

# Energy Issues

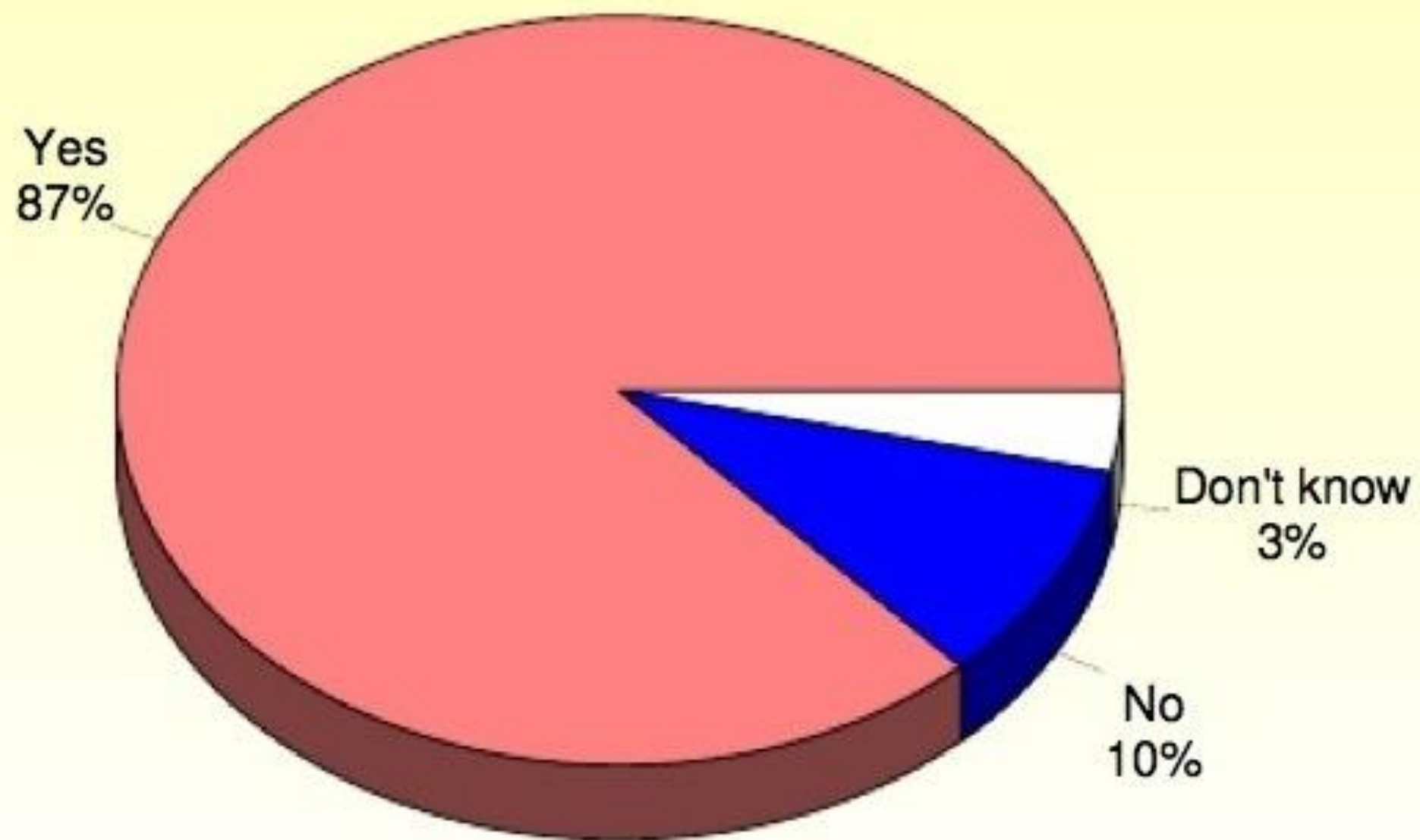
Integrated Resource Plan

Future Opportunities

Revenue and Rate Structure

# Whether Respondents Think It Is Important for the City of Columbia to Support Sustainability Programs That Help Reduce Pollution, Conserve Energy, and Protect Water Resources

by percentage of respondents





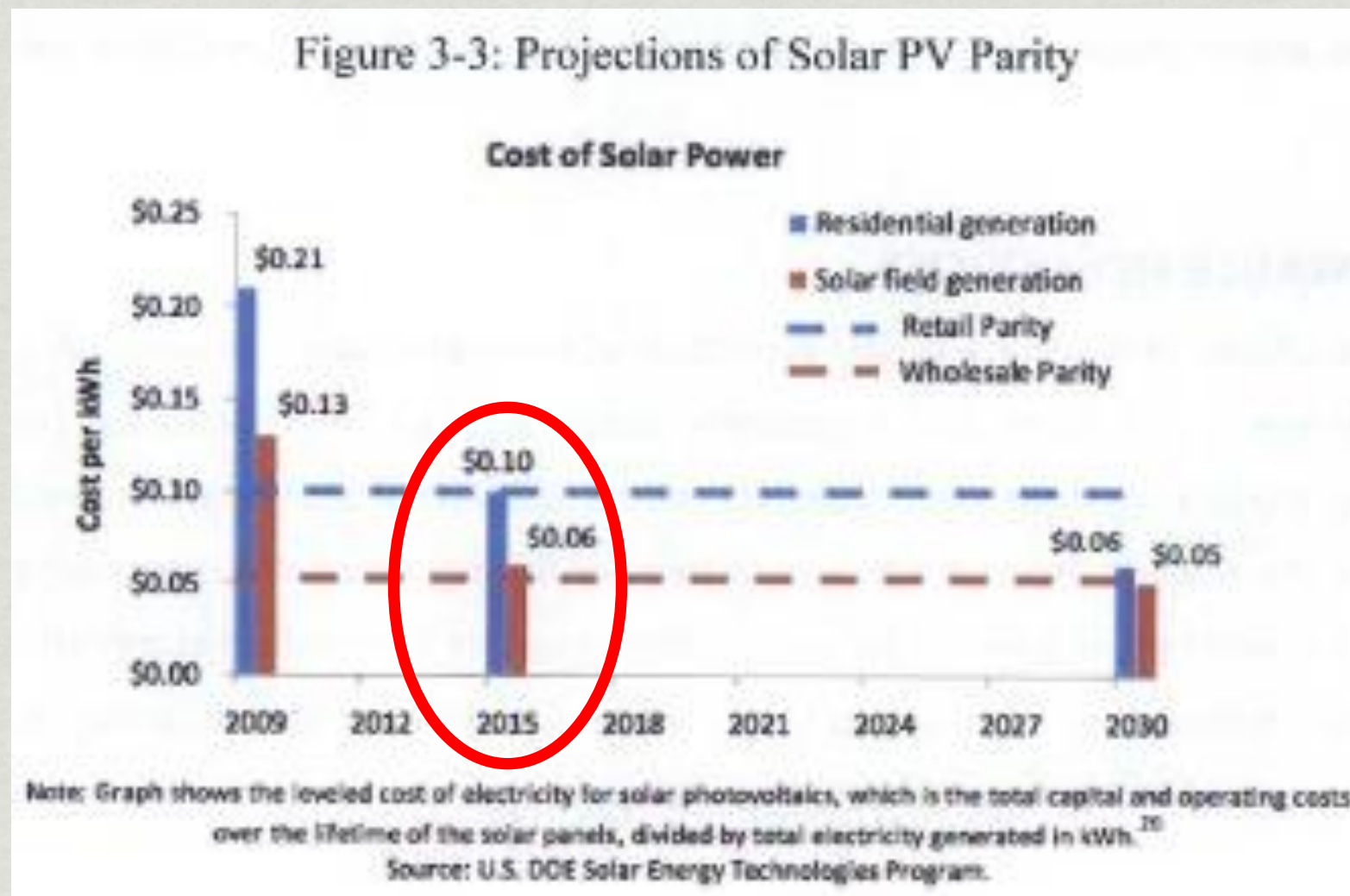
# IRP and Solar

Oddly, solar power was not considered in the Strategist computer model used in the IRP

Meaning: Photovoltaic energy was not allowed to line up and directly compete with fossil fuels

Instead, PV is relegated to a separate discussion... the NIT of the IRP

# IRP and Solar



Photovoltaic energy is about to be cheaper than grid energy. (DOE)



# IRP and Solar

Table 3-3: Avoided Costs to CWL of 1kW Solar Array (20 years)

<b>Annual Discount Rate</b>	<b>4%</b>
<b>Monthly Discount Rate</b>	<b>0.33%</b>
<b>NPV (\$/kWh)October 2013 through October 2033</b>	<b>\$1,073.12</b>
<b>kWh/Year</b>	<b>1462.51</b>

“You can’t have too much solar.”

# IRP and Solar

Customer-owned PV and efficiencies will obviously result in CWT revenue decreases

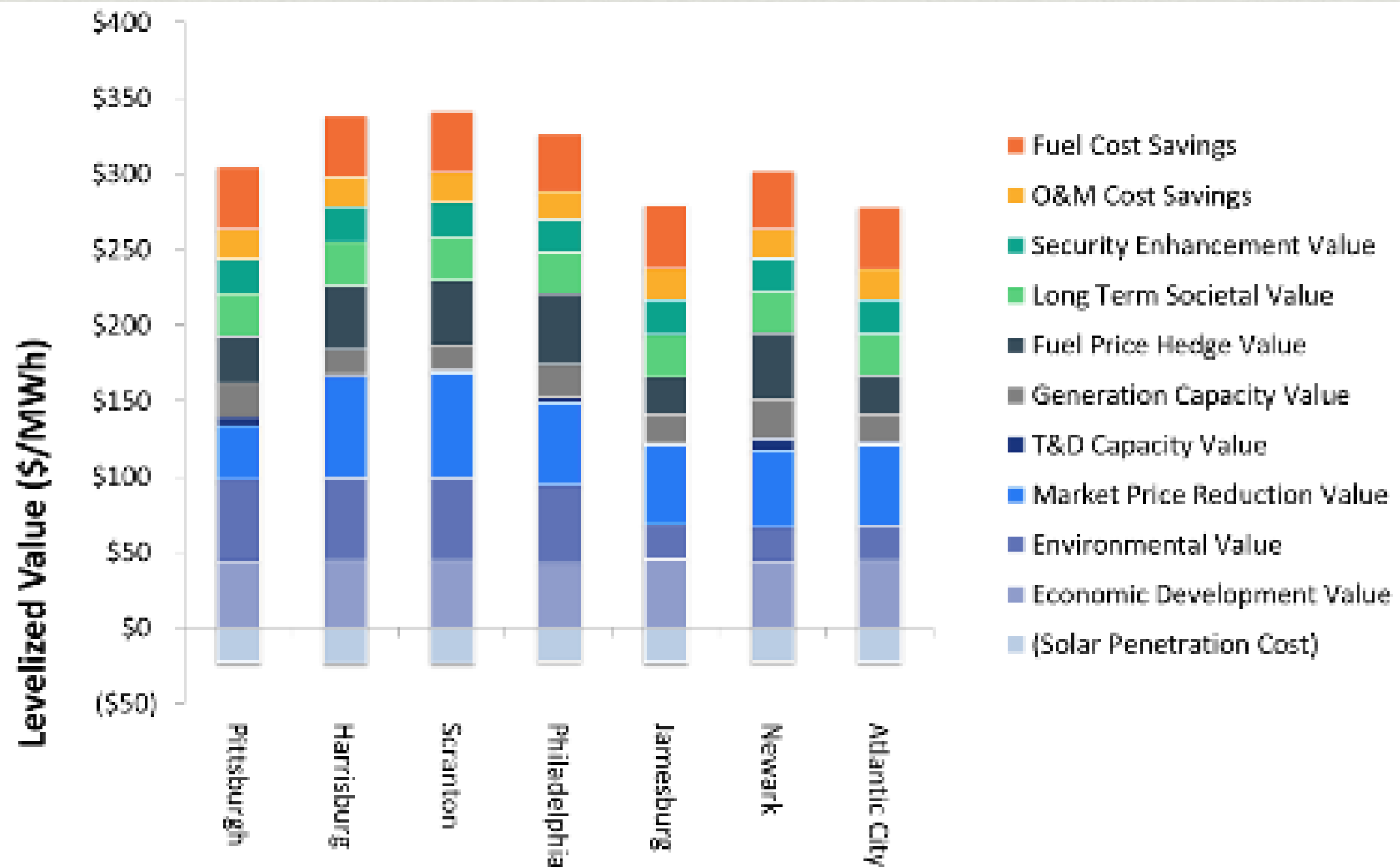
Cause for Concern amongst Electric Utilities

However, there are less-obvious savings that more than offset the loss of revenue

# Value of Solar:

## Pennsylvania Study

Figure ES- 1. Levelized value (\$/MWh), by location (South-30).

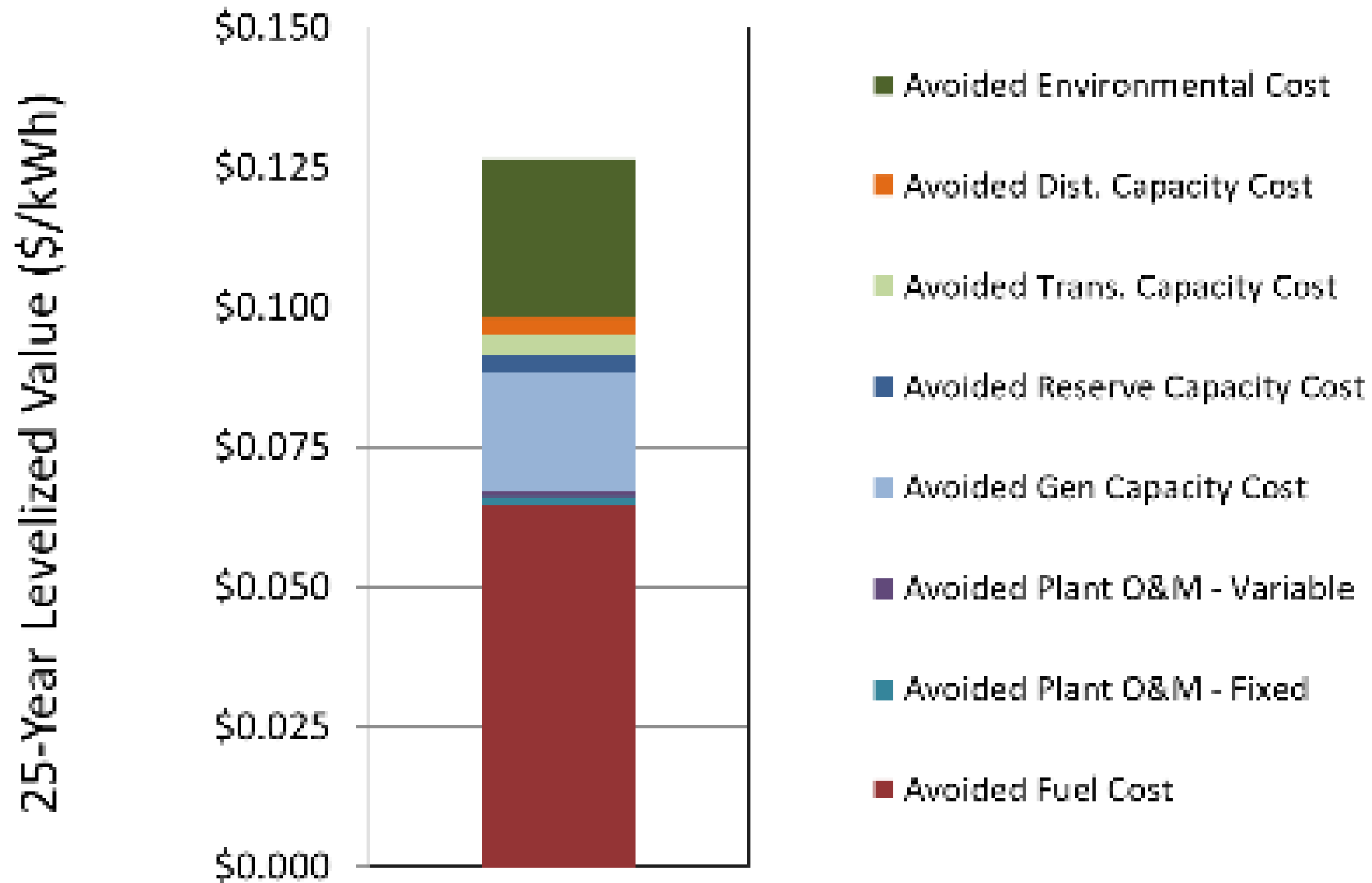




# Value of Solar:

## Minnesota Dept. of Commerce

Figure 3. (EXAMPLE) Levelized value components.





# **Excerpt from Memo to Council**

## **From the Water and Light Advisory Board**

*approved December, 2013*

### **RE: IRP, PV**

... In summary, we are recommending that council demonstrate political support for photovoltaics by directing staff to:

- aggressively promote photovoltaics  
(possibly by redirecting 'Power Partners' campaign)
- rapidly develop Community Solar programs
- provide photovoltaic loan programs for residential and commercial

customers

- identify and address any and all impediments to photovoltaics
- design new, improved rate structures (prior to any modification of rates)
- expedite the photovoltaic system permitting process
- develop plans for photovoltaic systems on city properties
- install at least 100 kW of city-owned photovoltaics annually

# Solar and Local Economic Development:

## Technical and Financial Barriers Have Fallen, The Three-Year Window of Opportunity is Now Open

By paying our electric bills,  
we all contribute about \$120  
million/year to our utility.



~\$100 million/yr

About \$100 million of this leaves  
our local economy, mostly for  
coal, gas, and purchased power.

As we develop our own power sources, we can keep more  
and more of this money in our community, supporting an  
independent, local, sustainable, renewable energy industry.



# Solar Opportunity

- local, distributed, clean, renewable, safe
  - creates good jobs
  - spurs outside investment
  - reduces peaks in energy usage
- defers need for infrastructure expenditures
  - affordable, bankable
- funded mostly by local residents and businesses (who earn ~ 5-10% AROI)
  - keeps money local
- pulls federal \$ into local economy (only through 2016)

30% Federal Tax Credit





# Solar Industry in MO

- **Private utilities' solar rebates kickstarted a state solar industry**
  - **Those rebates are gone**
  - **CWL now has the best solar deal in the state**
- **Installers are redirecting their marketing efforts towards Columbia**





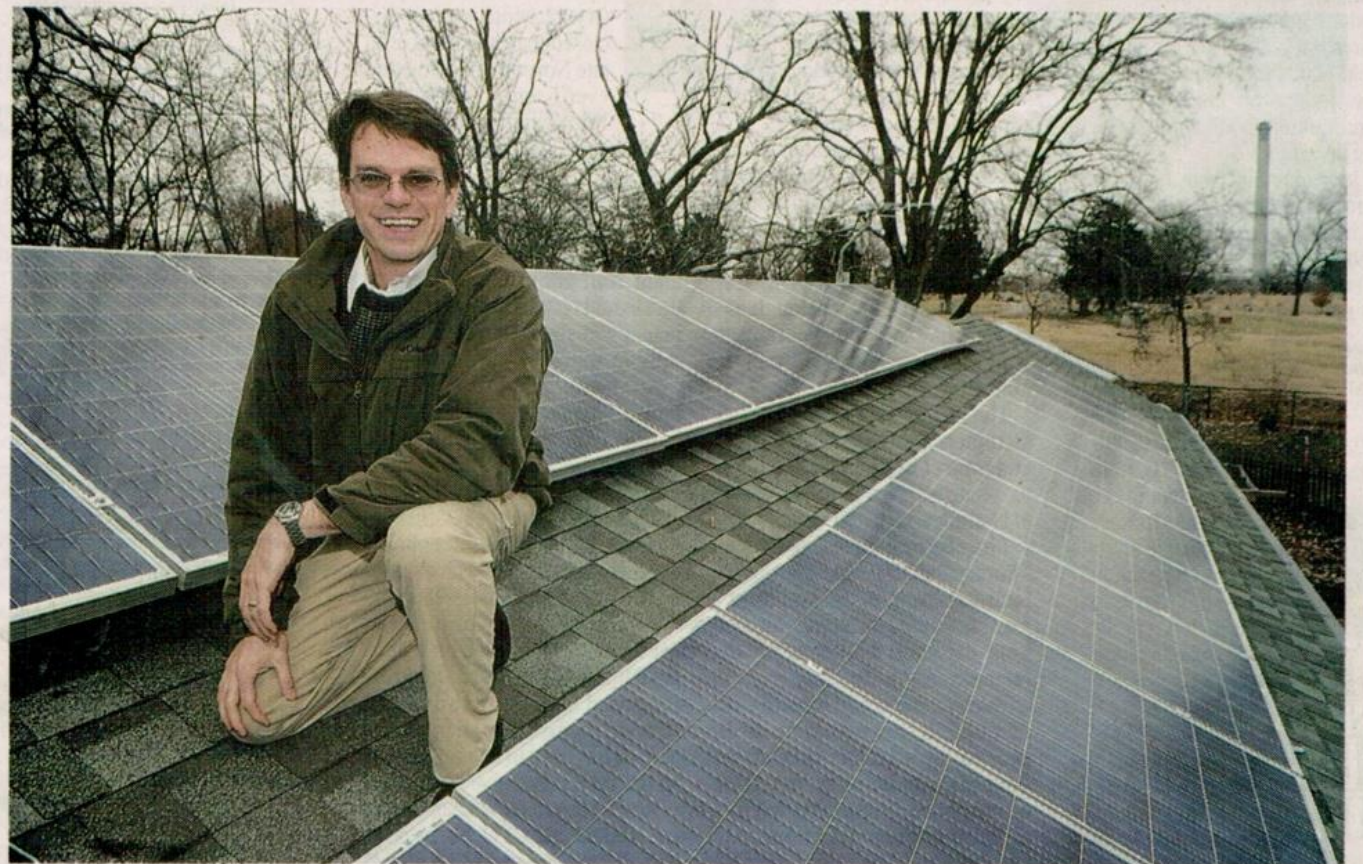
# Privately-Owned, Net-Metered Solar

Annual Return on Investment  
Ranges from 4% to 15%

Major changes ahead  
for the energy industry

40 pages — 50 cents ■ Columbia, Missouri ■ [www.columbiatribune.com](http://www.columbiatribune.com)

## GREEN ENERGY



Don Shrubshell /Tribune

Scott Christianson has installed 24 3-foot-by-5-foot solar panels on the roof of his home at 300 S. Garth Ave. to cut his electric bills. Solar technology is increasingly being used to provide commercial and residential power.

## Solar's popularity grows

Programs lower  
cost of systems.

BY ASHLEY JOST

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Less than one month after a Columbia couple installed the city's largest residential solar electric system, a local business has put in the city's largest commercial system.

Columbia Safety Industrial Supply, a local store that is part of the national GME Supply chain, started the installation process in

building should produce as much energy as it takes in.

EnergyLink, a Columbia-based company, designed and installed the system.

Including parts and installation, the out-of-pocket cost to Columbia Safety is just below \$200,000, but after local rebates and the federal tax credit are applied, the end cost is \$104,000.

The federal tax credit is something homeowners and business owners can apply for when they file their 2013 taxes. Those who are eligible receive a 30 percent

and helping to bring in the products necessary for the system.

During the design phase, O'Connor said the initial idea was to install 12 panels. After discussing all options with Christianson and Fajen, O'Connor said the homeowners decided to cover the roof with 24 panels, creating the 5.64-kilowatt system.

The systems run on credits, so when a credit of power is used by the building, the owners have to pay for it. However, the building is also generating electricity, credits, that go back to the larger grid,

Safety, is for the house to become net zero.

The out-of-pocket cost was about \$12,300, according to a spreadsheet provided by Christianson. The utility rebate from the city came to \$2,820, and projections for the federal tax credit are a similar amount, making the final cost just more than \$6,600.

"We've always been interested in sustainable energy sources in general," Christianson said. "Investments in the house to make it more energy efficient is a good pay off for us because we



# CWL-Owned PV / Community Solar

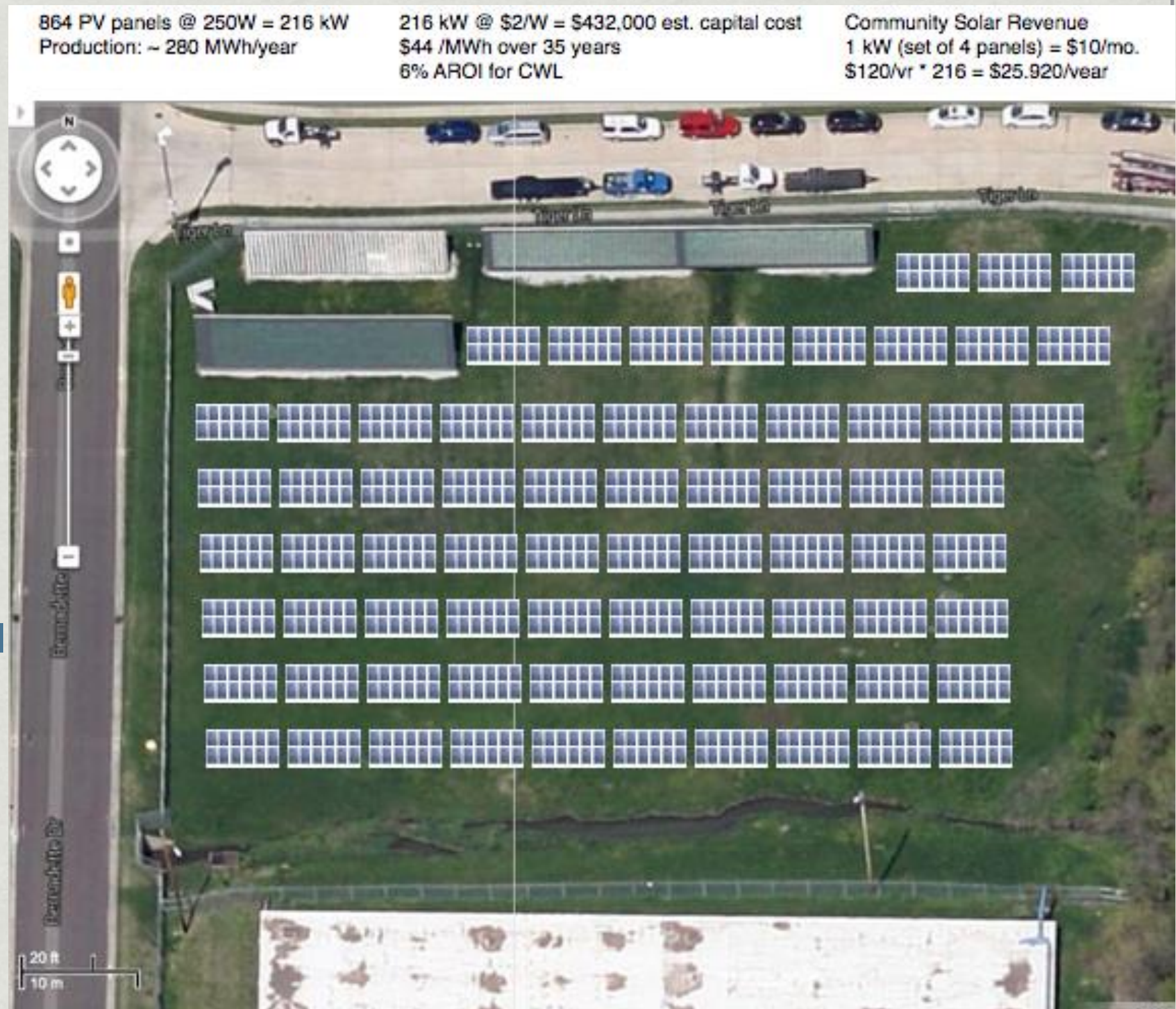
**Initial Cost: \$432,000**

**Essentially a pre-paid contract for 35 years of energy for 4.4 ¢/kWh**

**Generates 280,000 kWh/yr**

**Selling that to customers for 9.44 ¢/kWh provides over \$26,000 in annual revenue**

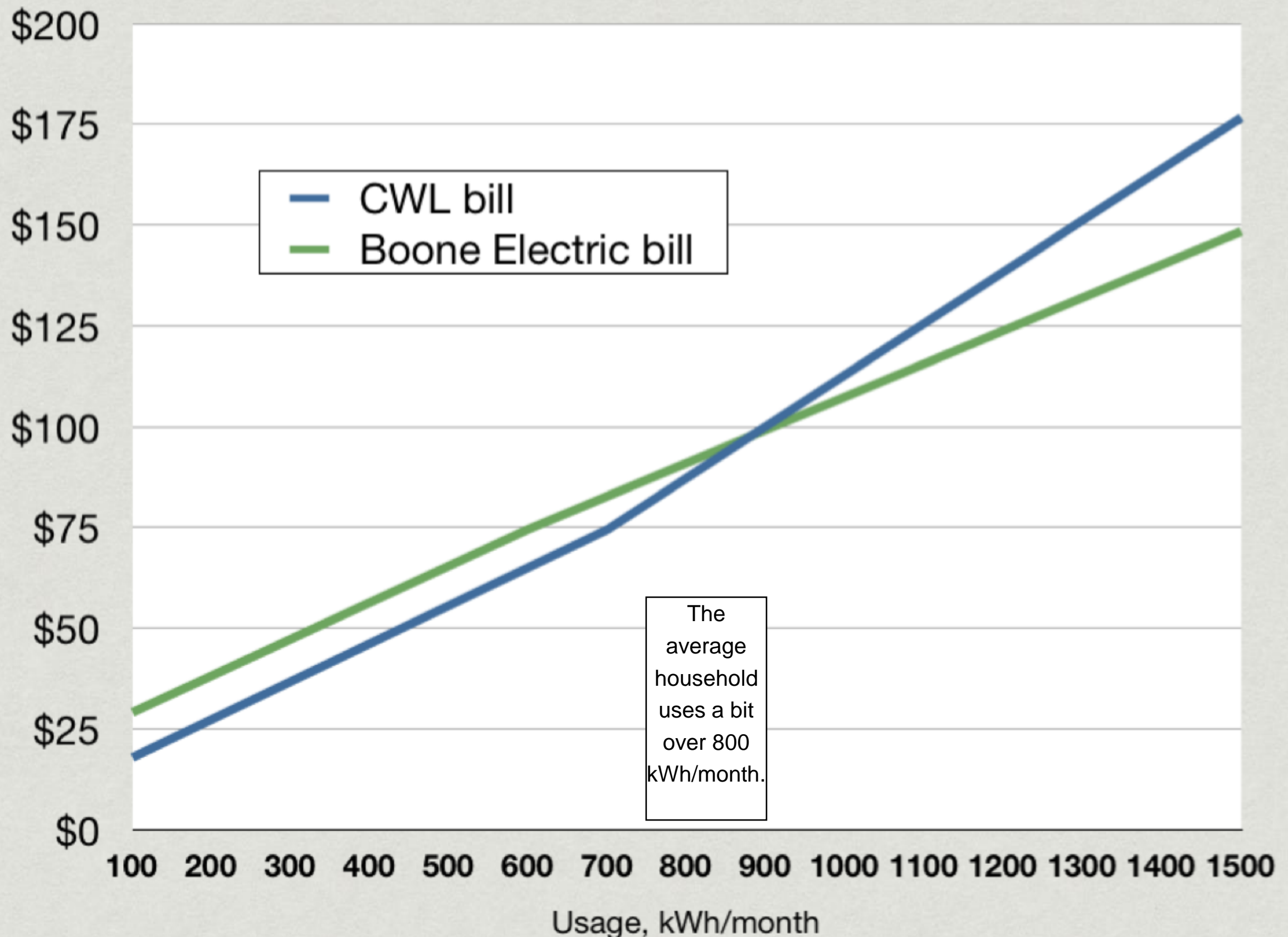
**~6% AROI for CWL**



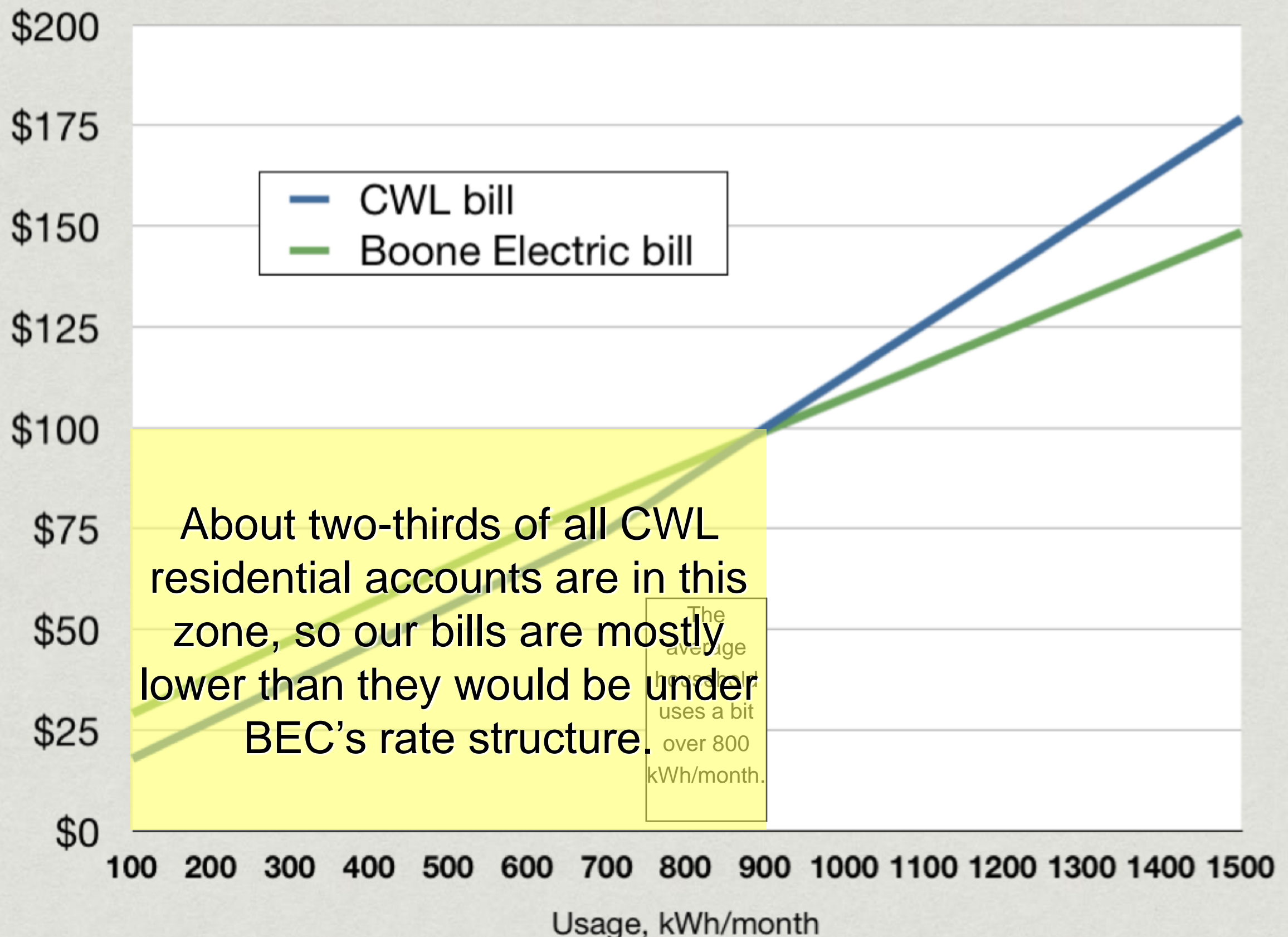


Rate Structure		monthly base rate	< 750 kWh; cents/kWh	750-2,000kWh; cents/kWh	> 2,000kWh; cents/kWh
Residential Rate—Summer (June-Sept)		\$8.45	9.44	12.77	13.72
Residential Rate—Non-Summer		\$8.45	9.44	10.88	10.88
Residential Rate—Non-Summer w/ 5 kW electric heat		\$8.45	9.44	8.3072	8.3072
Residential—Non-Summer with Heat Pump		\$8.45	9.44	8.024	8.024
		monthly base rate	< 1,500 kWh	> 1,500kWh	
Small General Service—Summer		\$8.45 (\$10.85 for 3 ph)	9.44	12.77	
Small General Service—Non-Summer		\$8.45 (\$10.85 for 3 ph)	9.44	9.44	
Small General Service—Non-Summer w/ 5 kW electric heat		\$8.45 (\$10.85 for 3 ph)	9.44	8.496	
Small General Service—Non-Summer w/ Heat Pump		\$8.45 (\$10.85 for 3 ph)	9.44	8.024	
SGS Alternative Option:		Demand Charge	all kWh		
Summer (June-Sept)		\$15.29	5.555		
Non-Summer		\$12.22	4.828		
		Demand Charge	all kWh		
Large General Service (25 - 750 kW peak)—Summer		\$382.25 plus \$15.29 per add'l kW	5.555		
Large General Service (25 - 750 kW peak)—Non-Summer		\$305.50 plus \$12.22 per add'l kW	4.828		
Industrial Service (> 750 kW peak)—Summer		\$14,962.50 plus \$19.95 per add'l kW	4.456		
Industrial Service (> 750 kW peak)—Non-Summer		\$11,970 plus \$15.96 per add'l kW	3.819		
Transmission Service			market price, no markup		

# Monthly Residential Electric Bill Comparison: CWL and Boone Electric

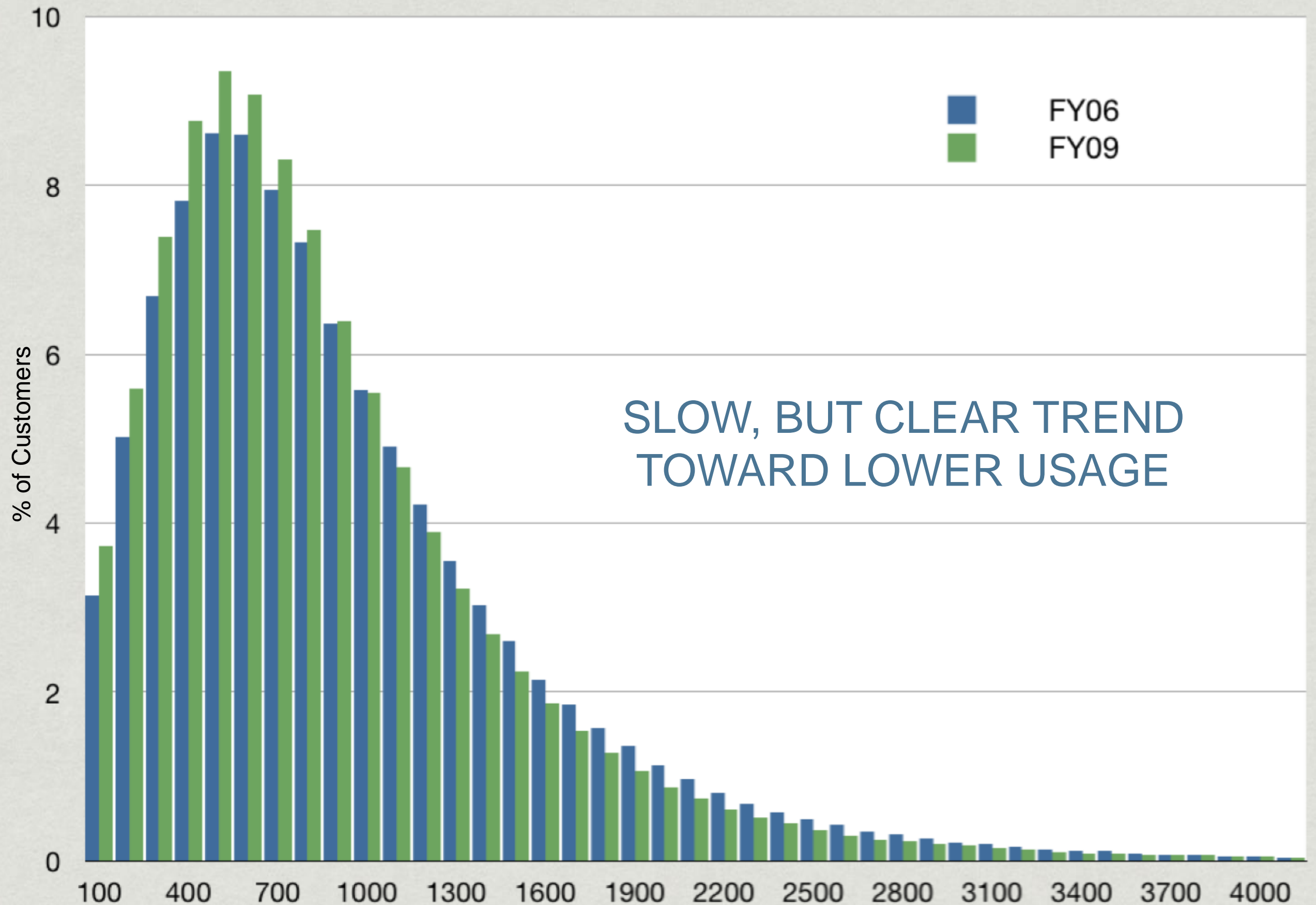


# Monthly Residential Electric Bill Comparison: CWL and Boone Electric





## CWL Residential Monthly Electrical Usage



**Memo to Council**  
**From the Water and Light Advisory Board**  
*approved September, 2012*

**RE: Utility Rate Structures**

Dear Mayor and Council,

The Water and Light Advisory Board recommends a well-planned, revenue-neutral modification of our utility rate structures in order to encourage conservation of both water and electricity.

Conservation rate structures provide a price incentive to encourage conservation – which is by far the cheapest, simplest, and cleanest way to meet future electricity and water demands.

In preliminary discussions regarding rate structures, staff has expressed very legitimate concerns about consistently collecting enough revenue to fund utility operations. A problem with our current rate structures is that we are forced to depend on higher usage in order to generate sufficient income. In other words, our rates are built such that responsible fiscal management is at odds with encouraging conservation. This conflict needs to be remedied before we can make substantive progress with our demand side management efforts.

The Water and Light Advisory Board recommends that council direct staff to develop options for conservation rate structures either through in-house efforts, or hiring a rate consultant.

Rates shall:

- be sufficient in quantity and stability to dependably recover the ongoing costs of utility operations
- be fair and non-discriminatory (customers receiving like services under similar circumstances are treated equally)
- be transparent; easy to understand
- encourage conservation and efficiency
- give customers as much control over their costs as possible
- not place an undue burden on those customers least able to pay

With a modern, conservation rate structure, our utility and our individual customers will all benefit through decreased overall system costs and deferred need for capital expenditures, which will keep rates as low as possible for as long as possible.



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**In summary, we are recommending that council demonstrate political support for photovoltaics by directing staff to:**

- **aggressively promote photovoltaics**  
(possibly by redirecting 'Power Partners' campaign)
- **rapidly develop Community Solar programs**
- **provide photovoltaic loan programs for residential and commercial**

**customers**

- **identify and address any and all impediments to photovoltaics**
- **design new, improved rate structures (prior to any modification of rates)**



# Summary

## **Photovoltaics**

**Net-Metered Customer Solar**

**CWL-Owned Solar**

**Community Solar**

## **Rate Structures**

**Comprehensive Review (prior to any piecemeal changes or x% increases)**

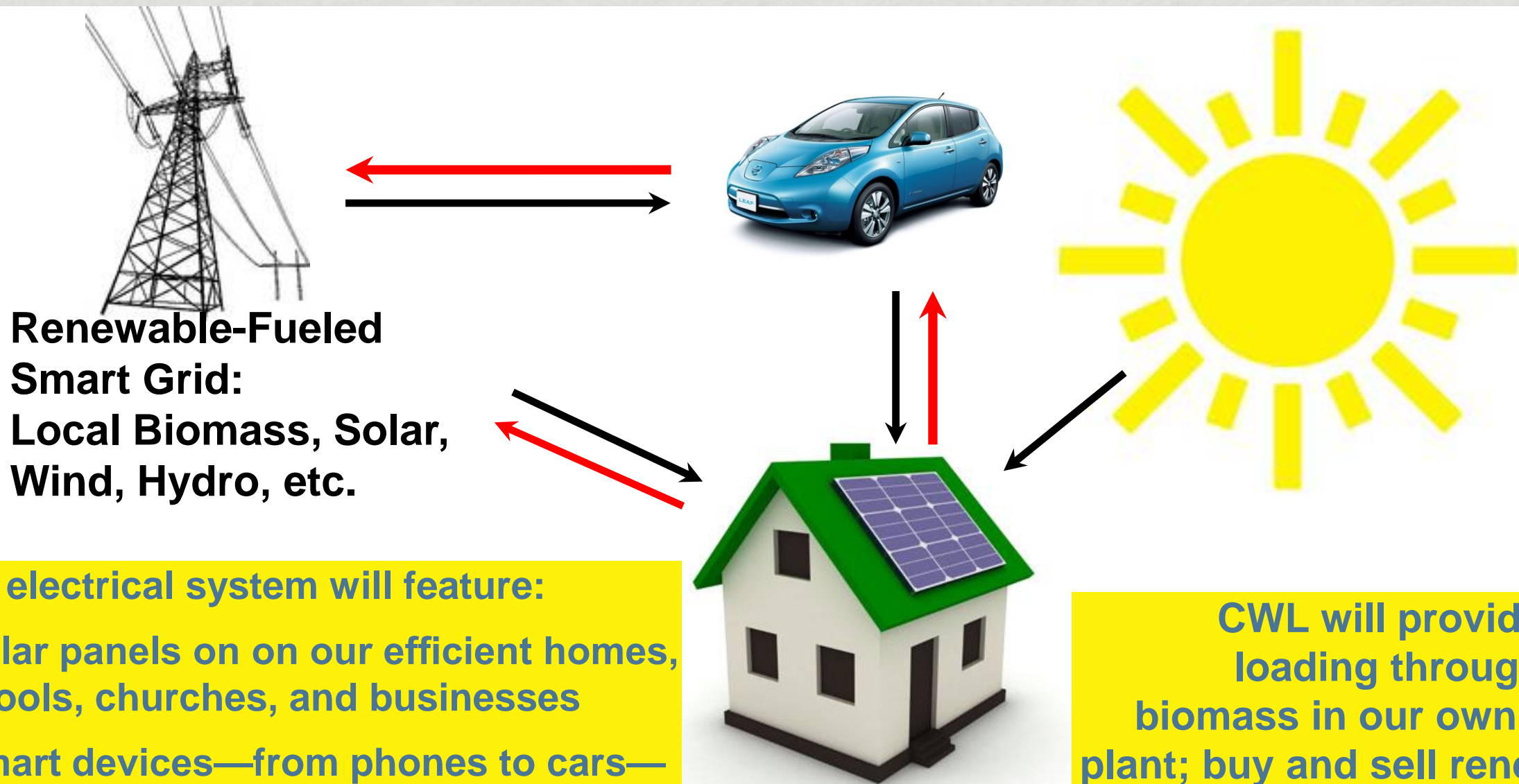
**Increasing base rates is an impediment to conservation**

## **Revenue**

**Ensure Sufficiency by Redirecting Outbound Energy-Related Cash Flows**

- **Petroleum (encourage and accommodate Electric Vehicles)**
- **Natural Gas (promote High-Efficiency Electric Space- and Water-Heating)**

# Eventually...



Our electrical system will feature:

- Solar panels on on our efficient homes, schools, churches, and businesses
- Smart devices—from phones to cars—that store this electricity in batteries
- Smart equipment that stores energy in many different forms (e.g., thermally, or in manufactured products)
- Energy-smart citizens

CWL will provide base loading through local biomass in our own power plant; buy and sell renewable electricity from/to MISO and regional suppliers; and act as a balancing agent to manage intermittent local renewables.

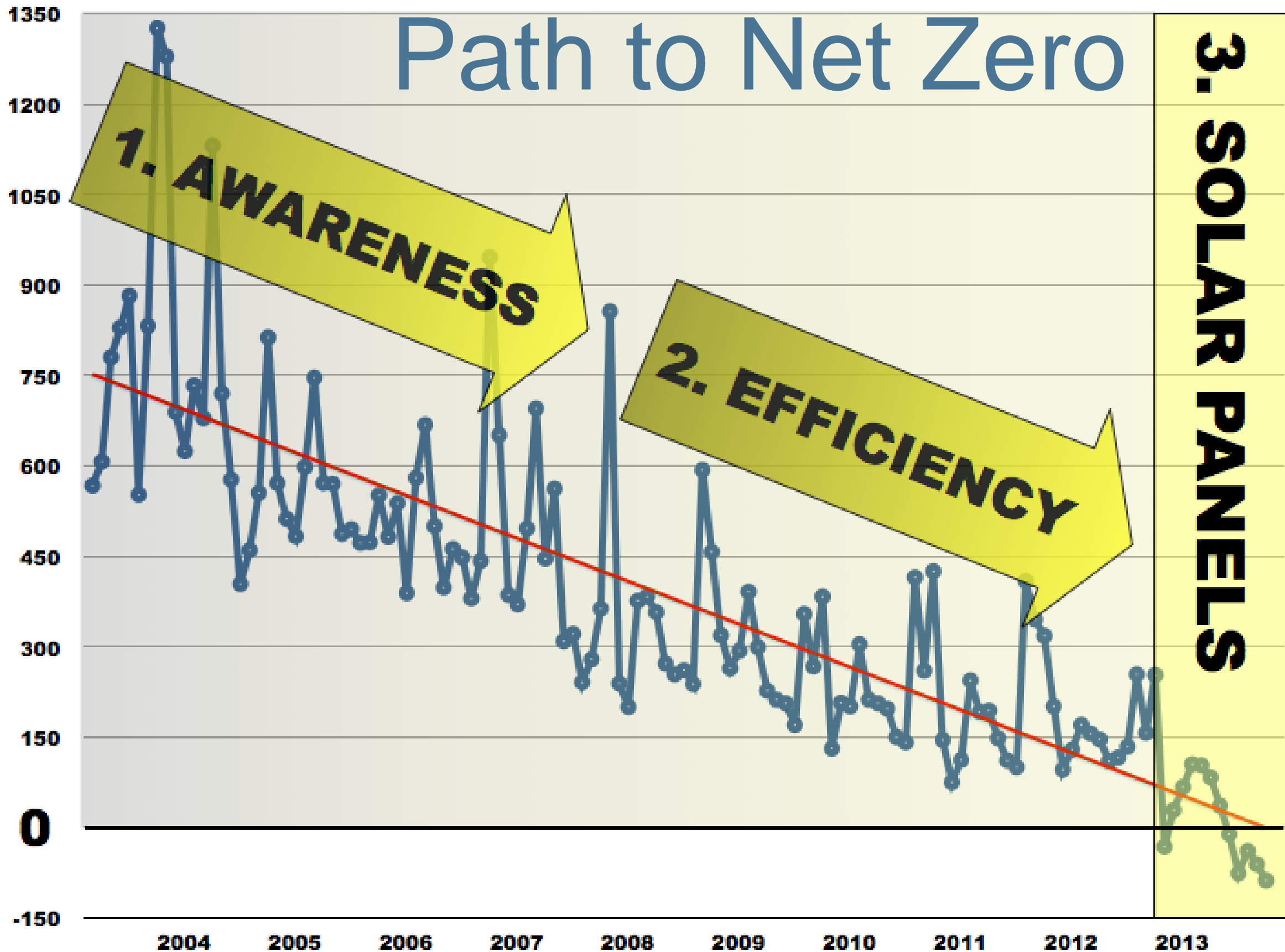


# Appendices

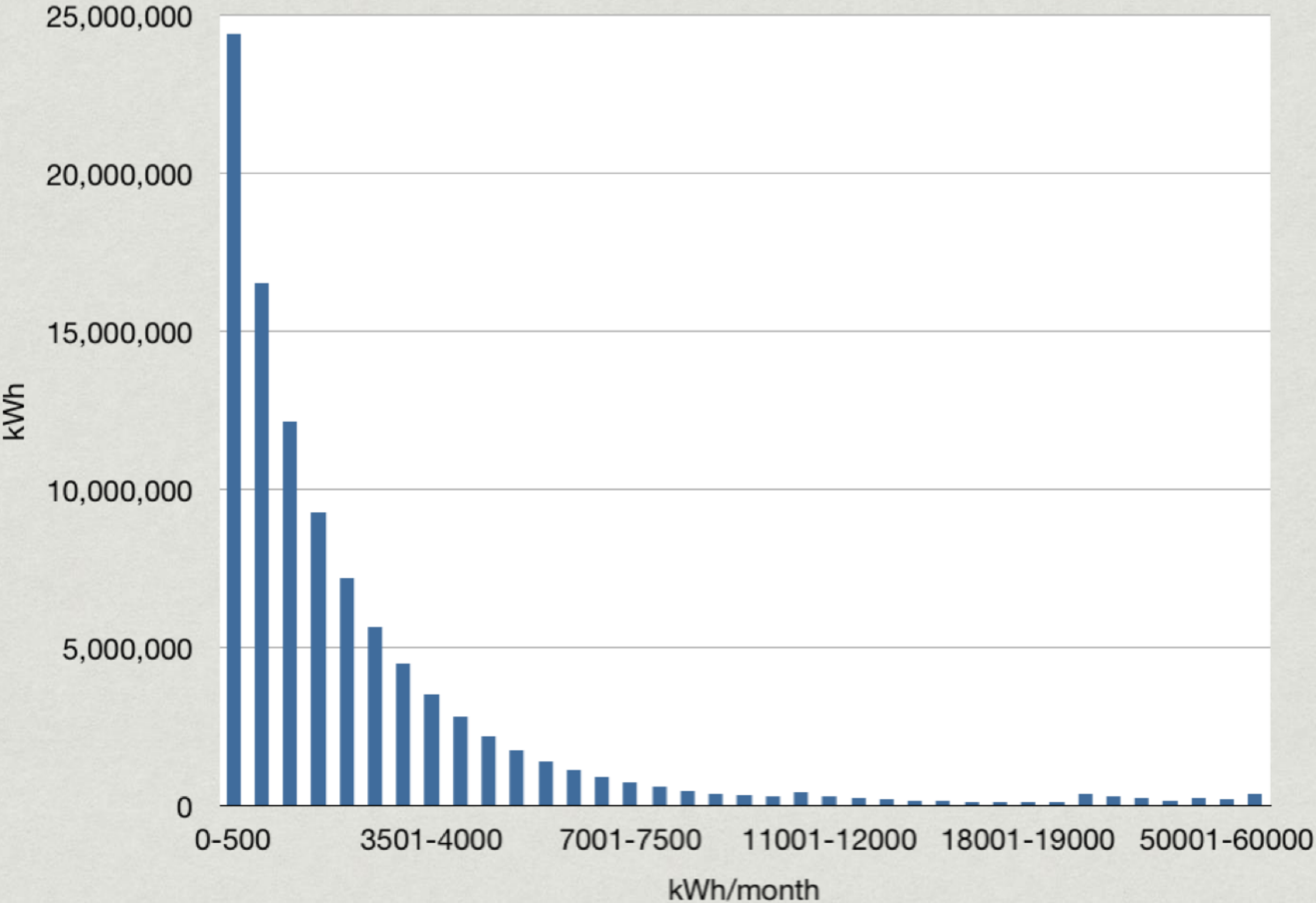


Kilowatt-Hours Purchased per Month

# Path to Net Zero

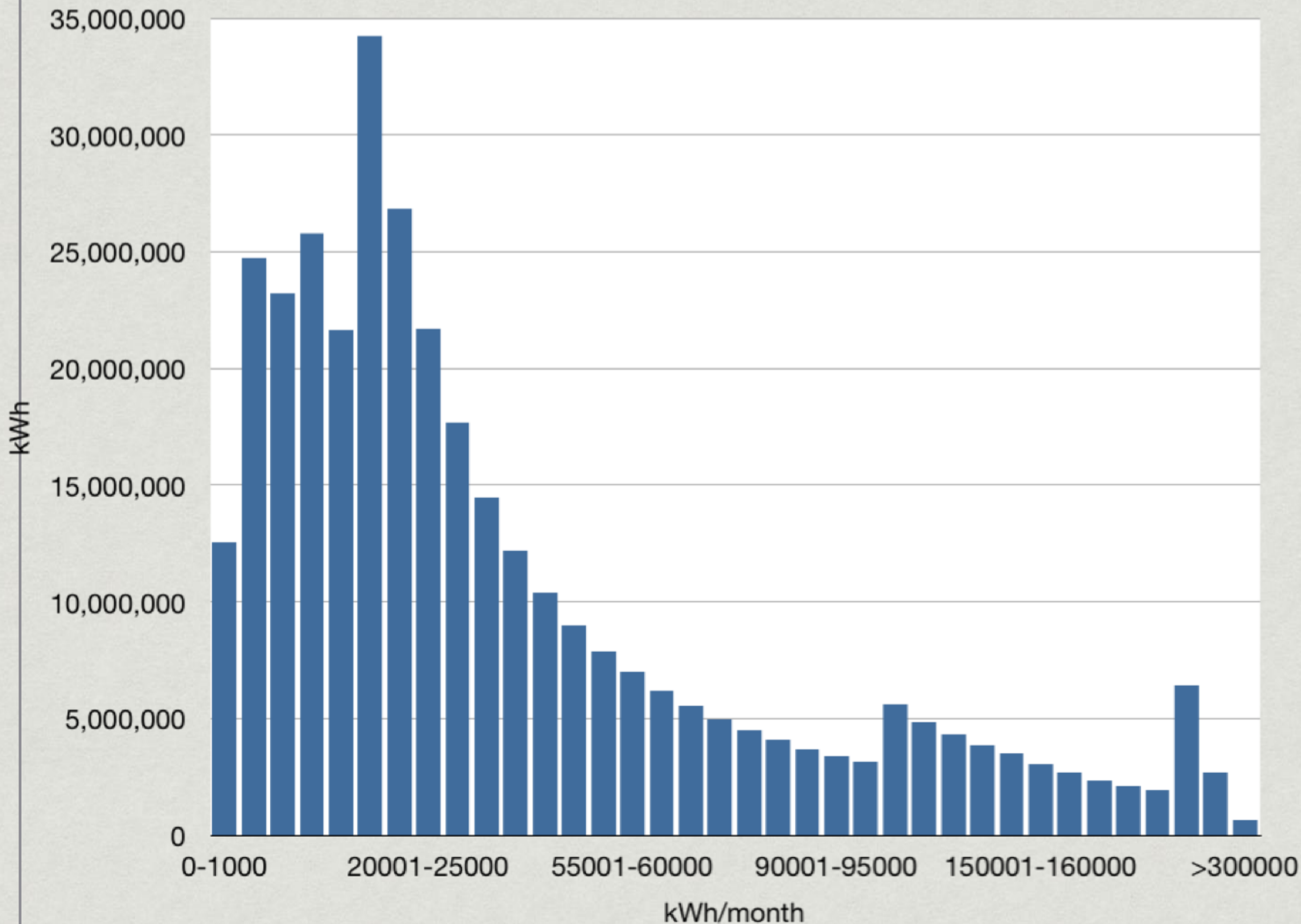


Monthly Small General Service Electric Usage Distribution





**Monthly Large General Service Electric Usage Distribution (FY2013)**



**Monthly Industrial Electric Usage Distribution (FY2013)**

