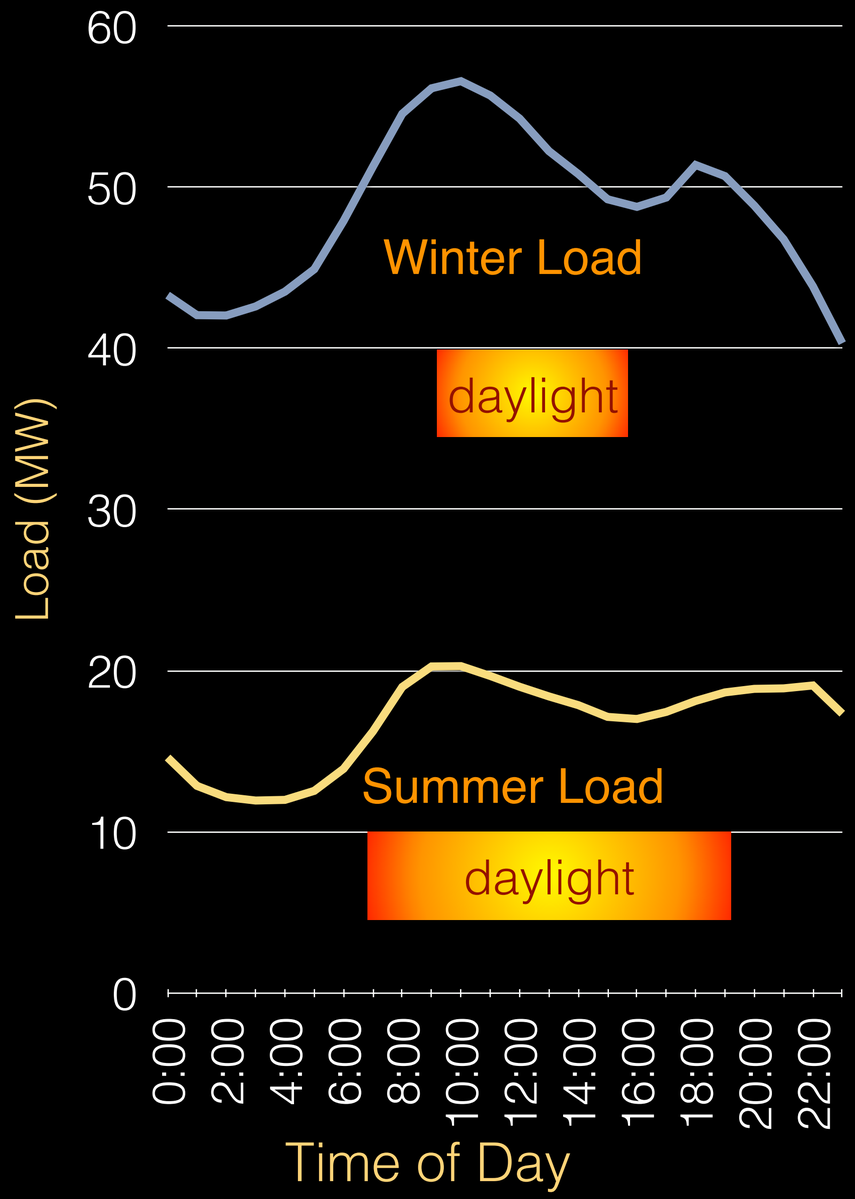
Source: OPALCO, PVWatts

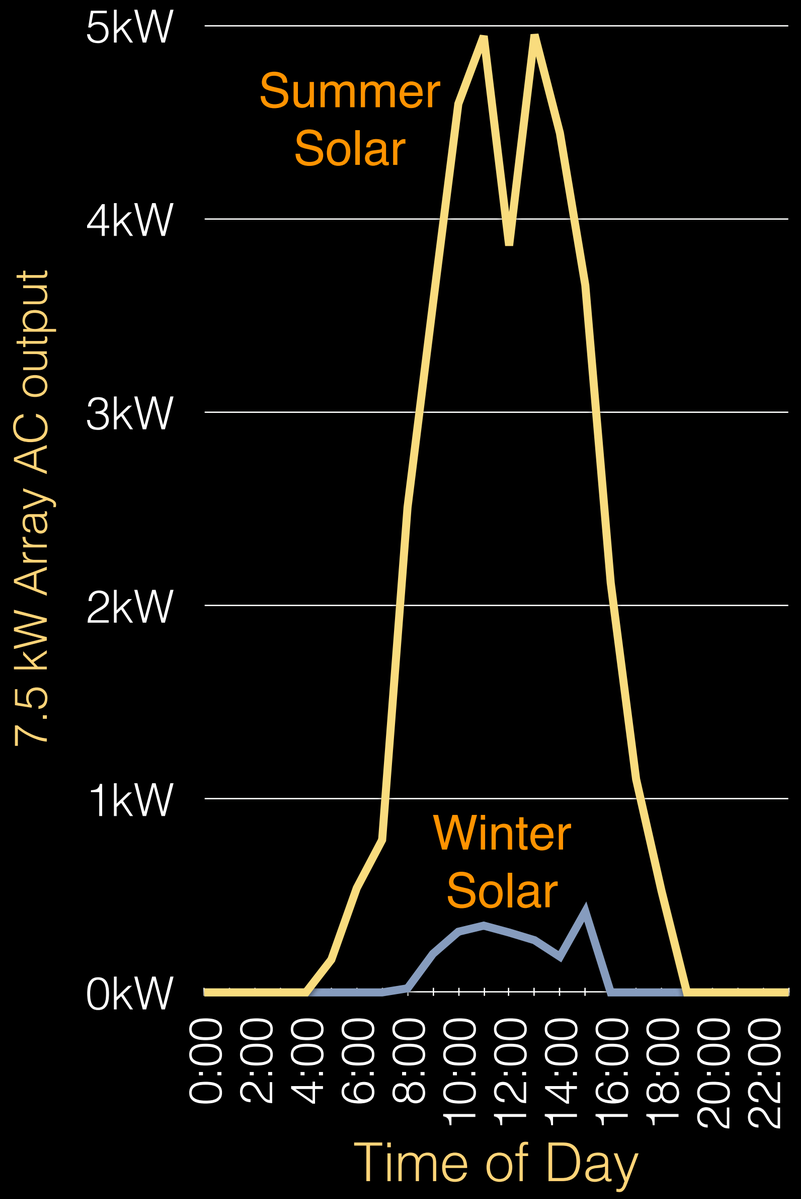
Notes

- OPALCO load 2012 to 2014
- Solar production from 10,000 rooftop arrays of 7.5 kW each = 75 MW
- Solar cost, about $225 million (not including financing and grid integration)
- Solar production is 180 degrees out of phase with load.



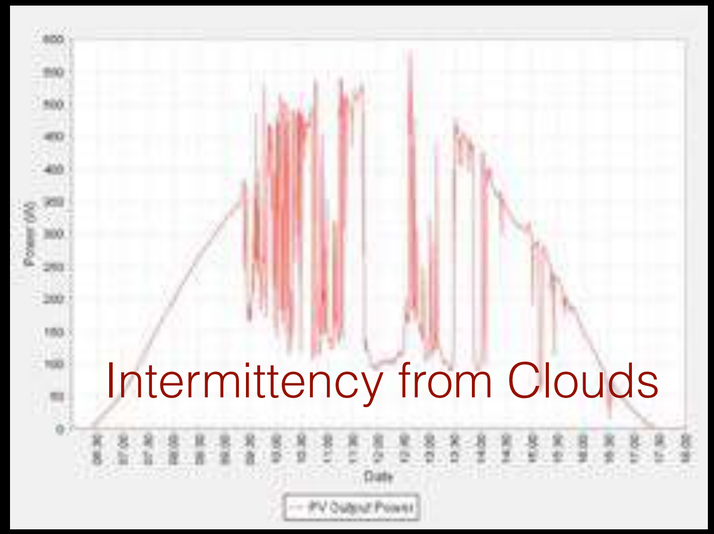
Load Fit and Demand Example: Daily Load and Solar Production





Notes

- OPALCO load on cold winter day and warm summer day
- Primary peak load in morning, secondary peak in evening, outside peak sun production
- Solar production from 7.5 kW rooftop array on sunny summer day and partly cloudy winter day



Source: OPALCO, PVWatts

“A rate change should not be confused with the rates.”

OPALCO rates are still some of the lowest in the country.

OPALCO’s grid is one of the most complicated.

BPA Monthly Bill to OPALCO

COMBINED BILL

Customer Name:	Orcas Power & Light Cooperative	Bill Period:	March 2015
Bill ID:	MAR15-PAT01-10288	Period Ending:	March 31, 2015
Issue Date:	April 09, 2015		

POWER

Rate Schedule	Service Description	Contract Number	Service Amount	Service Unit		Rate	Amount $
PF-14	Composite Charge LF	13085	1,961,053	DOL	@	0.34904	684,486
PF-14	LDD Composite Charge LF	13085	(684,486)	DOL	@	0.05337	(36,531)
PF-14	Non Slice Charge LF	13085	(301,568)	DOL	@	0.34904	(105,259)
PF-14	LDD Non Slice Charge LF	13085	105,259	DOL	@	0.05337	5,618
PF-14	HLH Load Shaping	13085	(21,237)	KWH	@	0.03023	(642)
PF-14	LDD HLH Load Shaping LF	13085	642	DOL	@	0.05337	34
PF-14	LLH Load Shaping	13085	603,284	KWH	@	0.02510	15,142
PF-14	LDD LLH Load Shaping LF	13085	(15,142)	DOL	@	0.05337	(808)
PF-14	Demand	13085	8,884	KW	@	8.93000	79,334
PF-14	LDD Demand	13085	(79,334)	DOL	@	0.05337	(4,234)
PF-14	Tier 2 Load Growth	13085	1,243,039	KWH	@	0.04162	51,735
	REP Customer Refund	12322	1	MO	@	(11,312.00000)	(11,312)
Sub Totals							**$677,563**

TRANSMISSION

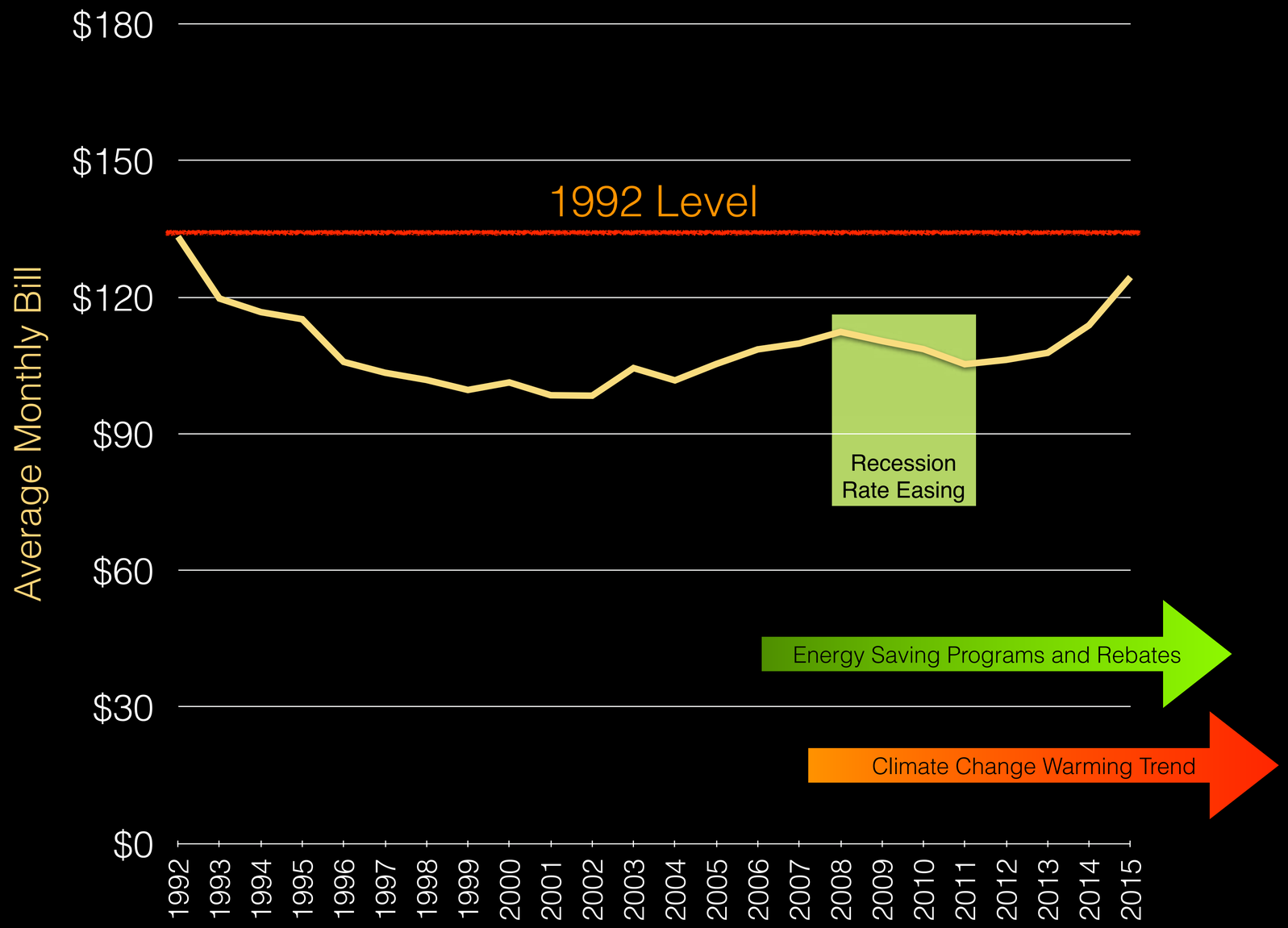
Rate Schedule	Service Description	Contract Number	Service Amount	Service Unit		Rate	Amount $
NT-14	NT Service Charge	10128	40,374	KW	@	1.74100	70,291
ACS-14	SCD NT Long Term Firm	10128	40,374	KW	@	0.30000	12,112
ACS-14	GSR NT Long Term Firm	10128	40,374	KW	@	0.00000	0
ACS-14	Reg & Frequency Response	10128	18,602,560	KWH	@	0.00012	2,232
ACS-14	Spin Reserve Requirement	10128	568,680	KWH	@	0.01086	6,176
ACS-14	Supp Reserve Requirement	10128	568,680	KWH	@	0.00995	5,658
GRSP-14	PFF Lagging Ratchet	10128	7,715	KVAR	@	0.28000	2,160
Sub Totals							**$98,629**
Total							**$776,192**

Fixed Charge

Notes

- As with OPALCO, the bulk of BPA charges are fixed costs.
- Also worth noting are the various charges that reward load that corresponds to production (e.g. load shape, demand,…)

History of 1,000 kWh Monthly Bill Inflation Adjusted



Headline

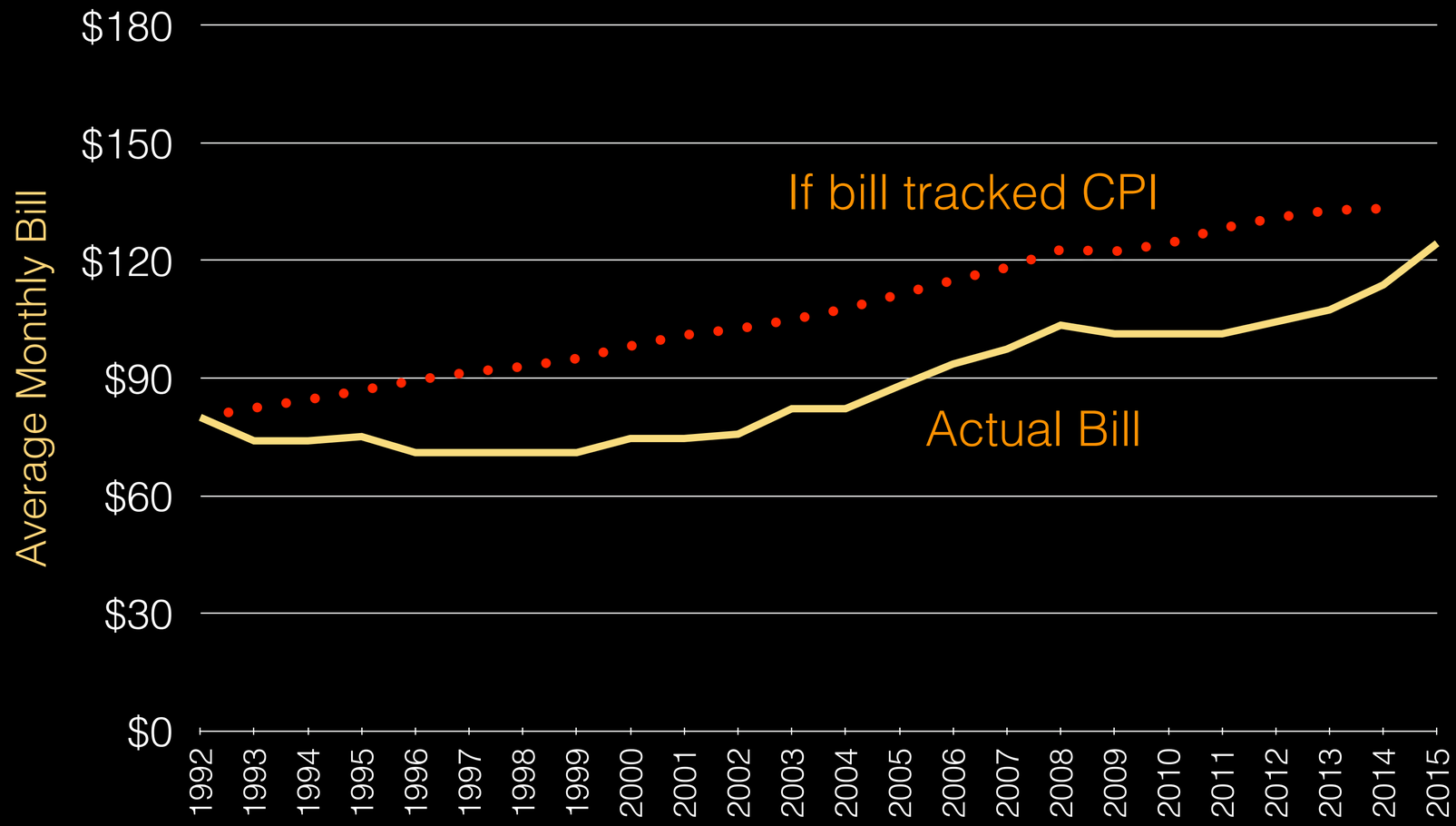
- OPALCO 2015 rates are lower than they were 23 years ago
- Rate has decreased an average of -.29% per year, 1992 through 2015

Notes

- 1992 through 2015, Residential
- Monthly bill for average OPALCO member usage of 1,000 kWh/month
- Monthly bill includes all Facility, Usage and Demand Charges.
- Rate increases postponed during 2008 - 2011 recession and after effects, to ease economic impact on county.

Source: OPALCO

History of 1,000 kWh Monthly Bill: Actual versus CPI tracked



Source: OPALCO, BLS

Headline

- OPALCO rates up less than inflation

Notes

- CPI (Consumer Price Index) - a basket of consumer goods and services, such as transportation, food and medical care, …
- 1992 through 2015, not adjusted for inflation
- Monthly bill for average OPALCO member usage of 1,000 kWh/month
- Monthly bill includes all Facility, Usage and Demand Charges.

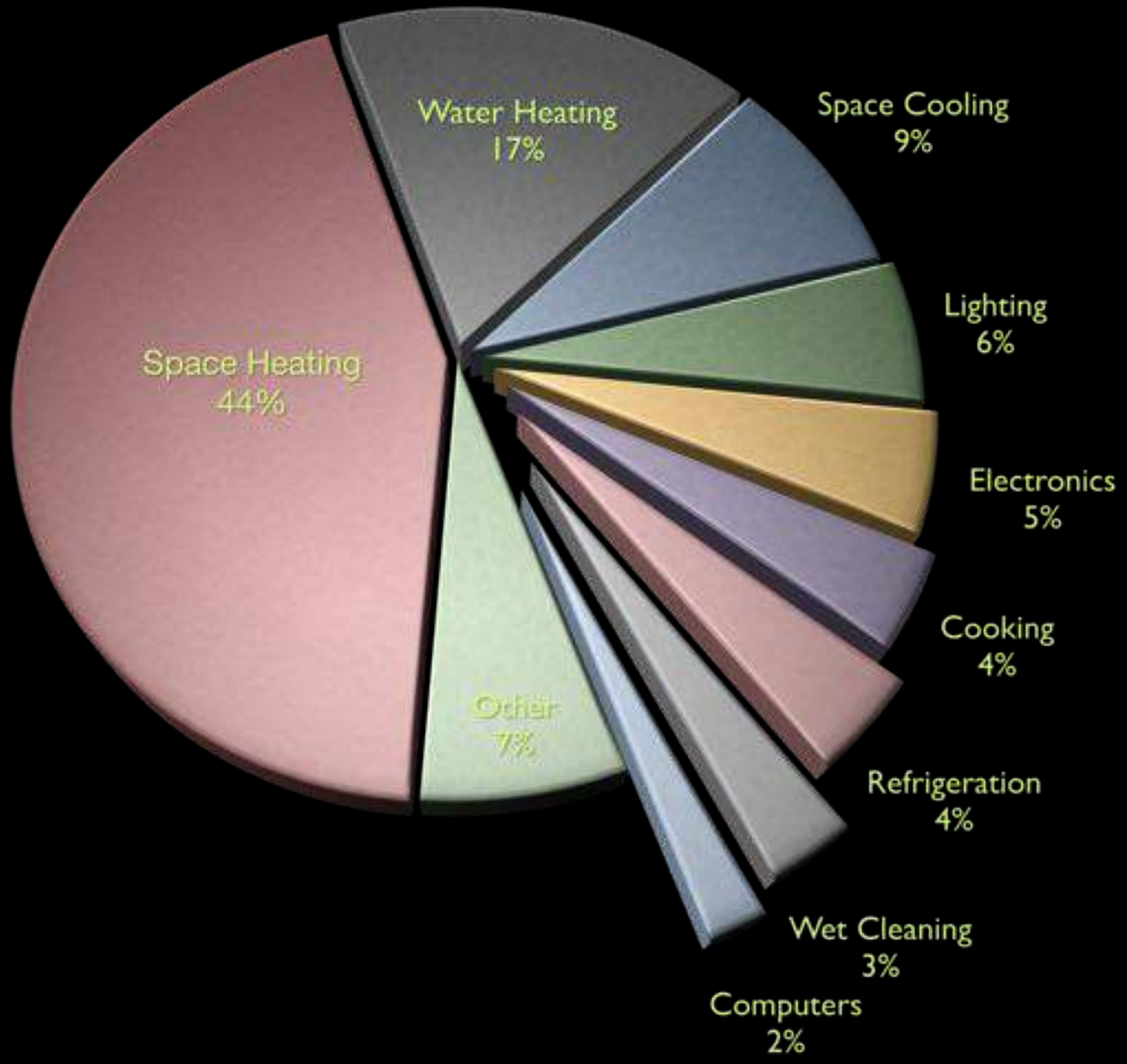
Rate Change Versus Rates

Conservation Potential Assessment (CPA)

80/20 Rule (Pareto Principal)

“What 20% of activities consume 80% of energy?”

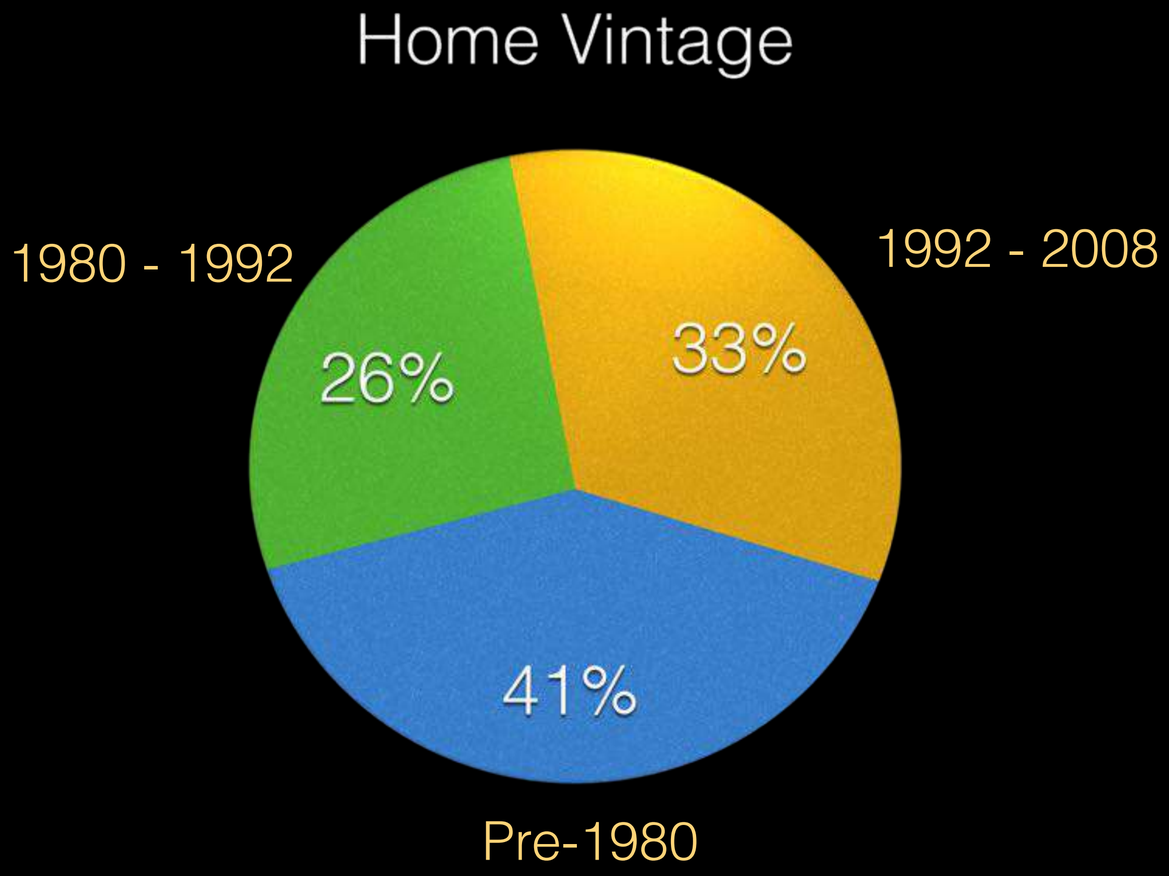
Residential Primary Energy End-Use



"What 20% of activities consume 80% of energy?"

source: *Buildings Energy Data Book, DOE - 2012*

San Juan County Energy Use



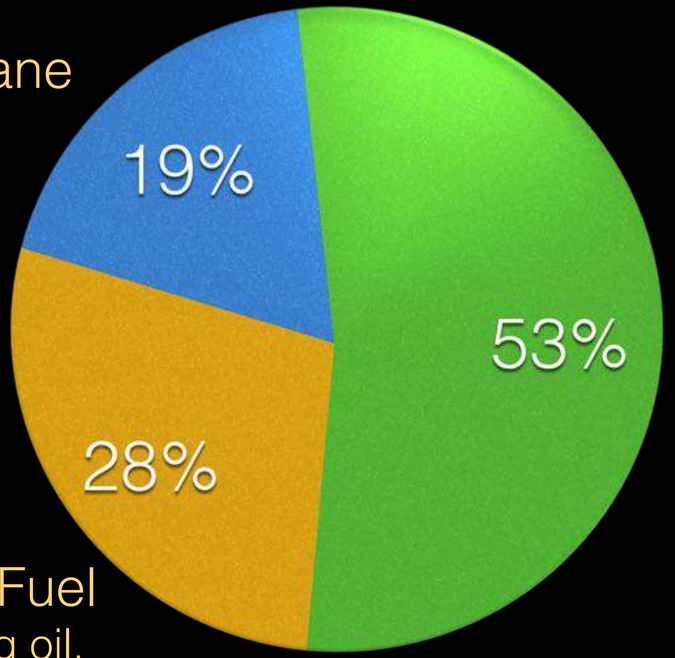
Notes

- 13,313 homes
- .78% growth rate

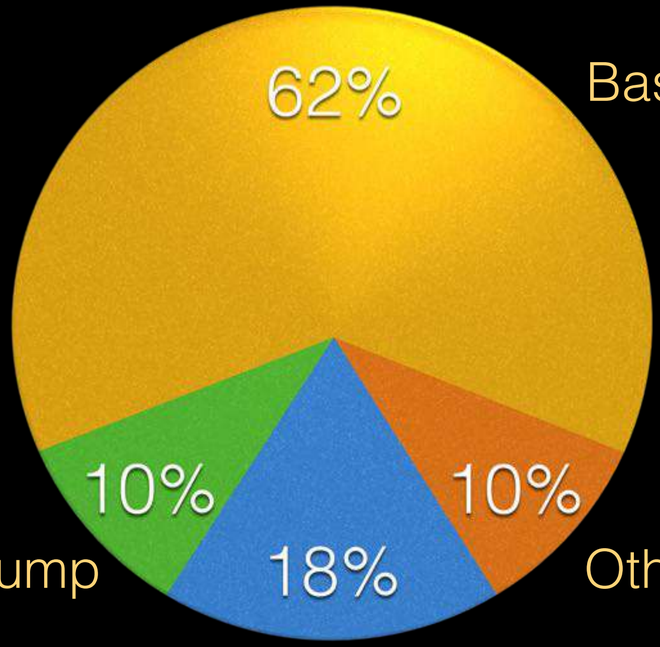
Source: OPALCO 2013 Conservation Potential Assessment (CPA)

San Juan County Energy Use

Heating Fuel Type



Electric Heat System Type



Source: OPALCO 2013 Conservation Potential Assessment (CPA)

Heating Types: Annual Cost and Carbon Footprint

- Looking at comparative fossil fuel (propane, heating oil, gasoline) and electric usage costs
- Fossil fuel costs are national averages. Local costs are usually higher.
- Electric usage costs are for 2015 at 8.55¢/kWh, though they reduce to 8.20¢/kWh in 2017
- Doesn’t look at heater cost, rebates, tax credits, fuel tank cost/ rental, etc.
- Carbon footprint data is from EIA, EPA and IPCC

Propane Price Shocks

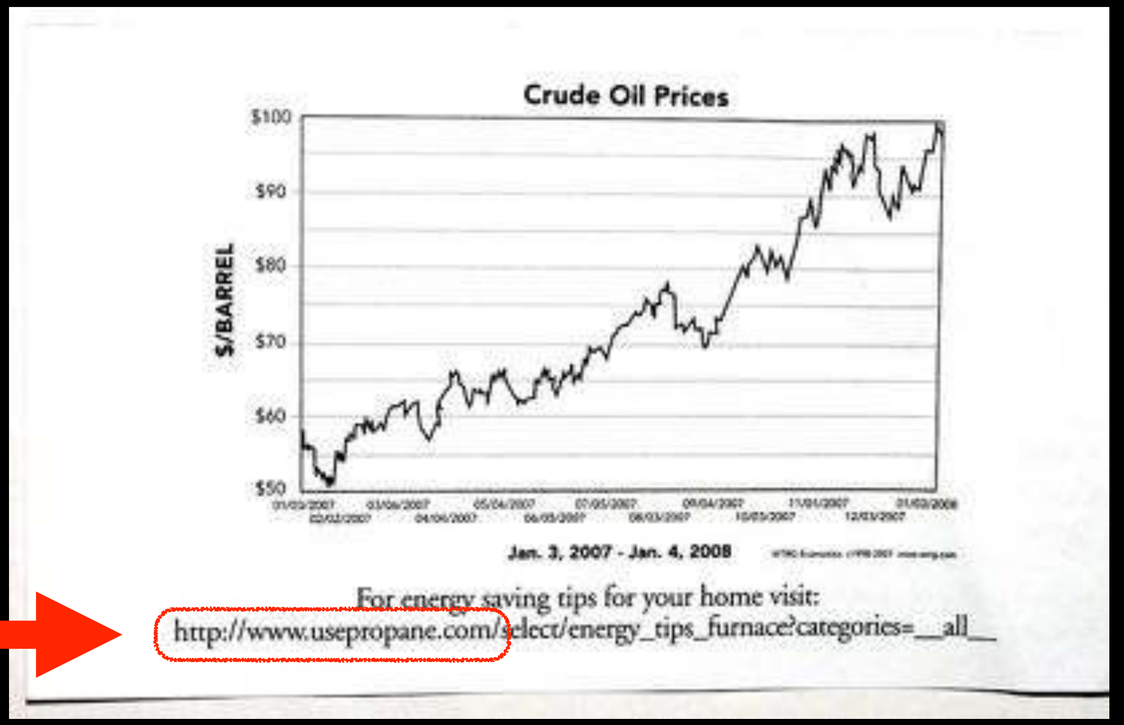
Statement stuffer mailed to San Juan Propane customers in 2008

Front

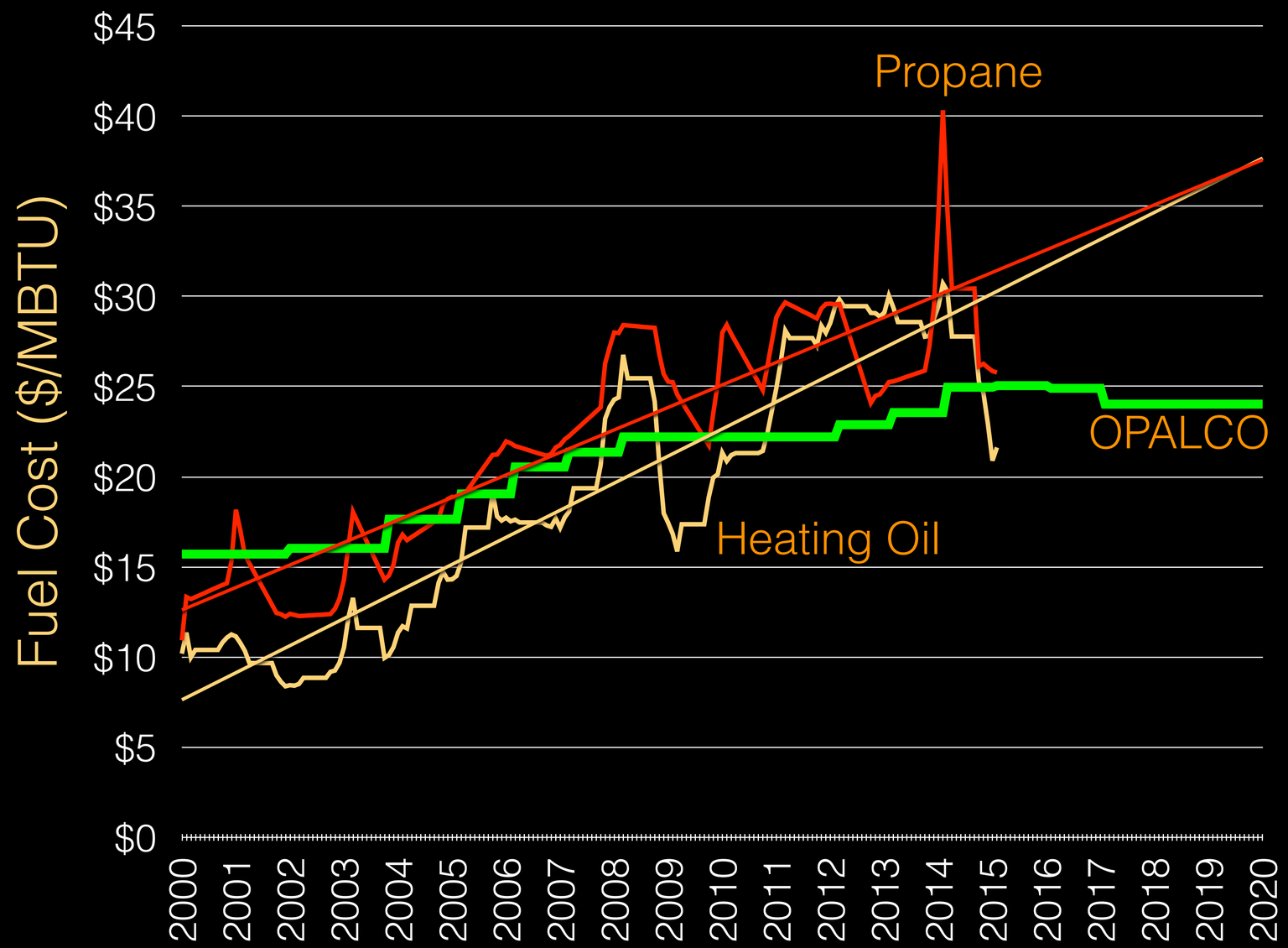
How will I afford to keep my house warm as heating prices continue to rise?

"The average U.S. household will pay $986 in heating costs this winter, up 10.9% from the 2006-07 season and $9 higher than the original forecast made a month ago, according to the Energy Information Administration, the analytical arm of the Energy Department."

Back



Fuel Cost for 1,000,000 BTU of Energy



Source: EIA, OPALCO

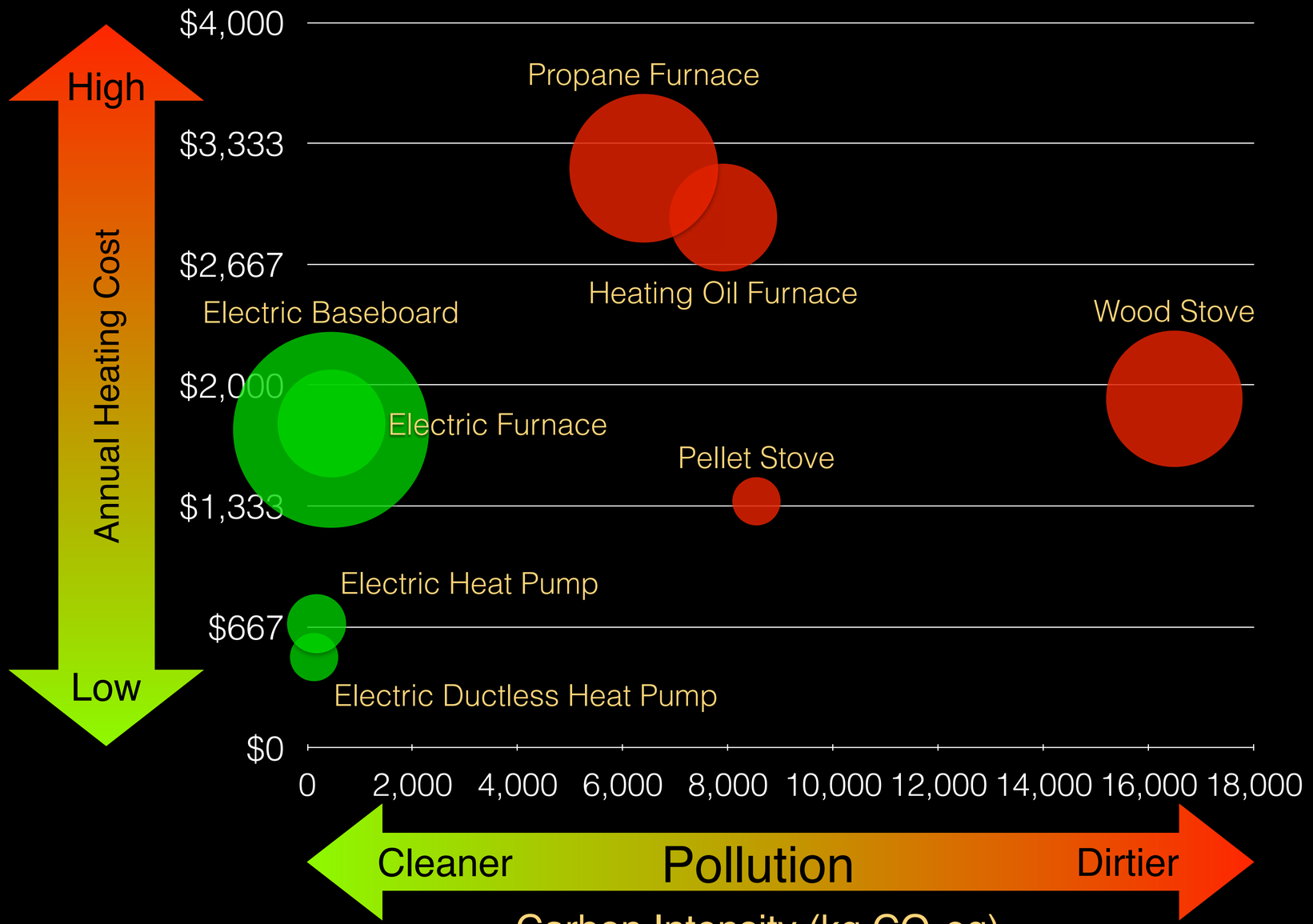
Headline

- Electric generally costs less than propane and fuel oil, with much more stable pricing and slower growth trend.
- In application, electric heaters are more efficient and can dramatically reduce heating costs.

Notes

- For comparison, all fuel prices normalized to 1,000,000 BTUs of energy
- Electric price is based on OPALCO rate plan through 2020. Propane and heating oil price through February 2015.
- Note extreme price shock volatility of propane and heating oil pricing compared to electric

Heating Types: Annual Cost and Carbon Footprint



Source: EIA, EPA, OPALCO

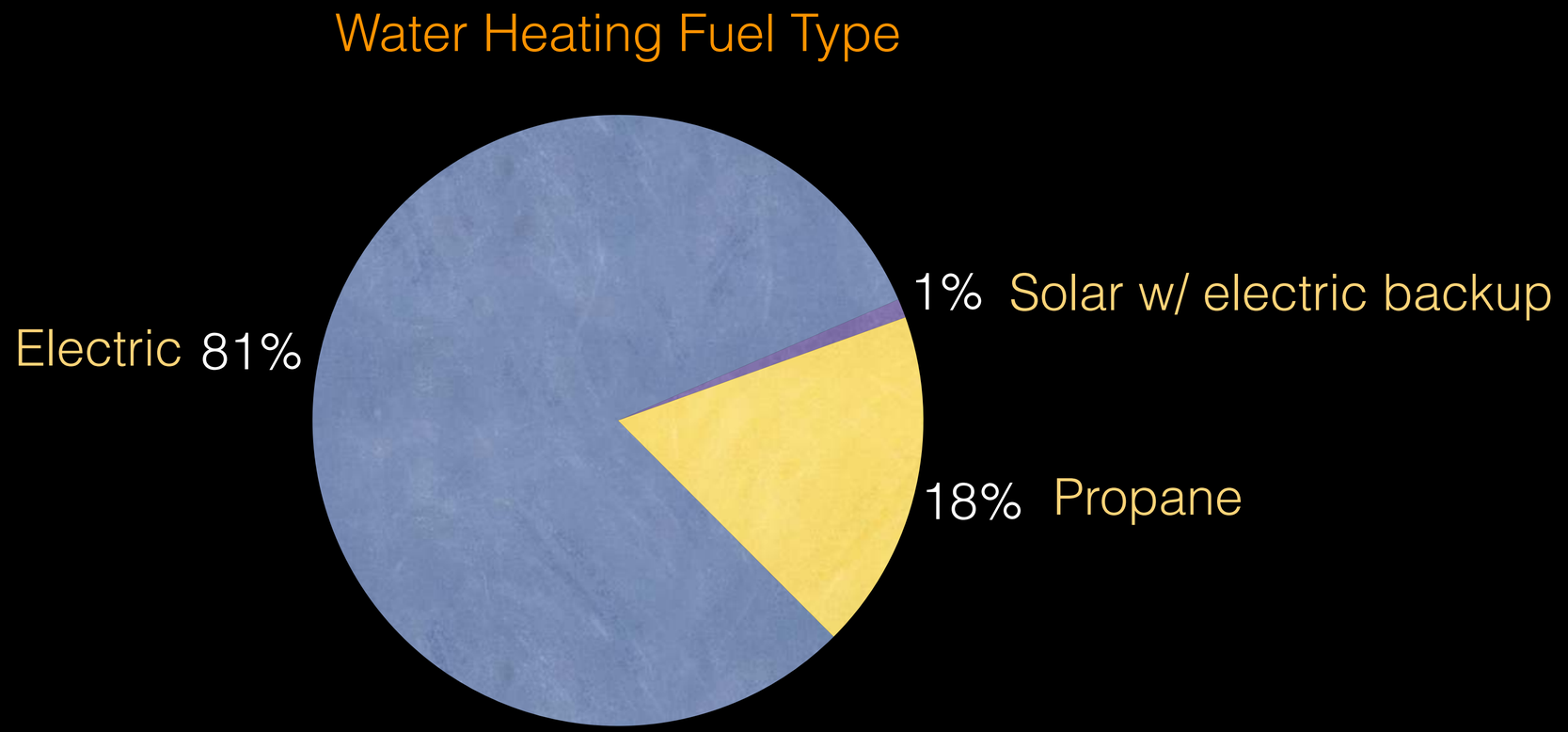
Headline

- Electric heaters are lower cost, much cleaner, and waste less energy than propane, heating oil, and wood heating.

Notes

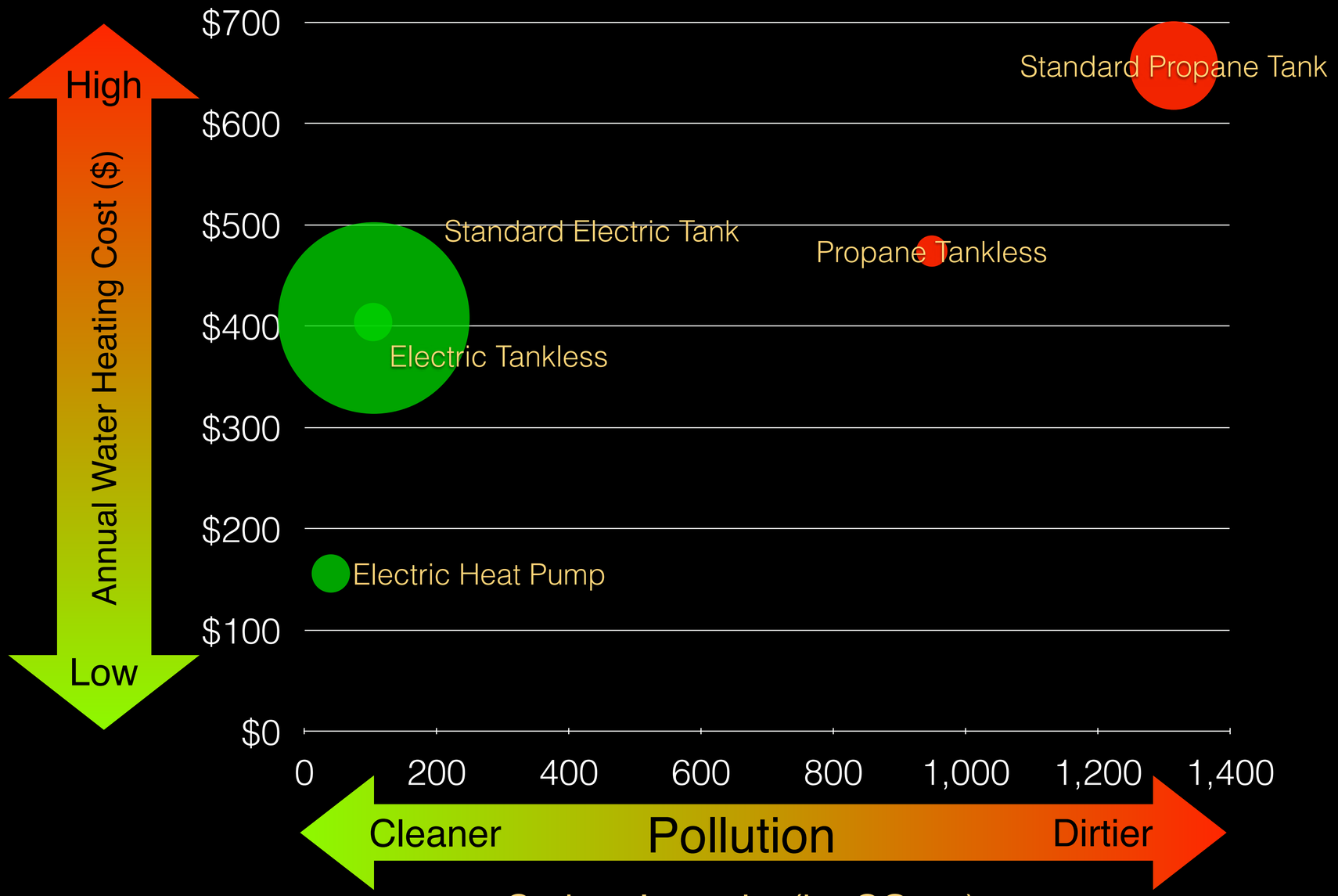
- In a typical home, requiring 70 million BTUs of heat, what is the annual cost and carbon footprint, for various heaters?
- Bubble area proportional to installed share in San Juan County (wood/pellet and heat pump share are estimates)
- GREEN = Electric heaters
  RED = Propane/Oil/Wood heaters
- For hydronic radiant heating, see Water Heater chart

San Juan County Energy Use



Source: OPALCO 2013 Conservation Potential Assessment (CPA)

Water Heaters: Annual Cost and Carbon Footprint



Source: EIA, EPA, OPALCO

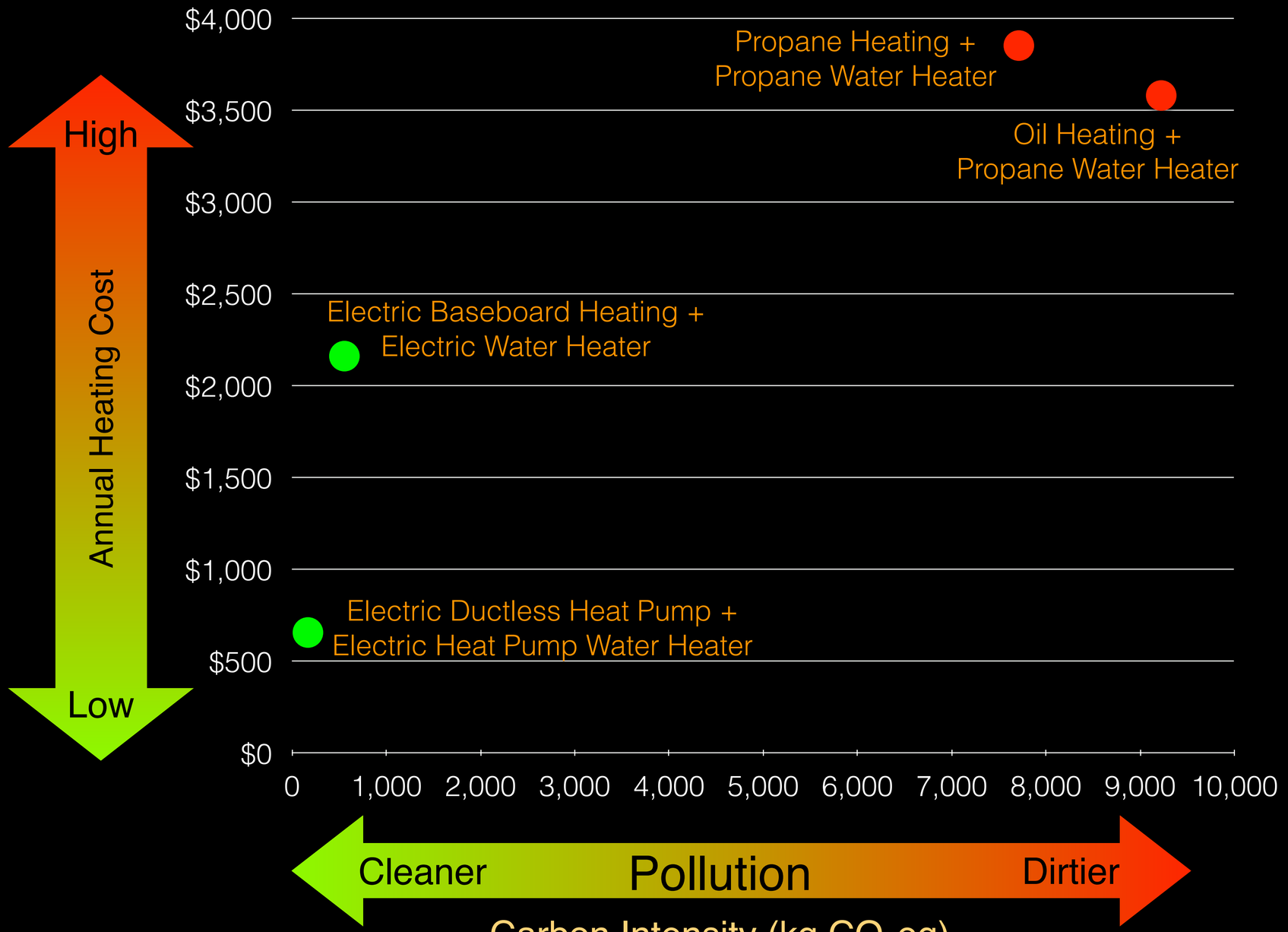
Headline

- Electric water heaters are much lower cost, much cleaner, and waste less energy than propane

Notes

- In a typical home, what is the annual cost and carbon footprint, for various electric and propane water heaters?
- Bubble area proportional to installed share in San Juan County (tankless and heat pump are estimates)
- GREEN = Electric water heaters (81% Share)
  RED = Propane water heaters (18% Share)

Combining Home and Water Heating: Annual Cost and Carbon Footprint



Source: EIA, EPA, OPALCO

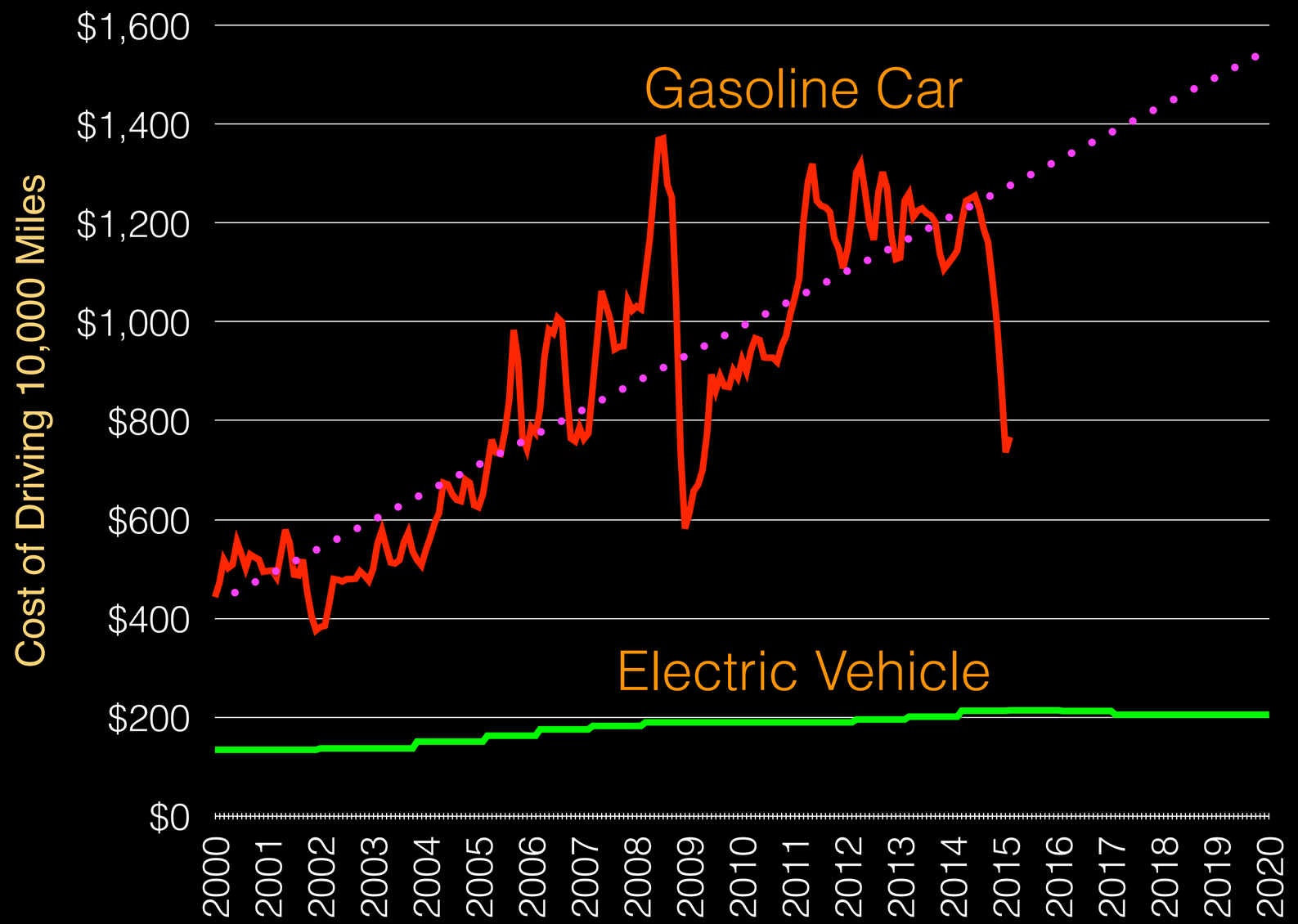
Headline

- An all electric home is about 2 to 6 times lower cost to heat the space and water, and 15 to 45 times cleaner, with much less wasted energy than propane or heating oil.

Notes

- In a typical home, what is the total annual cost and carbon footprint, for various combinations of heating and water heaters?
- GREEN = Electric heaters
  RED = Propane/Oil

Annual Fuel Cost of Driving a Car



Source: EIA, OPALCO

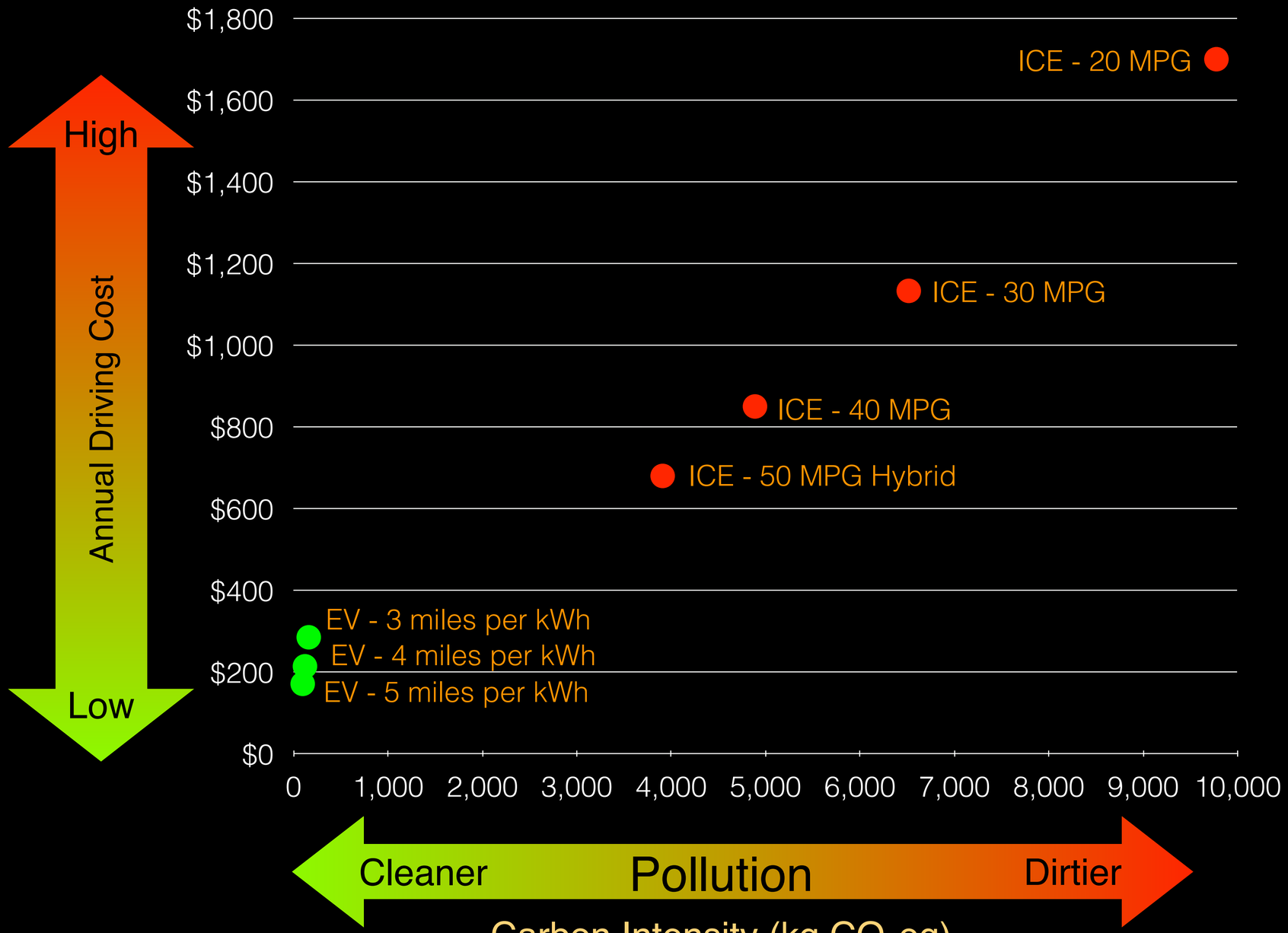
Headline

- Electric vehicles cost from 3 to 6 times less than gasoline vehicles, depending on the price of gasoline.

Notes

- Driving 10,000 miles per year
- Internal Combustion Engine (ICE) car getting 30 Miles Per Gallon (MPG)
- Electric Vehicle (EV) getting 4 miles per kWh of electricity (e.g. Nissan Leaf)
- Electric price is based on OPALCO rate plan through 2020. Regular octane gasoline price through February 2015.
- Note extreme price shock volatility of gasoline cost compared to electric

Driving A Car: Annual Cost and Carbon Footprint



Source: EIA, EPA, OPALCO

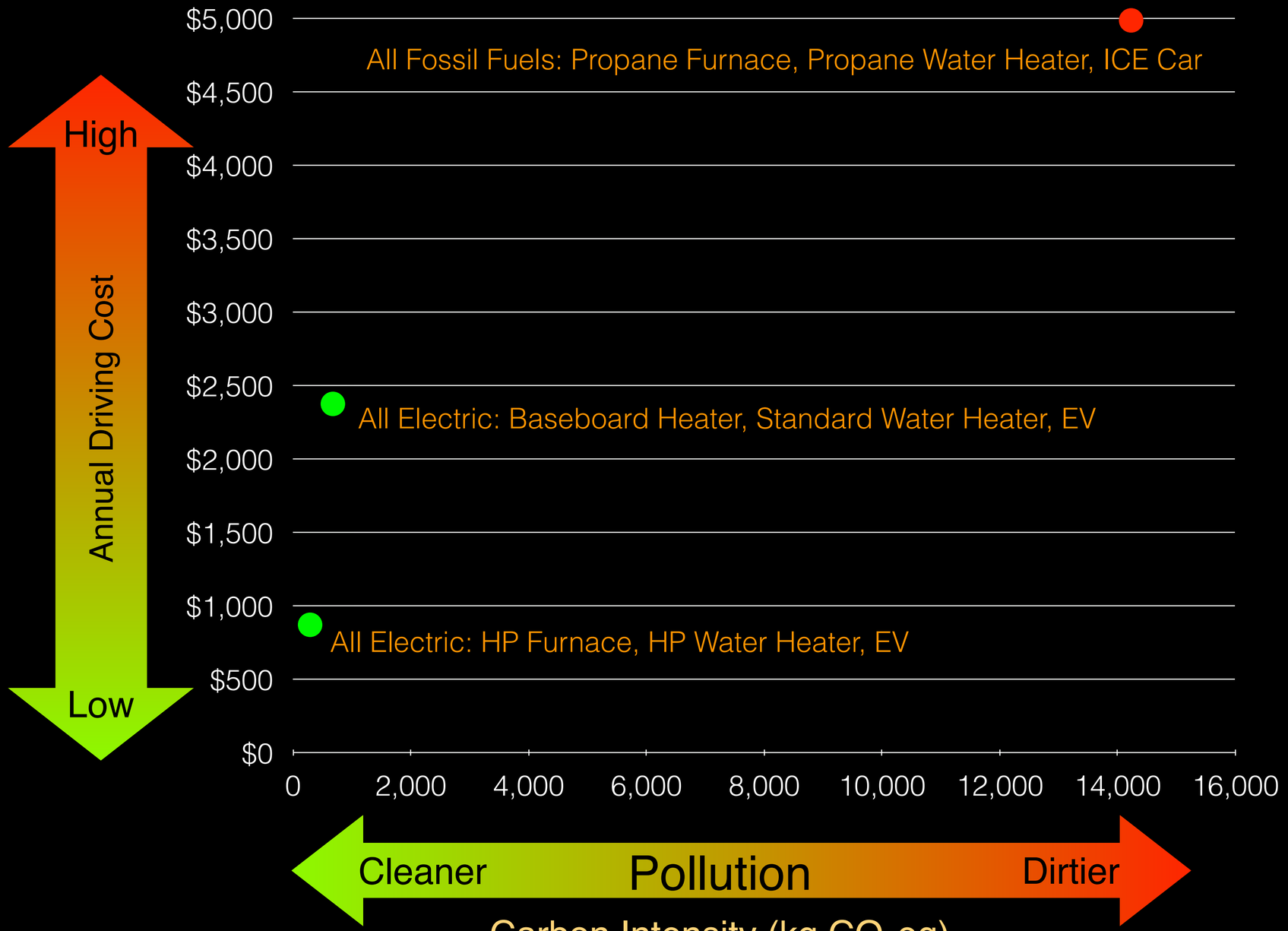
Headline

- Electric vehicles energy cost about 3 to 10 times less than gasoline vehicles, depending on the MPkWh and MPG, emitting up to 200 times less CO2.

Notes

- Driving 10,000 miles per year
- Internal Combustion Engine (ICE) car getting 20 to 50 Miles Per Gallon (MPG)
- Electric Vehicle (EV) getting 3 to 5 miles per kWh of electricity (e.g. Nissan Leaf)
- Electric price is based on OPALCO rate plan through 2020. Regular octane gasoline price two year average through February 2015.
- GREEN = Electric Vehicles (EV)
  RED = Internal Combustion Engines (ICE)

All Electric Home and Car Versus Fossil Fuel



Source: EIA, EPA, OPALCO

Headline

- All electric home up to 6 times lower cost and up to 90 times less CO2.

Notes

- Heating: Electric baseboard or heat pump, or propane furnace
- Water Heater: Standard electric or heat pump, or standard propane
- Car: Internal Combustion Engine (ICE) getting 30 Miles Per Gallon (MPG), or Electric Vehicle (EV) getting 4 miles per kWh of electricity (e.g. Nissan Leaf)
- Electric price is based on OPALCO rate plan through 2020. Regular octane gasoline price two year average through February 2015.
- GREEN = Electric heating and car
  RED = propane heating and gasoline car

What problems are we trying to solve?

Low Carbon Footprint

Affordable Energy

Energy On Demand

Reduce Waste

Sustainable

Load Match

Peak Shave

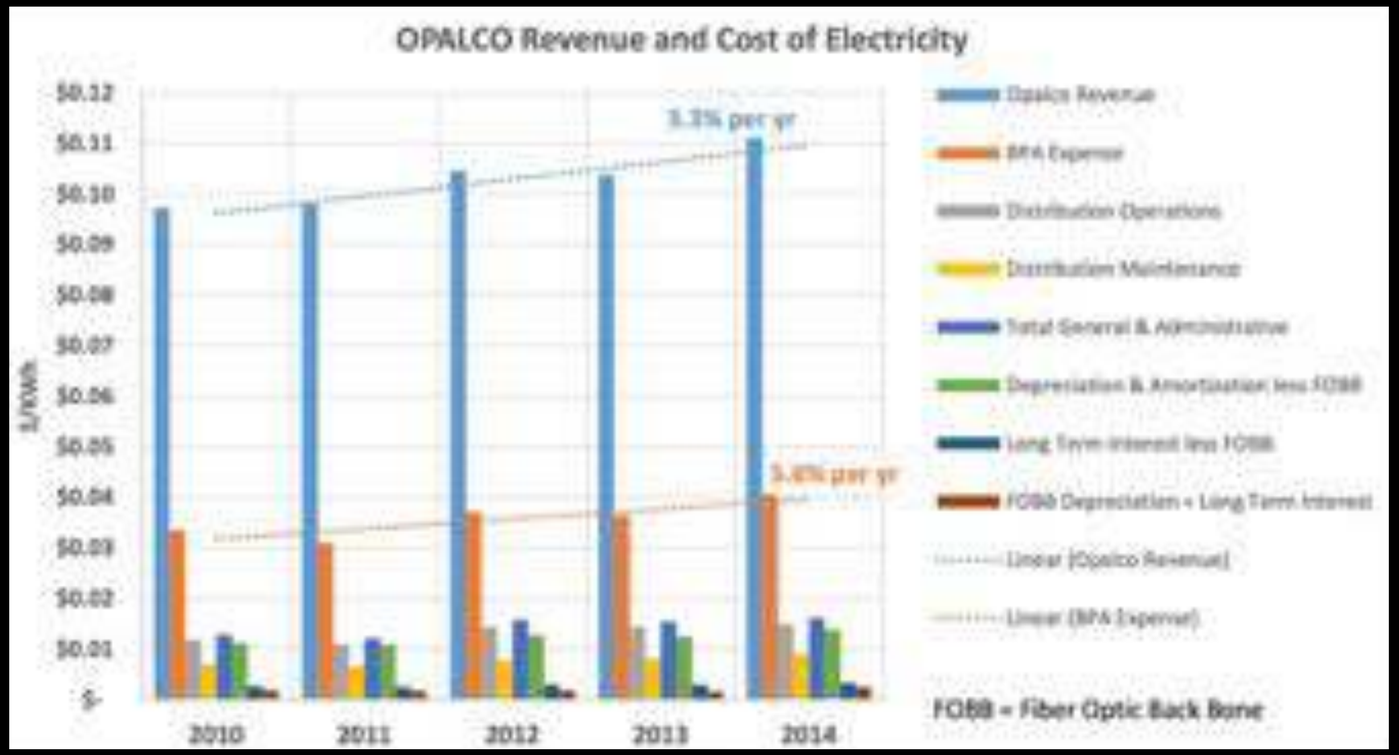
Zero Load Growth…

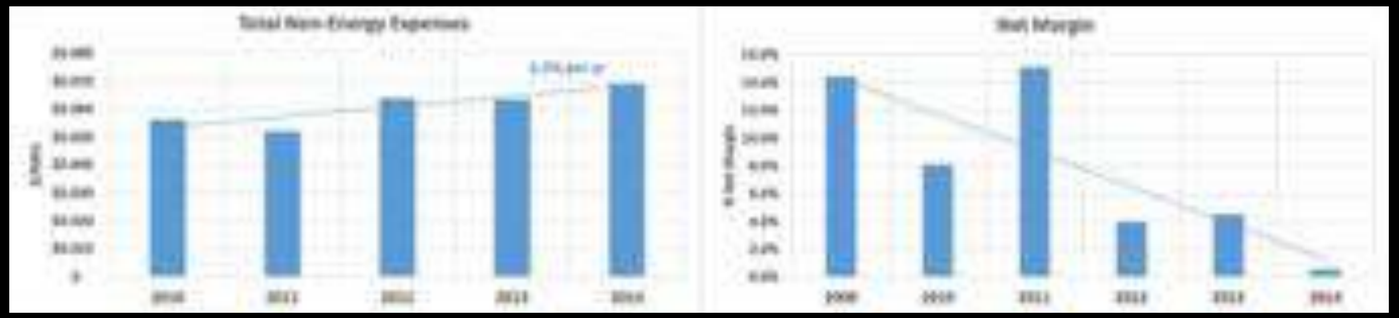
"The problems drive the solutions."

"Incentives drive innovation."

"actual costs versus social engineering"

Financial Analysis Prepared by OPALCO Board Member Dr. Jerry Whitfield





Facts

- Today OPALCO Members pay on average 11¢/kWh overall for electricity.
- OPALCO pays BPA 4¢/kWh for purchased power.
- It costs OPALCO 7¢/kWh to deliver power to Members residences and businesses.
- The Fiber Optic Backbone costs Members 0.25¢/kWh.

Five Year Trend

- Sale of electricity (kWh) to Members has been flat.
- Members cost of electricity has increased by 3.3% per year.
- Cost of BPA power has increased by 5.6% per year.
- OPALCO's Non-Energy costs have risen by 6.5% per year.
- Resulting Net Margin has decreased to zero in 2014.

Conclusions

- The cost of providing safe and reliable power has increased at about twice the rate of inflation.
- Members cost of electricity has increased more or less with inflation.
- Members have been getting a good deal at the expense of OPALCO's Net Margin which is used to pay for Members Equity in the Cooperative.
- OPALCO's ability to borrow future funds is being undermined by very low Net Margins.

Issues

- Lower than expected electrical demand is due to a complex mix of warmer weather, member energy conservation, deployment of roof-top solar, and member lifestyle.
- Price per kWh can increase even while individual member's bills decrease through lower usage.
- Rate structure requires pricing of 36.5% for energy and 63.5% for facility charge to reflect actual costs.
- OPALCO revenue volatility in times of flat demand becomes manageable if pricing reflects actual costs.
- Reducing energy component in price decreases incentive for energy conservation or deployment of roof-top solar.
- Estimated member investment in roof-top solar is about $3.5M.

Thank You