Targeting Success

Conservation Potential Assessments: Technical and Achievable Energy Efficiency Potential

- Lauren Gage, Planning and Evaluation Lead, BPA Energy Efficiency
- Ray Grinberg, Power Resources Manager, Peninsula Light Company
- John Wilson, Energy Services Analyst, Peninsula Light Company
- Bill Welch, Department Manager - Energy Management Services, Eugene Water & Electric Board

B O N N E V I L L E P O W E R A D M I N I S T R A T I O N

Targeting Success

Conservation Potential Assessments: BPA Efforts to Support Utilities

Presented by:
Lauren Gage, Evaluation and Market Research Lead
BPA Energy Efficiency
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BPA efforts to support utility potential work

- "Handbook" for Potential studies in the Northwest
  - Brief Introduction
  - Timeline/next steps
- Utility Potential Calculator
  - Brief Introduction
  - Timeline/next steps
- CAVEAT: These are both still DRAFT and require Council review.

Background

- Understanding energy efficiency potential is increasingly more important
  - Tiered Rates
  - 6th Plan
  - I-937 in Washington
- Comprehensive potential studies can be costly, particularly for small utilities
- BPA has been working for two years to develop tools to support utilities

Handbook for Potential Studies in the Northwest

- 2 years ago, BPA hosted a full-day meeting to discuss potential studies. We realized:
  - Knowledge bases are widely distributed
  - The Northwest is a bit different than the rest of the country
- Contracted with EES to develop a "Handbook" (Primer?) with the goal of developing a reference guide for utilities:
  - Basics on potential studies and required data
  - Overview of Council's potential models and Target Calculator
  - Brief description of *Utility Potential Calculator*
  - Components of a typical Action Plan
- Result is 35 page document – still needs Council review

Basics of Potential Studies

- Types of Potential
- Basic Data Requirements
- Basic Modeling Methodology
- Supply Curves
- Detailed Data Requirements
- Representative Methodology / Chronological Steps
- Lists and Links to Resources

Example of "Basic Data Needs"

Energy Efficiency Measure Data

- kWh, kW savings, load shapes
- Costs - incremental, O&M, replacement
- Energy and non-energy benefits/costs
- Measure Life

Customer Characteristic Data

- Building types, Residential: single family, multifamily, manufactured
- Building characteristics: heating fuel, vintage, basement type, HVAC types
- Appliance saturation: refrigerators, lighting
- Commercial building square footage; total and by segment
- Current measure penetration Rate

Utility Data

- Load forecast; total and disaggregated by end-use
- Avoided cost
- Discount rates
- Line losses
- Past energy efficiency program achievements

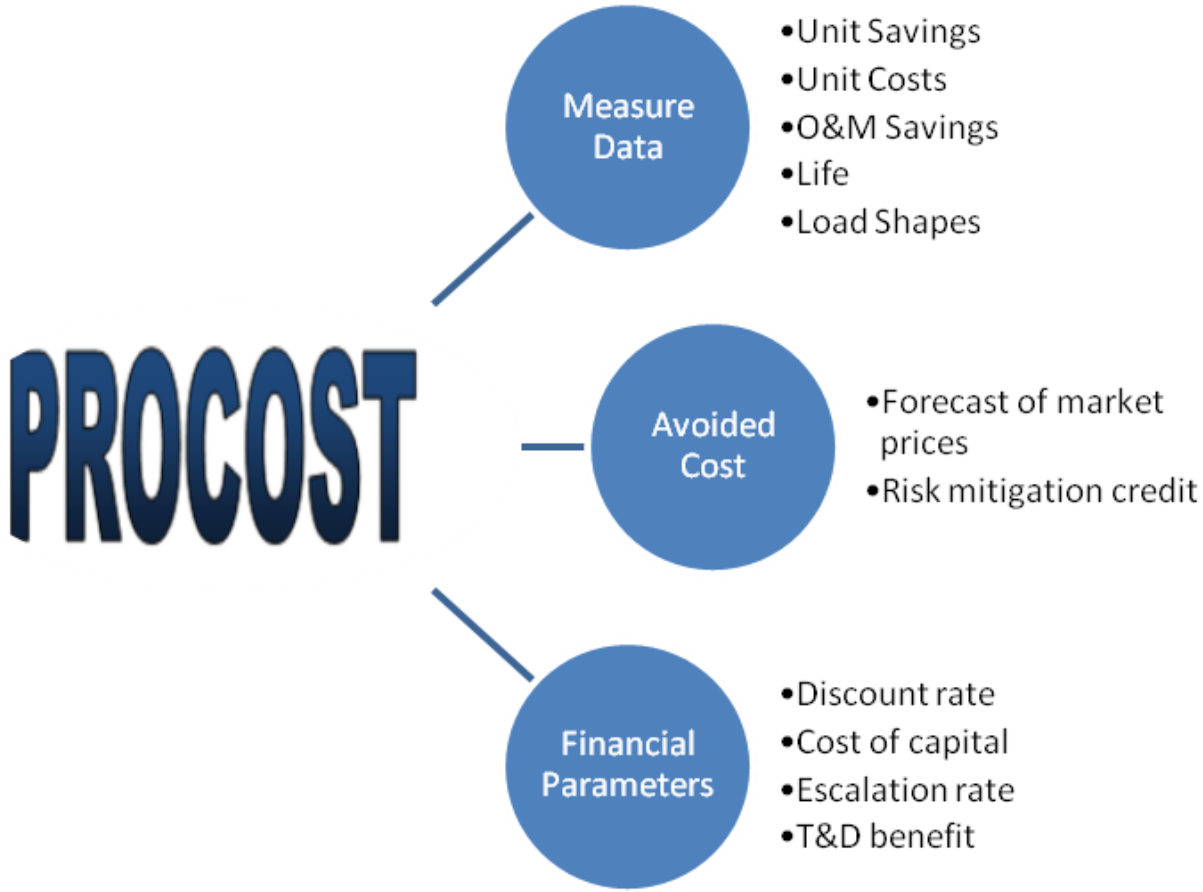
Example: Some references

- **Guide for Conducting Energy Efficiency Potential Studies**, National Action Plan for Energy Efficiency.http://www.epa.gov/solar/documents/potential_guide.pdf
- **California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects.** July 2002. http://drrc.lbl.gov/pubs/CA-SPManual-7-02.pdf
- **Understanding Cost-Effectiveness of Energy Efficiency Programs: Best Practices, Technical Methods, and Emerging Issues for Policy Makers, National Action Plan for Energy Efficiency http://www.epa.gov/cleanenergy/documents/utility_data_guidance.pdf**
- **The Technical, Economic and Achievable Potential for Energy-Efficiency in the U.S. – A Meta-Analysis of Recent Studies, American Council for an Energy-Efficient Economy. January 2004. http://www.aceee.org/conf/04ss/rnemeta.pdf**
- **Energy Efficiency and Conservation Measure Resource Assessment for the years 2008-2027, Energy Trust of Oregon. February 26, 2009. http://www.energytrust.org/library/reports/090226_EE_ConservMeasure_ResourceAsses.pdf**
- **Comprehensive Assessment of Demand-Side Resource Potentials (2008-2027). May 4, 2004. http://www.pse.com/SiteCollectionDocuments/2007IRP/Appendices/K1-Demand-sideAnalysisReport.pdf**
- **California Statewide Residential Sector Energy Efficiency Potential Study,** Pacific Gas & Electric. April 2003. http://docs.cpuc.ca.gov/published/report/30114.pdf
- **B.C. Hydro Conservation Potential Review**, 2006. http://www.bchydro.com/about/company_information/reports/electricity_conservation.html
- **The New Mother Lode: The Potential for More Efficient Electricity Use in the Southwest**, Southwest Energy Efficiency Project. November 2002. http://www.swenergy.org/nml/index.html
- **Energy Efficiency in Maryland's Electricity Future**, September 2007. http://www.aceee.org/getfile.cfm?publicationid=91

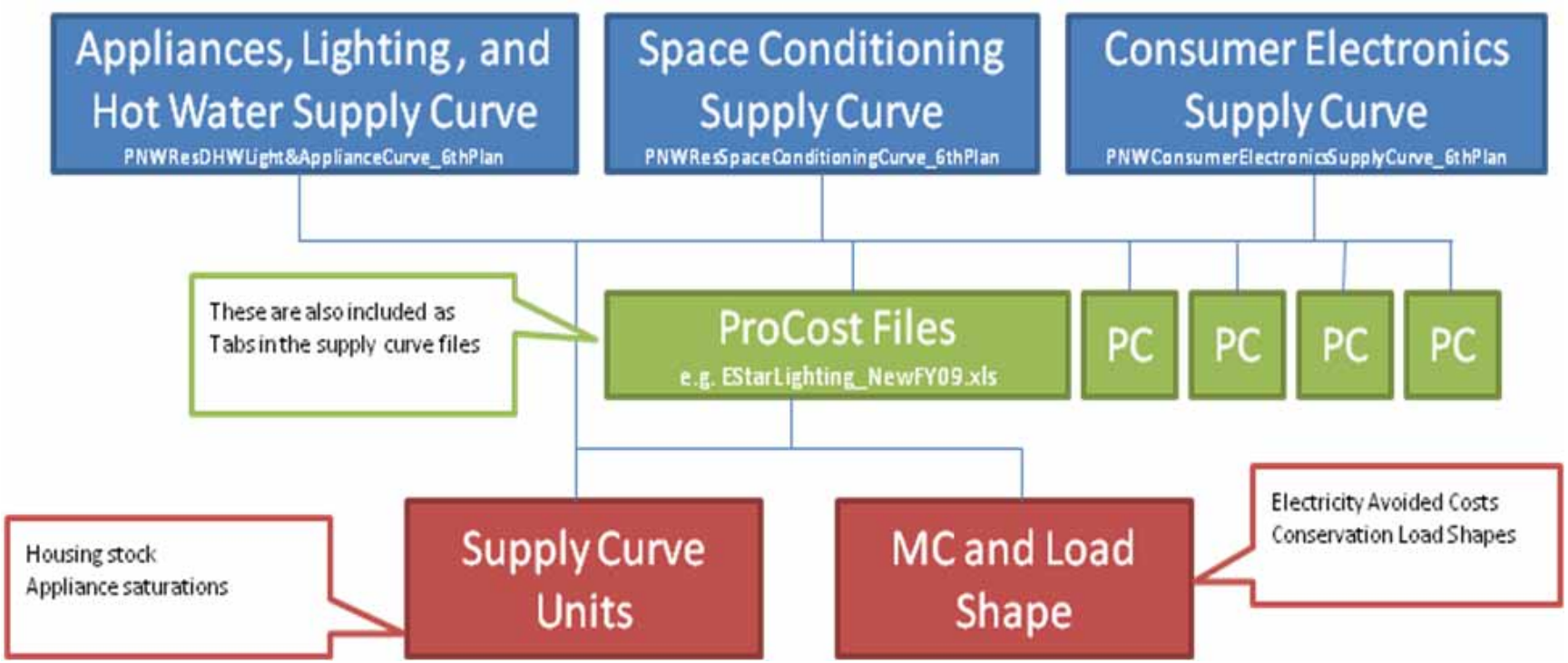
Council's Models

- Overview of the methodology (based on 6th Plan report)
- Overview of ProCost
- Basics of Council Approaches to:
  - Achievability Rates, Portfolio Model and Avoided Costs, Ramp Rates
- Council Potential Models
  - Overview
  - By Sector
  - Some information on how a utility would/could customize each sector model

Example: ProCost Overview



Example: Council Residential Model



Options for Estimating Potential

- Council's Target Calculator
- Utility Potential Calculator (UPC)
- Custom Utility Potential Study
- Customize the Council Model

	Utility Location	Residential Load	Commercial Load	Industrial Load	Housing Stock	Appliance Saturation	Heat Type	Building Vintages	Commercial Stock	Industry Types	Demolition/Growth Rates	Avoided Cost	Technical Measure Data	Ramp Rates	Utility Data*
Target Calculator	x	x	x	x											
UPC	x	x	x	x	x	x	x	x	x	x	x				
Full Potential Study	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Council Models	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

*Including finace rates, line losses, admin cost

Utility Potential Calculator

- What is the Utility Potential Calculator (UPC)?
  - High level calculator to provide quick estimates of energy efficiency potential
  - Results are customized based on utility customer characteristics
  - Uses the Council's measure characteristics, timing and costs
- What the UPC is not:
  - Detailed, utility-specific potential study
  - Primary research to understand customer characteristics
  - Utility-specific measure costs, savings or achievability

Data Requirements

- Data to Change: Customer characteristics
  - Residential: Total housing units, housing type, foundation, heating type, vintage and appliance saturations, cooling, heating and solar zones and growth and demolition rates.
  - Commercial: square footage by sub-sector
  - Industrial: load by sub-sector
  - Agriculture: Total number of irrigated acres, dairy farms in their territory
  - Distribution efficiency: enter utility
- Data not changed: Council measures
  - Savings
  - Life
  - Saturation
  - Achievability
  - Applicability

Example: Residential Inputs

RESIDENTIAL

Heating Zone	Cooling Zone	Solar Zone
1	1	1

RESET

Residental Households	Total Population
10,000	30,000

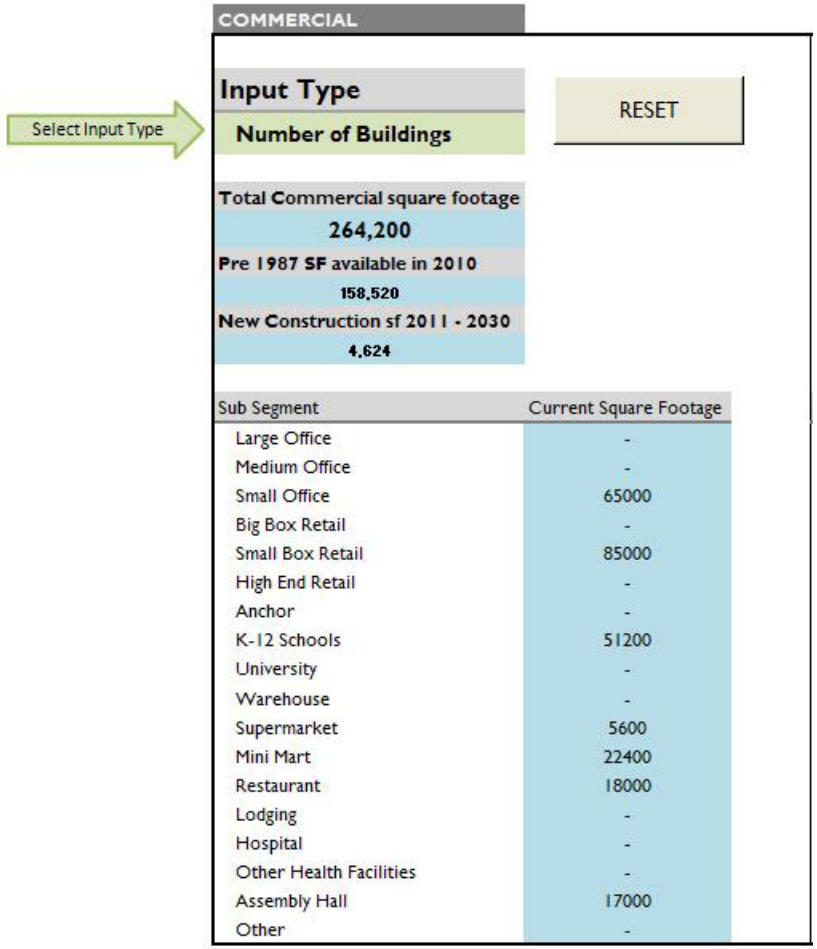
Housing Stock	Service Territory %	Regional %
House Type		
Single Family	72%	72%
Multi-Family	18%	18%
Manufactured Homes	10%	10%
Housing Vintage		
Pre-1980	72%	72%
1980 - 1993	18%	18%
Post 1993	10%	10%
Heat Fuel Type		
Natural Gas Homes	37%	37%
Electric Homes	53%	53%
Other Fuel Homes	10%	10%
Electric Heat System Type		
Forced Air Furnace	34%	34%
Heat Pump	20%	20%
Zonal (Baseboard)	44%	44%
Electric Other	2%	2%
Single Family Foundation Type		
Crawlspace	64%	64%
Full Basement	23%	23%
Slab on Grade	13%	13%

Housing Appliances	Saturation %	Regional %
Water Heating		
Electric	64%	64%
Natural Gas	36%	36%
Appliance Saturation		
Refrigerator	112%	112%
Freezer	57%	57%
Clothes Washer	87%	87%
Electric Dryer	82%	82%
Dishwasher	67%	67%
Electric Oven	82%	82%

Demolition	Annual Rate	Regional Rate
Single Family	-0.23%	-0.23%
Multi-Family	-0.23%	-0.23%
Manufactured Homes	-1.07%	-1.07%

Growth Rate	Annual Rate	Regional Rate
	1%	1%

Example: Commercial Inputs



Sub Segment	Current Square Footage
Large Office	-
Medium Office	-
Small Office	65000
Big Box Retail	-
Small Box Retail	85000
High End Retail	-
Anchor	-
K-12 Schools	51200
University	-
Warehouse	-
Supermarket	5600
Mini Mart	22400
Restaurant	18000
Lodging	-
Hospital	-
Other Health Facilities	-
Assembly Hall	17000
Other	-

Model gives options to input data as square footage, load or number of buildings

Industrial

INDUSTRIAL

Annual Base Load in 2007	MWh	Annual Growth Rate (Regional Average)
Mechanical Pulp	0	0.46%
Kraft Pulp	0	0.66%
Paper	5,000	-0.11%
Foundries	0	-1.07%
Frozen Food	0	-0.40%
Other Food	0	0.20%
Sugar	0	-0.05%
Lumber	40,000	-1.10%
Panel	0	-1.01%
Wood	0	0.16%
Electric Fabrication	0	0.60%
Silicon	0	-1.01%
Metal Fabrication	0	0.92%
Equipment	0	-2.02%
Cold Storage	25,000	2.19%
Fruit Storage	0	2.22%
Refinery	0	-1.38%
Chemical	0	0.28%
Miscellaneous Manufacturing	0	0.50%
		Reset Growth Rates
Total	70,000	

Agriculture

AGRICULTURAL

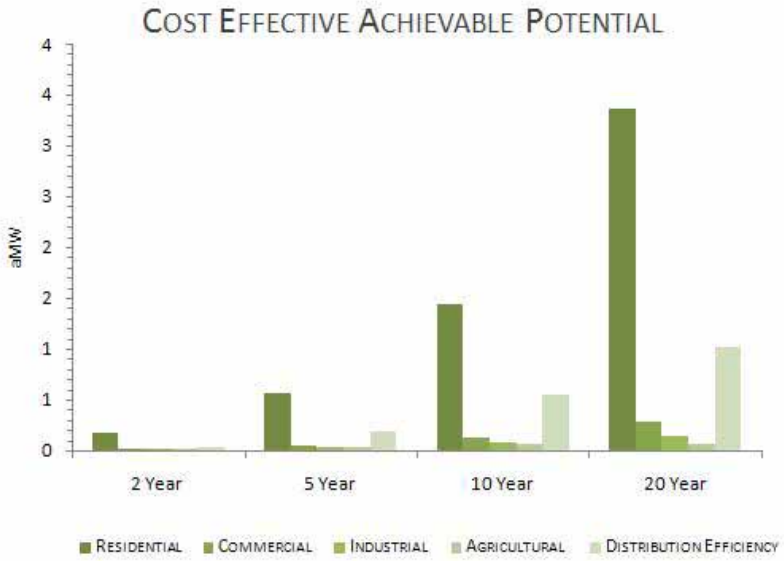
Please Select State	**Washington**		
Total Irrigated Acres	Alfalfa Grown in Territory		
45,000	NO		
Number of Dairy Farms	Total Head of Dairy Cattle		
0	0	**Average head per Farm**	**81**
Columbia Basin Ground Water Management			
NO			

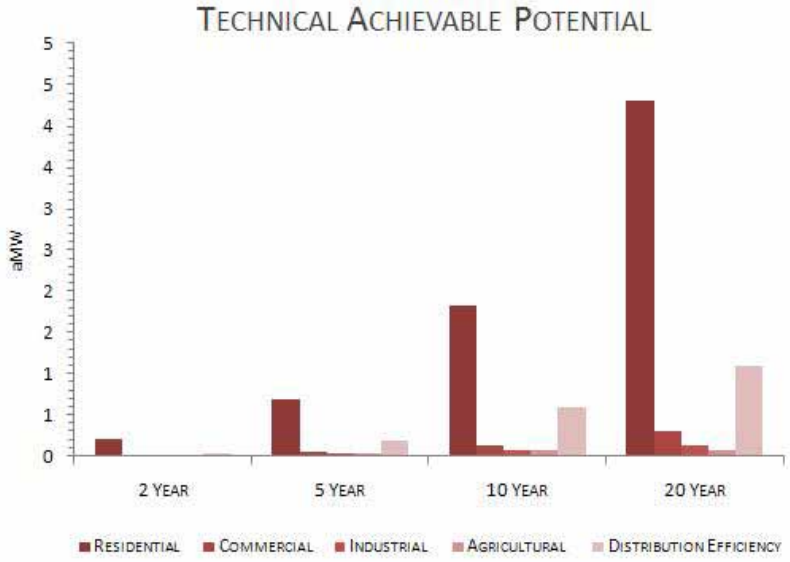
Savings

Example Outputs

	2 Year	5 Year	10 Year	20 Year
Residential	0.18	0.57	1.44	3.38
Commercial	0.02	0.05	0.12	0.28
Industrial	0.01	0.03	0.07	0.13
Agricultural	0.01	0.03	0.06	0.06
Distribution Efficiency	0.04	0.19	0.55	1.02
TOTAL	**0.25**	**0.86**	**2.24**	**4.86**

	2 Year	5 Year	10 Year	20 Year
Residential	0.22	0.69	1.83	4.32
Commercial	0.02	0.05	0.13	0.30
Industrial	0.01	0.03	0.07	0.13
Agricultural	0.01	0.03	0.07	0.07
Distribution Efficiency	0.04	0.20	0.59	1.11
TOTAL	**0.30**	**1.00**	**2.69**	**5.93**



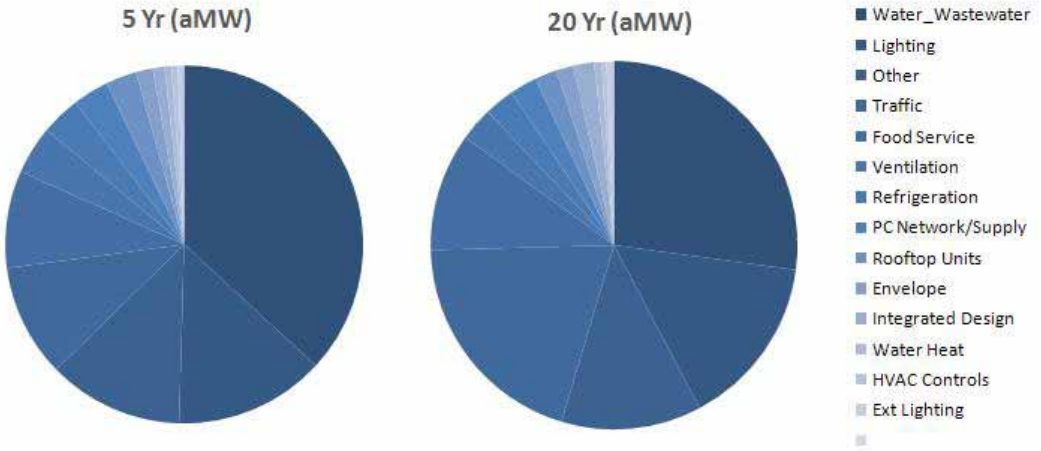


Sector Summary

Example Outputs

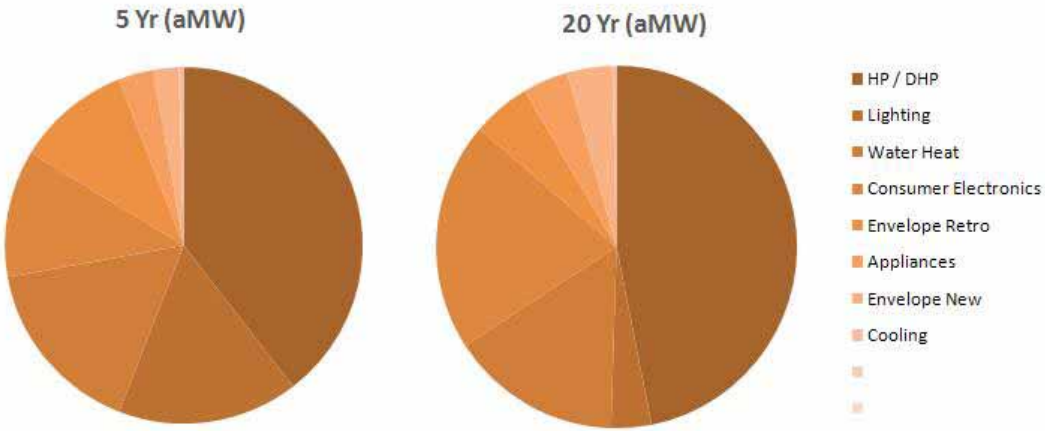
Commercial

	5 Yr (aMW)	20 Yr (aMW)
Water_Wastewater	0.019	0.076
Lighting	0.007	0.043
Other	0.006	0.035
Traffic	0.005	0.056
Food Service	0.005	0.029
Ventilation	0.002	0.008
Refrigeration	0.002	0.007
PC Network/Supply	0.002	0.007
Rooftop Units	0.001	0.005
Envelope	0.001	0.004
Integrated Design	0.001	0.005
Water Heat	0.000	0.002
HVAC Controls	0.000	0.001
Ext Lighting	0.000	0.002



Residential

	5 Yr (aMW)	20 Yr (aMW)
HP / DHP	0.224	1.583
Lighting	0.093	0.121
Water Heat	0.092	0.516
Consumer Electronics	0.065	0.693
Envelope Retro	0.059	0.176
Appliances	0.018	0.137
Envelope New	0.013	0.135
Cooling	0.002	0.013



Next Steps

- Handbook: In review process with Council staff. Likely to be ready in 1-2 months.
- UPC: Currently being tested, looking for two more utility volunteers. Ready for public distribution in 2-4 months.
- If you are interested in either of these, please send a message to your EER and we will make sure you get the documents when they are ready.
- For more information, contact:

Lauren Gage
Evaluation and Market Research Lead
lsmgage@bpa.gov
503-230-4961

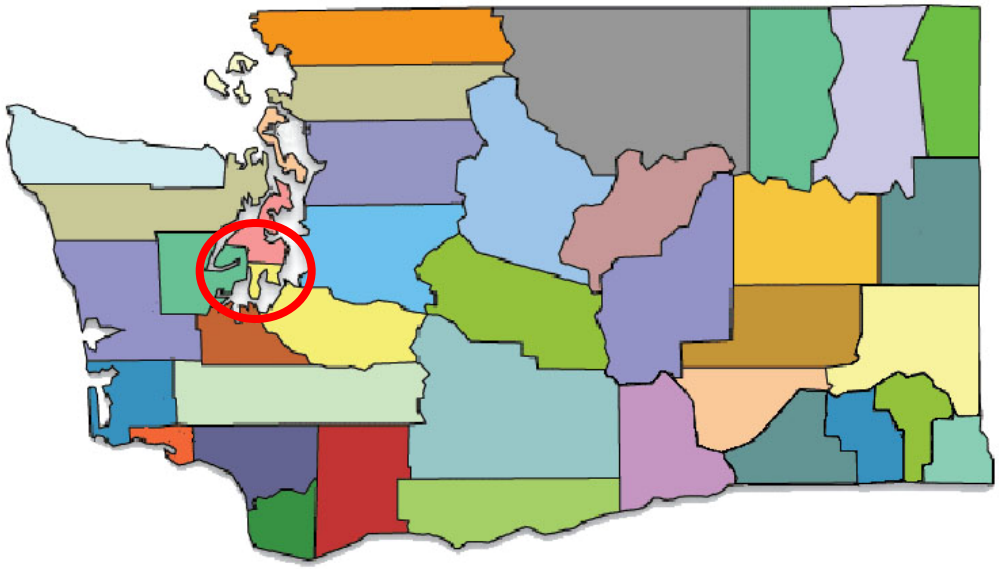
Peninsula Light Co.

a mutual corporation · since 1925

The power to be...

PenLight & The Conservation Potential Assessment

Peninsula Light Company



- Mutual Cooperative
- ≈ 30,000 Electric Meters Members
- Serves ≈ 65,000 Members

Conservation Potential Assessments

Why do a Conservation Potential Assessment

- Subject to I-937
- Tasked by State to Achieve all Cost Effective forms of Conservation
- PenLight Doesn't Look Like any Other Utility
- From 2000 – 2008 PenLight did Very Little Conservation
- Establish a Benchmark

Lots of Conservation Potential but Where?

Conservation Potential Assessments

Request for Proposals (RFP)

- You get What you ask for
- PenLight Reviewed Three Applicants
- RFP Decision Making Matrix
  - Cost
  - Regional Experience
  - How ‘Actionable’ is the Plan
- Large Price Difference Between Proposals

Gathering Quality Data

- Worked with Applicants Upfront to Develop Meaningful Survey Questions

- Primary Data Sources
  - Residential Survey
  - Customer Billing / Information System

- Secondary Data Sources (Commercial)
  - Public County Records
  - Phone Books

- Challenges to Gathering Commercial Data

Conservation Potential Assessments

Working with Consultant

- Direct Staffing Time and Labor
  - Segmenting Data
  - Defining ‘Customer Types’
- Ancillary Staff Time and Labor
  - Lots of IT / IS Help Gathering Data
- Accounting for Historical Conservation
  - Two Decades of Windows and Insulation (1980’s & 1990’s)

Conservation Potential Assessments

Final Product

- **What it Is**
  - Necessary Documentation to Support I-937 Efforts
  - Part of PenLight's Integrated Resource Plan
  - Great Reference Tool
  - Organic Document that Needs to be Updated

- **What it Isn't**
  - A-Z Action Plan for Realizing Conservation Potential
  - A Document Which Aligns Perfectly with the BPA Implementation Manual

Conservation Potential Assessments

Next CPA?

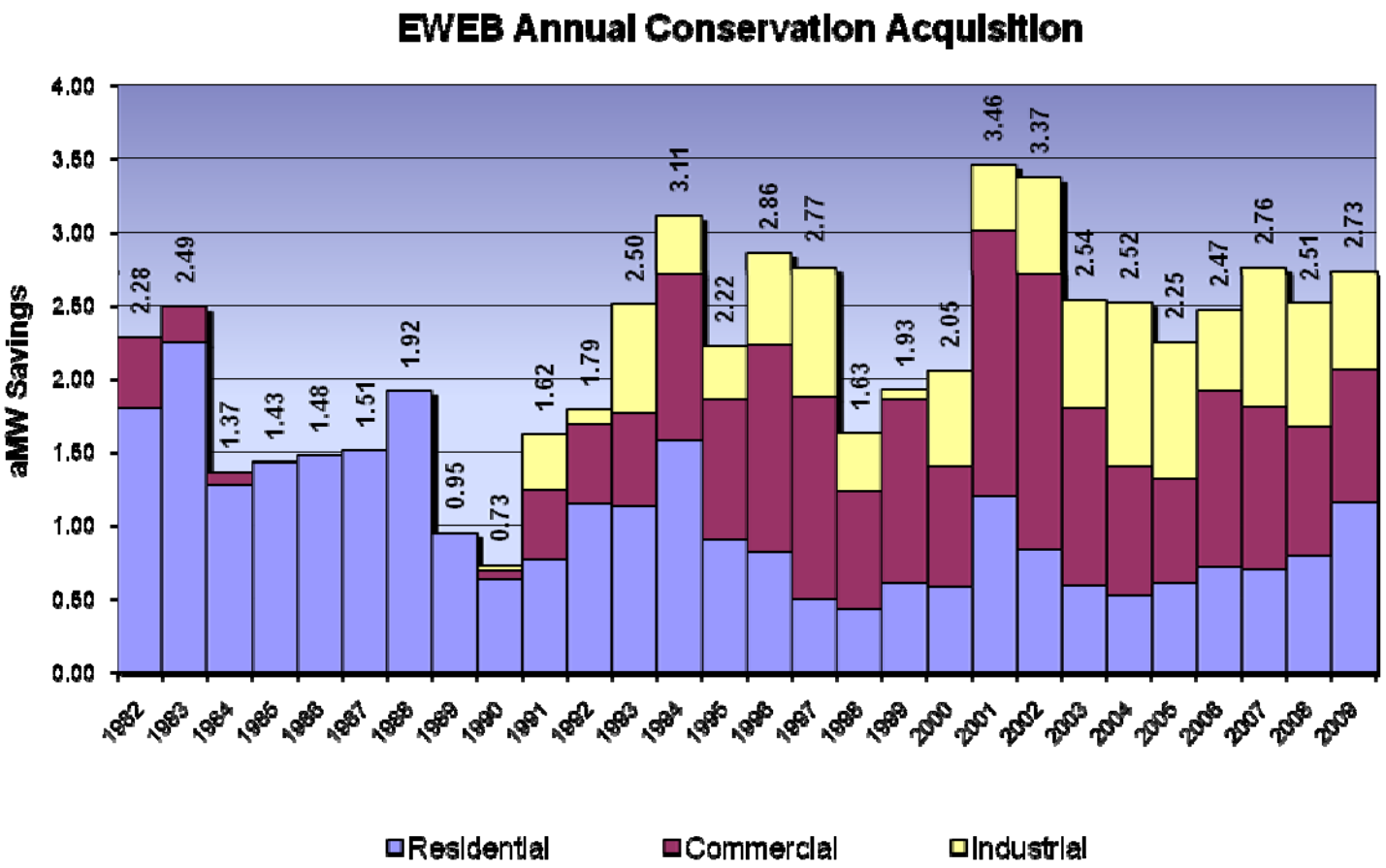
- Focus More on Commercial / Industrial
- Incorporate Recent Achievements
- Re-examining “Future” Technologies
- Retrofit Focus vs. New Construction

Your CPA is Only as Good as the Data you Provide

Why do a CPA?

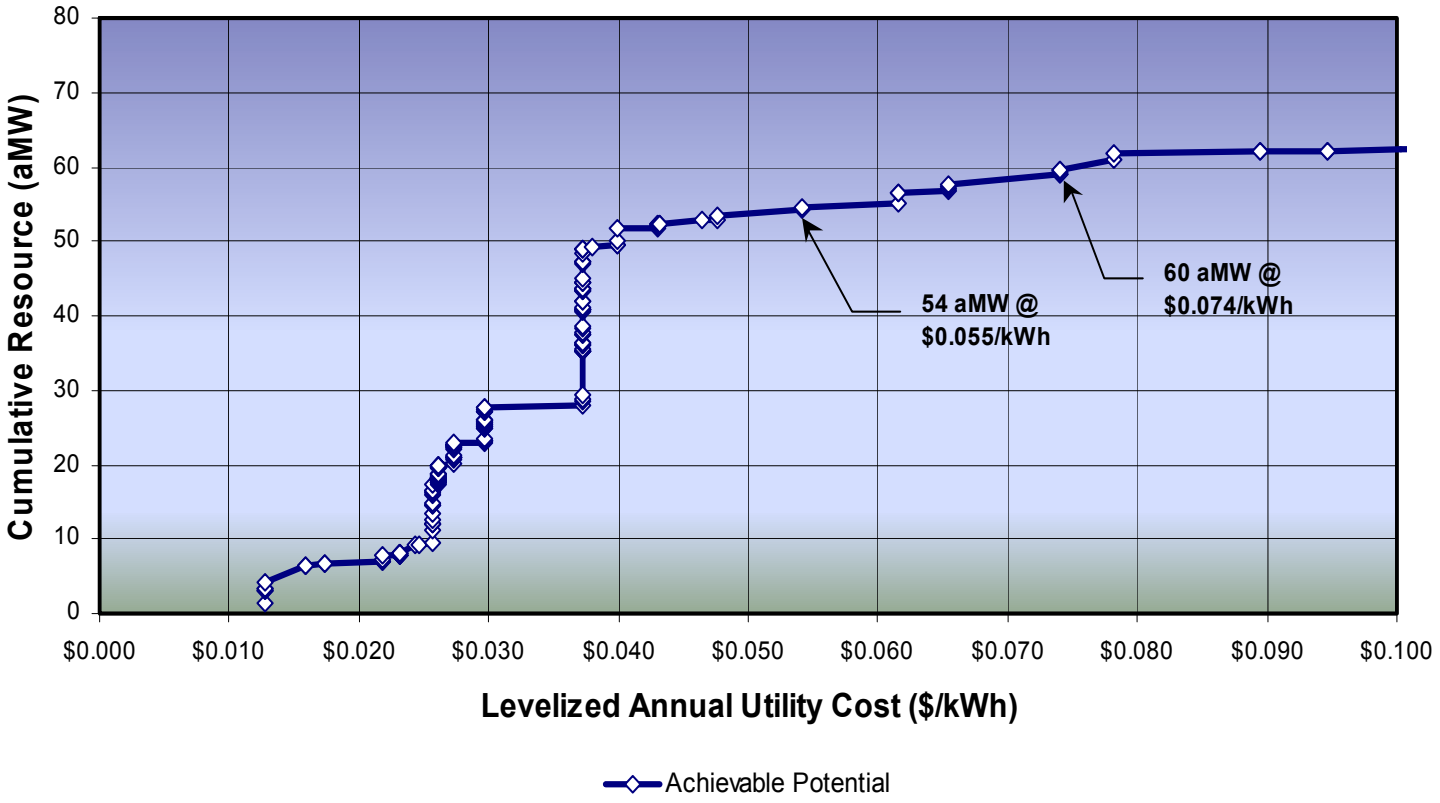
Bill Welch
Eugene Water & Electric Board

Most of EWEB's long history of conservation was done with no CPA

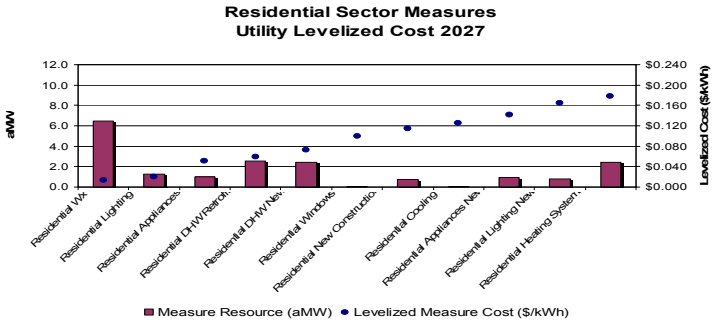


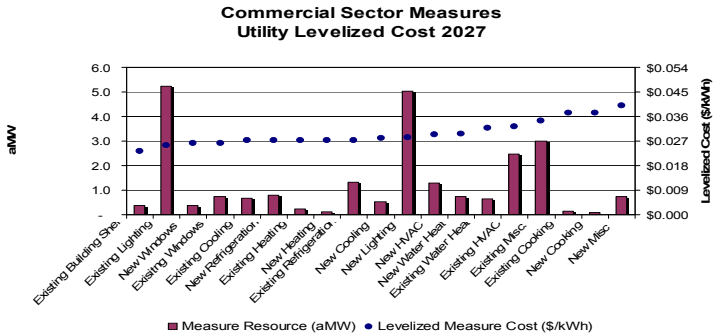
Why bother planning ahead?

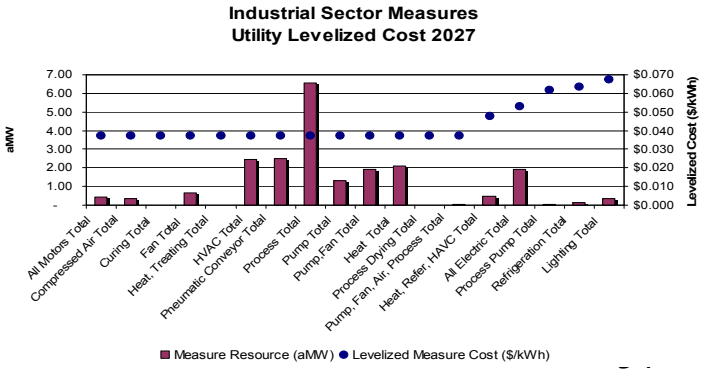
2008 CPA Resource Supply Curve



A more informed view

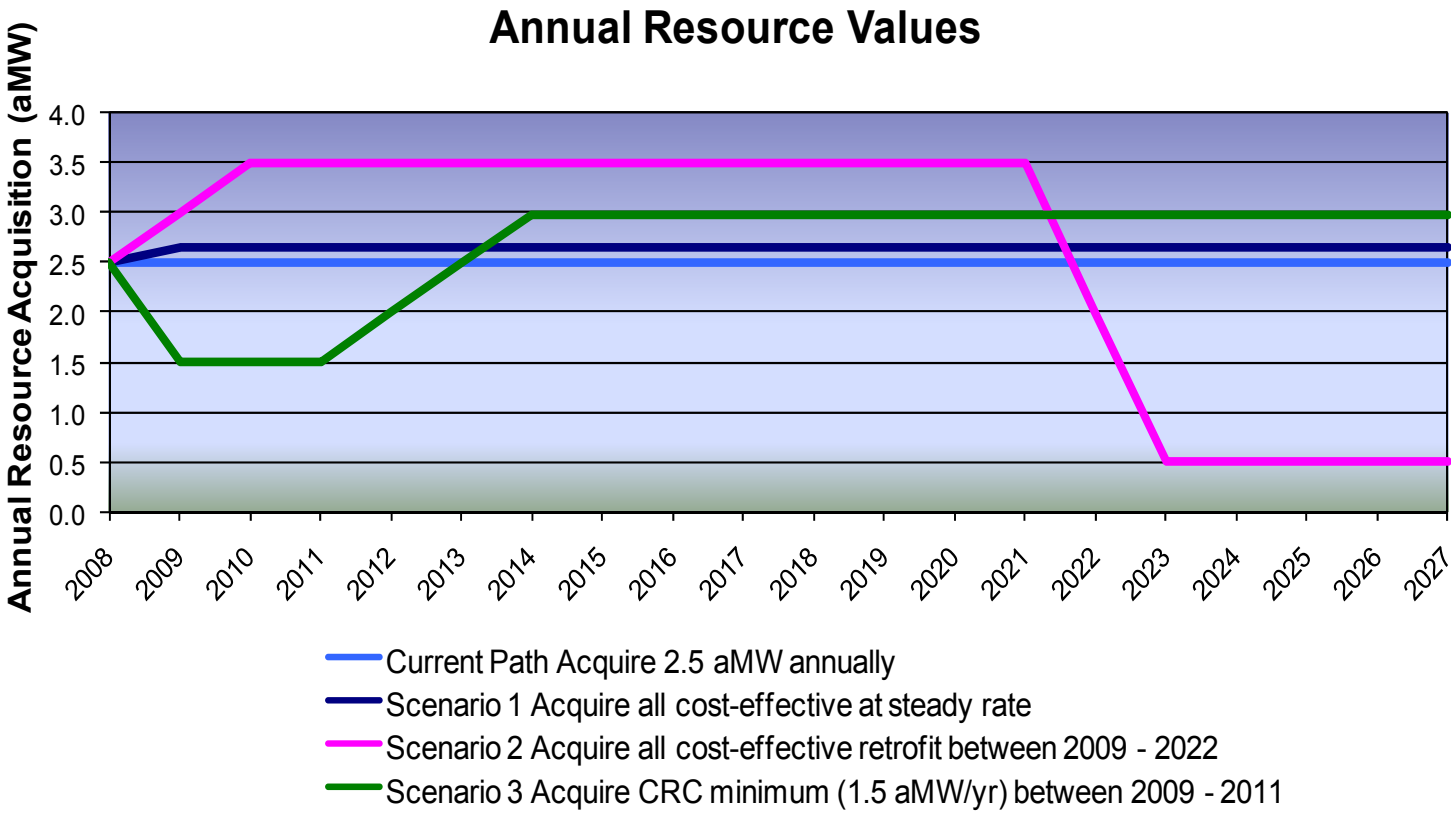






With information, the choices are much clearer

Potential 20 year acquisition paths



CPA allowed quantitative analysis of options

	Current Path	Scenario 1	Scenario 2	Scenario 3
Initial 5-year Installed DSM	12.5	13.3	16	9
Total 20-year NPV	$28 million	$30 million	$35 million	$18 million
Benefit Cost Ratio	1.78	1.79	1.74	1.64
Levelized Cost ($/MWh)	$43.59	$43.46	$44.77	$47.06
Power Market ($/MWh)	$75.60			

Annual budget and sector targets derived from CPA

Sector/Program	Budget	2010 Target aMW	kWh	First year $ / kWh	Levelized $ / MWh
Residential	**$3,033,249**	**0.70**	**6,147,000**	**0.493**	**$41.1**
Regular programs	$2,633,249		6,147,000	0.428	
Community Care	$400,000				
Commercial	**$2,255,238**	**0.86**	**7,564,000**	**0.298**	**$26.4**
Regular programs	$2,120,238		7,564,000	0.280	
Community Care	$135,000				
Industrial	**$1,044,718**	**0.81**	**7,126,000**	**0.147**	**$28.3**
Incentive programs	$989,366	0.44	3,876,000	0.255	
Rate Credit	$55,352	0.37	3,250,000	0.017	
Marketing	**$426,096**				
General pgm marketing	$348,065				
Education and outreach	$50,779				
Home shows	$27,252				
Market Transformation	**$50,000**				
NEEA general dues	$50,000				
Total	**$6,809,301**	**2.38**	**20,837,000**	**0.327**	**$34.6**

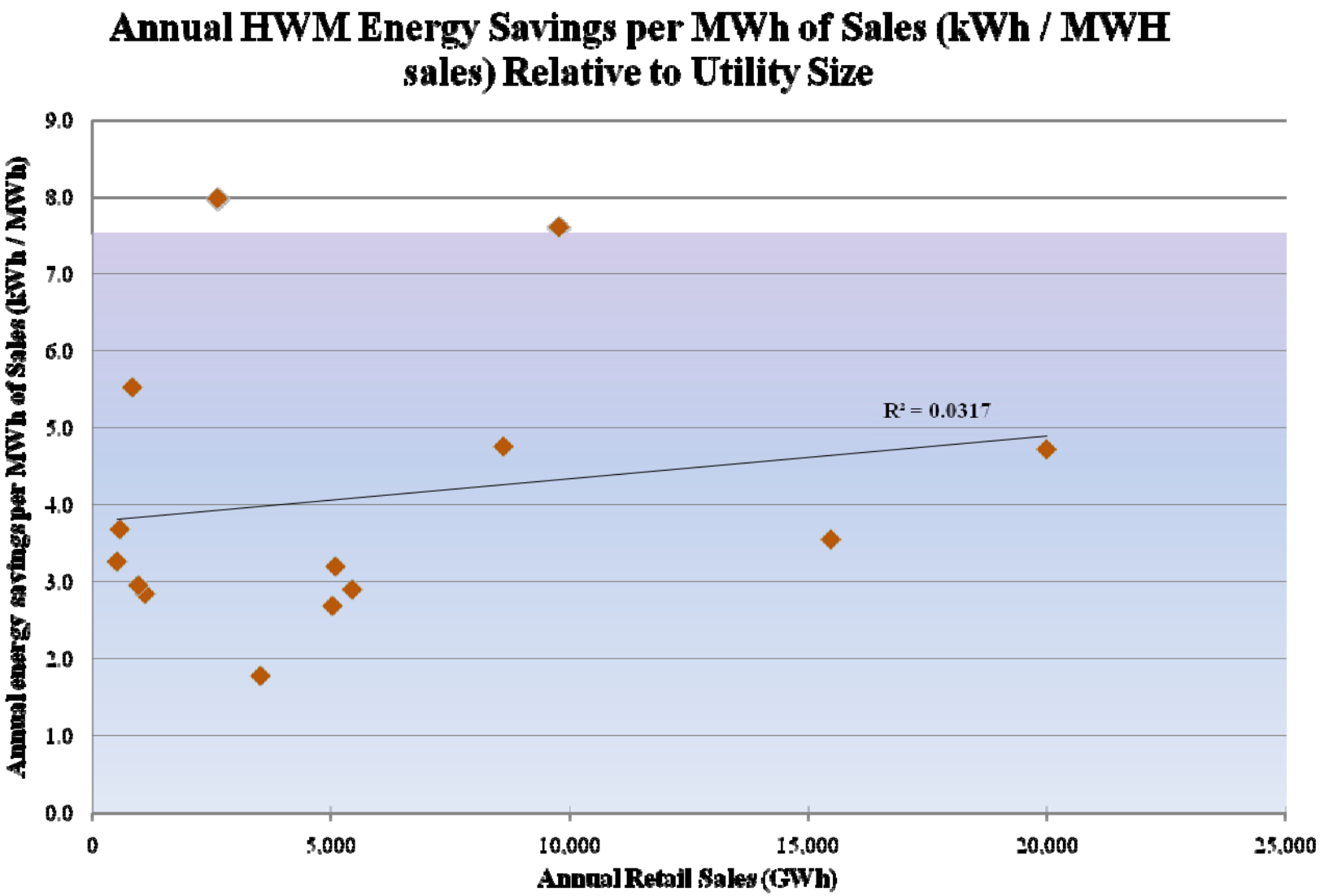
2010 CPA
Time for a course correction?

CPA projections are only as good as the data going into them

Or we can just ask this guy for the answers

EWEB

What's to be gained by all of us doing CPAs?


Annual HWM Energy Savings per MWh of Sales (kWh / MWH sales) Relative to Utility Size
Annual energy savings per MWh of Sales (kWh / MWh)
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
R² = 0.0317
0
5,000
10,000
15,000
20,000
25,000
Annual Retail Sales (GWh)

EWEB

Eugene Water & Electric Board