Energy Efficiency for Alaska Consumers and Utilities

A Workshop for the Alaska RCA

Presented by Richard Sedano

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The Regulatory Assistance Project

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Introducing RAP and Rich

- RAP is a non-profit organization providing technical and educational assistance to government officials on energy and environmental issues. RAP Principals all have extensive utility regulatory experience.
  - Richard Sedano directs RAP's US Program. He was commissioner of the Vermont Department of Public Service from 1991-2001 and is an engineer.

Today's Workshop

- Why Energy Efficiency
- How to Implement Energy Efficiency and Associated Policy Issues
- Paying for Energy Efficiency and Compensating the Utilities
- Open Discussion and Action Steps

Today’s Workshop Objectives

- Discuss and become familiar with typical commission practices addressing energy efficiency
- Flag matters that are controversial
- Position commission to make decisions and provide clarity for stakeholders

I. Why Energy Efficiency

- Cost-effective compared with other resources
- It can offset the consequences of growth
  - Generation-heavy state can sell more or moderate risk
- Inherent barriers exist for electric and gas consumers to do efficiency on their own
- Utility system can be a good delivery mechanism
  - Commission clarity and leadership are important
- Efficiency can be an economic development tool

Cost of Energy Efficiency

- Mature energy efficiency programs are being delivered at a cost to consumers of 3 cents per kWh
- Supply sources (plus transmission, losses, etc.) generally cost more
  - Issue to flag for later: capital investments get paid for over time – roughly 15-20% of capital cost is the annual rate effect
- Risks of cost increases from fossil fuel-driven supply, especially in wholesale market structure

Cost of Energy Efficiency

- Recent insight:
  - As energy efficiency scale has grown in states like Vermont and California, the reservoir of low cost savings seems endless – why?
  - More funds allow for comprehensive and custom programs that get more savings in buildings and processes, **“deeper,” “whole building”** savings
  - More funds allow for **market transforming** efforts like training and trade ally work that promote efficient products and practices in markets

Cost of Energy Efficiency

- Another recent insight
  - Lowest cost energy efficiency is not necessarily most valuable energy efficiency
  - **Identifying** highest avoided cost times and places and end uses and **targeting** programs at them can maximize value, though at potentially higher cost per saved kWh

Commissions and Energy Efficiency

- Some state statutes clearly direct or permit the commission to order jurisdictional utilities to deploy energy efficiency or at least to consider it
- Other state statutes are silent on energy efficiency, but do focus on more general directives about just and reasonable rates, which can interpreted as supporting EE
- Some states lump EE into promotional practice rules

Energy Efficiency Program Spending and Savings

- For highest spending states:
  - Spending ranges beyond **4%** of utility revenues
  - Savings are approaching **2% of sales and 2% of peak**
- Realistic to consider **offsetting** or **exceeding load growth** with energy efficiency alone or in combination with customer-sited generation and demand response

Connection to Codes and Standards

- If standard practice for energy consumption becomes more efficient, consumer funded efficiency programs can focus on more valuable objectives.
  - This is the way building energy codes and appliance and equipment efficiency standards work with consumer funded energy efficiency programs

Growth in Electric Use and Demand has Risks

- More power generation (cost control, siting)
- More exposure to fuel price increases
- More exposure to volatility for fuel price and availability
- More exposure to energy security concerns
- More transmission driven by load growth
- More air emissions (caps) and water use

Barriers to Energy Efficiency
Effecting Customers, Others

- Awareness
- Information, Knowledge, Confidence
  - Customers, stores, contractors, suppliers, etc.
- Opportunity to make a decision
- Upfront cash
- Long run cash, Financing
- Split Responsibility (the renter's dilemma, applies also to new construction)

Preview Note about Cost Effectiveness

- Energy efficiency investment at full price may not be attractive to customer (higher discount rate, demanding a quick payback)
- But is beneficial to the system (lower discount rate, clear avoidable costs)
  - Distinct Cost Effectiveness Tests
- Difference justifies intervention with services and incentives

Energy Efficiency Program

- A business plan to address barriers to investment in cost-effective energy efficiency (with ancillary benefits)
  - Best program does just what is required to motivate action by the key decision-maker
    - Who is the decision-maker?
    - What is the problem?
    - What is the answer?

Use of Financial Incentives for Customers

- All ratepayers paying participants to do something helpful to all ratepayers' system
  - An investment
  - Not a give-away or handout or a social program
- Justified by Benefit/Cost analysis
- Manage customer incentives carefully
  - For generally available programs, link amount to desired effect, expect to ramp down incentive as higher standard becomes ordinary

Fiscal Policy and EE

- Many states include tax incentives in the EE business case for customers
  - Alaska may be particularly suited for this with the degree of state funds in use
- As with utility financial incentive, tax incentives should be actively managed to respond to a changing market

Paying for Energy Efficiency Through Utility Rates

- Consumers pay because there are system benefits to all from energy efficiency
  - Utilities or 3rd party administrator oversee
  - Network of implementation contractors
- Supply chain of services and products
  - Trade allies
- Leadership reinforces success
- Regulators oversee progress and direction

Leadership and Clarity

- Leadership is very important with energy efficiency
  - It is a departure from traditional strategies to meet energy needs. Even some experts and experienced professionals are skeptical of EE value.
    - EE can seem like an “extra”
  - It relies on investments in assets not owned or controlled by the utilities
  - To overcome “legacy friction” and apply current imperatives and lessons of success from other states, clear, **unambiguous leadership is valuable**

Important choice: make new system that takes time to grow and apply lessons, or fast implementation that makes, learns from mistakes?

Rates vs. Bills: EE as a Strategic Resource

- Energy efficiency affects rates
  - Short term increase to pay for programs
  - Long run effect on rates depends on magnitude of avoided cost
    - Significant avoided costs may lead to lower rates even with lower sales: Idaho's Strategy
- In the short run, energy efficiency lowers bills to participants, raises bills to non-participants

Bills vs. Total Cost: EE as a Strategic Resource

- **Energy efficiency reduces total system costs**
  - By definition, based on Benefit/Cost screening
  - Allows more money in general economy to go to investment, saving, fun, etc.
- Non-participants may pay more or less on their bills in the long run, depending on magnitude of avoided costs, but less in long run bills than they would have paid

Ancillary Benefits of Energy Efficiency

- Environment
  - The cleanest kWh is the one not used
- Quality, Comfort
  - Efficient products and processes also tend to be of higher quality and better engineering; living spaces work better
- Economic Development
  - State can use availability of EE as a quality enhancement in attracting businesses
- More (water, retail fossil fuels, etc.)

How Much Is Possible?

- A recent study by the Northwest Power and Conservation Council finds that achievable, cost-effective energy efficiency could meet 85 percent of forecasted load ***growth*** in the four-state region over 20-year study period
  - Pacific NW has high proportion of electricity vs. gas, high per-capita electricity use, low cooling loads, long history of efficiency
  - Results at http://www.nwcouncil.org/energy/crac/meetings/2009/06/Default.htm

Potential Studies Reflect Choices

- Program screening assumptions can allow for a range of results
  - Consultants guided by client tendencies
  - Controversy and mistrust can result if utility is always low-balling
- Commissions can provide clarity by guiding appropriate assumptions
  - Can fold this into approved programs
  - Can reflect lessons learned over time

II. Implementing Energy Efficiency Programs

- Budgets, cost-effectiveness analyses, and resource potential studies
- Scope of programs, equity, and low-income issues
- Administration
- Regulatory oversight (program budgets, EM&V, annual reports, public involvement)
- Customer focus and marketing
- Integration into utility resource planning and investment

Energy Efficiency Budgets

- What is your point of view?
  - What can we afford?
  - What is cost-effective? Do we do all of that?
  - Do we set a firm budget or savings target and stick with it?
  - Do we allow increases above the firm figure for particular purposes?
- At the beginning, plan for a transition

Approaches to Setting DSM Spending Levels

- Based on Savings (increasingly preferred)
  - Cost-Effective DSM Potential Estimates
  - Levels Set Through Resource Planning Process
  - Tied to Projected Load Growth
  - Savings Set by Law
- Based on Spending (can be OK in the beginning)
  - Percentages of Utility Revenues
  - Mills/kWh of Utility Sales
  - Expenditures Set by Law
- Case-by-Case

Some Elements of Cost-Effectiveness

- Avoided costs
  - Capacity, T&D, other quantifiable
  - When savings occur
    - Can focus on peak
  - Where savings occur
- Discount rate
- Adjustments from Gross Savings to Net
  - Free riders, spillover, installation, persistence, rebound
- Program costs

Supplemental slides on Avoided Cost Calculation at the end

Cost-effectiveness Framework

Testing whether an alternative plan is lower cost is the basic building block of CE analysis

Step 1 Evaluate the costs of EE program

Step 2 Evaluate the change in costs of your preferred supply plan ("avoided costs")

- These are the 'benefits' of implementing your program

Step 3 Compute the difference (or ratio)

More formally, net present value difference of benefits and costs…

Net Benefits (difference)	Net Benefits_a (dollars)	$= \text{NPV} \sum \text{benefits}_a \text{ (dollars)} - \text{NPV} \sum \text{costs}_a \text{ (dollars)}$
Benefit-Cost Ratio	Benefit-Cost Ratio_a	$= \dfrac{\text{NPV} \sum \text{benefits}_a \text{ (dollars)}}{\text{NPV} \sum \text{costs}_a \text{ (dollars)}}$

Definition of Cost Tests

Cost Test	Acronym	Key Question Answered	Summary Approach
Participant Cost Test	PCT	**Will the participants benefit over the measure life?**	**Comparison of costs and benefits of the customer installing the measure**
Utility/Program Administrator Cost Test	UCT/PAC	**Will utility bills increase?**	**Comparison of program administrator costs to supply side resource costs**
Ratepayer Impact Measure	RIM	**Will utility rates increase?**	**Comparison of administrator costs and utility bill reductions to supply side resource costs**
Total Resource Cost	TRC	**Will the total costs of energy in the utility service territory decrease?**	**Comparison of program administrator and customer costs to utility resource savings**
Societal Cost Test	SCT	**Is the utility, state, or nation better off as a whole?**	**Comparison of society's costs of energy efficiency to resource savings and non-cash costs and benefits**

Summary of Costs and Benefits

- High level summary of costs and benefits included in each cost test
- Each state adjusts these definitions depending on circumstances
- Details can significantly affect the type of energy efficiency implemented

Component	PCT	PAC	RIM	TRC	SCT
Energy and capacity related avoided costs.	-	Benefit	Benefit	Benefit	Benefit
Additional resource savings	-	-	-	Benefit	Benefit
Non-monetized benefits	-	-	-		Benefit
Incremental equipment and install costs	Cost	-	-	Cost	Cost
Program overhead costs	-	Cost	Cost	Cost	Cost
Incentive payments	Benefit	Cost	Cost	-	-
Bill Savings	Benefit		Cost	-	-

TRC Test Implications

- TRC Test measures <u>overall</u> cost-effectiveness
  - Pop Quiz
    - Does the size of the incentives change the TRC?
    - Do the customer bill savings change the TRC?
- Distribution Tests (RIM, PCT, UCT)
  - If the TRC is positive, what can we say about the distribution of costs and benefits?
  - Need 'distributional tests' for insight
    - PCT (cost-effectiveness for participants)
    - UCT / PAC (cost-effectiveness from a utility perspective)
    - RIM (economics for non-participants) *

Some Observations on the RIM Test

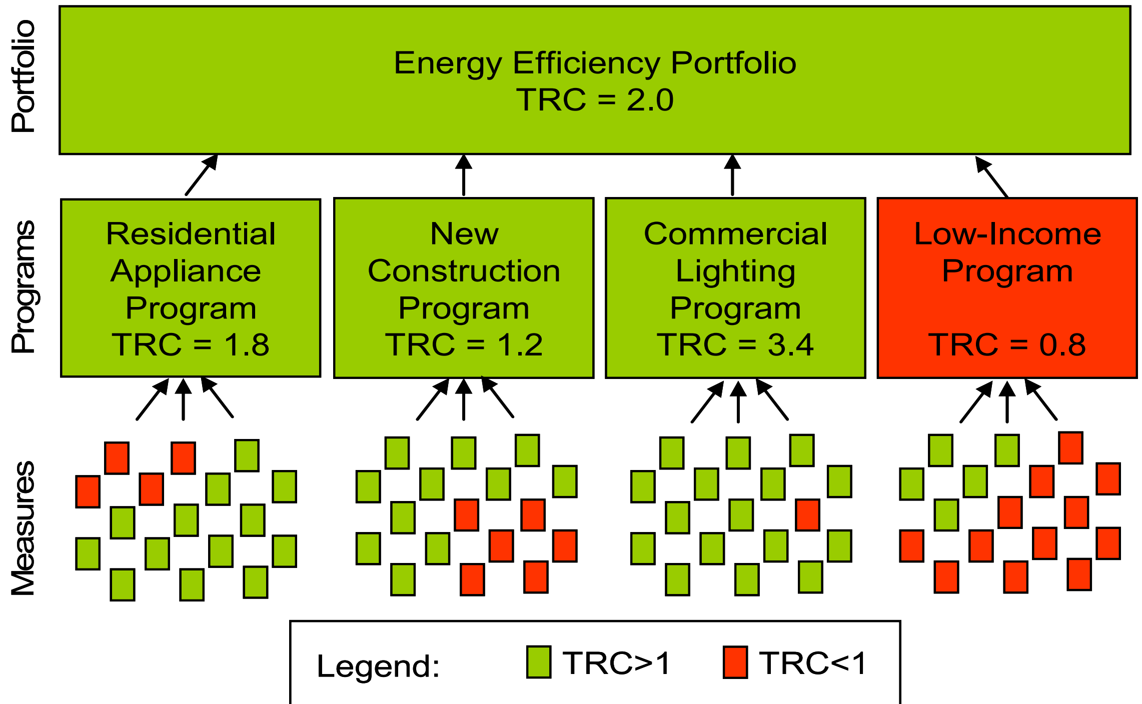
- The RIM test is not used to evaluate supply-side investments
  - The Utility Cost test is used, implicitly, for all other utility investments
  - Capacity saving and load management activities satisfy RIM
- RIM gives useful information about projected rate effects
- Use of RIM assumes that price alone is sufficient to inform consumers about efficient choices
  - Ignores well-documented and significant barriers to adoption of energy efficiency
- Use of RIM assumes that greatest economic efficiency is served by no increase in price
  - Economic efficiency is maximized when total cost to serve a given level of demand is minimized
  - Under conditions of natural monopoly, significant barriers to efficient investment, and substantial unpriced external costs, minimizing price does not equate to minimizing total cost.

Program Screening

- Generally reduces to a spreadsheet
- Program thresholds (B/C>1)
  - Public interest programs could have B/C<1
- Many states have an overall target benefit/cost ratio for program portfolio
  - Allows very beneficial programs to create "room" for socially important but economically borderline programs to be included

Point of Cost-Effectiveness Measurement

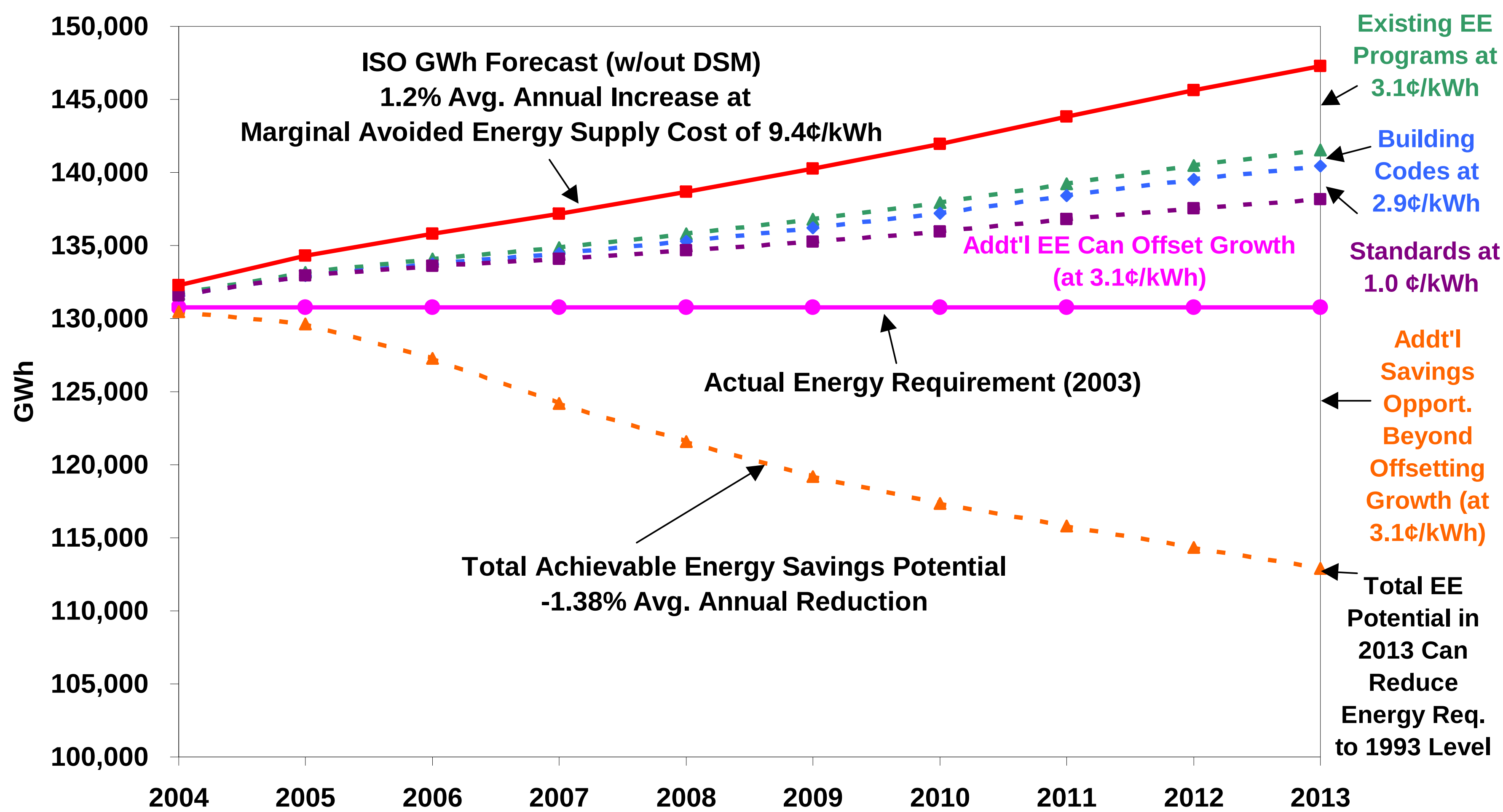
- Application at portfolio level allows for inclusion of individual programs or measures that do not past cost test
  - Low Income, emerging technologies, market transformation



Resource Potential Studies

- Assesses market potential for energy efficiency efforts
  - Valuable for strategic planning
    - But you might do obvious, tested programs you can start quickly to gain experience first (Arkansas)
  - Particularly useful if market is segregated to assess growth areas that might eventually require wires upgrades
  - Generally show achievable potential far in excess of current program scope
  - Cost that many states find worth the investment

Existing and New EE Strategies Can Offset ISO Forecasted Energy Requirements (GWH) and Beyond



New England EE potential www.neep.org

Ways to Measure Potential

- Technical Potential: Complete penetration of all measures deemed technically feasible
- Economic Potential: Technical potential constrained by cost-effectiveness compared with supply-side alternative
- Maximum Technically Achievable: Technical potential over time with most aggressive programs
- Maximum Economically Achievable: Economic potential over time with most aggressive programs
- Budget Constrained: Savings with specific funding

Recent Energy Efficiency Potential Studies

Study* (Date)	Technical Potential (aMW)	Achievable Potential (aMW)	Achievable as % of Baseline Sales**	Levelized Cost ($/kWh)
PacifiCorp: Wyoming (2007)	158	82	5%	$0.03
NWPCC: 4 PNW states (2009)	--	5,800	21%	$0.03
Northeast EE Partnerships: NE ISO area (2004)	--	3,924	23%	$0.03

*20-year study period for PacifiCorp and NWPCC; 10 years for NEEP

**Percent of baseline sales forecasted for last year of the study period

- McKinsey (2009): 23% reduction in non-transportation energy consumption in US by 2020

Black and Veatch Study For Alaska

- Surveyed existing activity
- Surveyed typical customer categories
- Simplified process appropriate for the task
  - "Intuitive screening"
- Gamut of "measures"
  - Missing is innovative program design
- Observations about administration

A Few Thoughts on Energy Efficiency Budgets

- Equity by customer class and region is a good long term strategy but all ratepayers benefit from cost-effective energy efficiency
- Pay attention but don't worry too much about Administration and General
  - Important factor is outcomes
  - Accounting methods from state to state are different, so comparing A&G is confounding
- Low unit costs come from maximizing savings per customer contact (lesson learned!)
  - Treat whole buildings, avoid piecemeal delivery

Program Scope

- 1. (Lost) Opportunity Programs
  - Address decision-makers at the time they make purchase decisions concerning energy
    - New construction
    - Point of purchase
    - Trade ally training (the WalMart story)
- 2. Low Income Programs
  - Essential, lower benefit/cost threshold

Program Scope

- 3. Retrofit Programs
  - More costly to get decision-maker's attention
    - Appliance bounty programs good for quick hits
  - Reservoir of cost-effective savings is huge in below model energy code buildings
- 4. Emerging Markets and Technologies
  - Devoting a slice of budget to trying new stuff can be risky, but can also bring a reputation of high expectations and quality

Program Scope

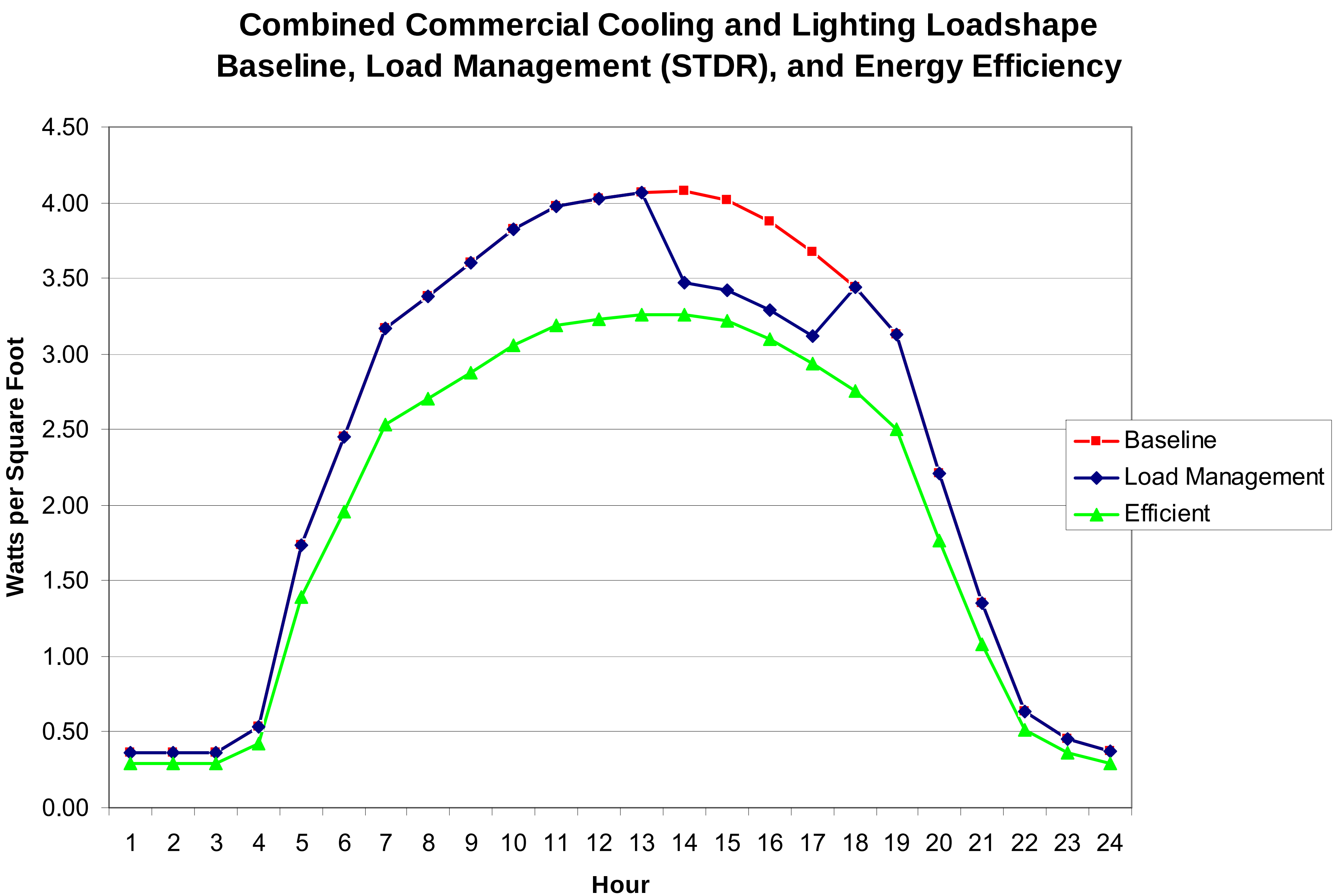
- 5. Market Transformation
  - Investment in changing the way people make energy decisions (information, training), making efficient products widely available to consumers
    - There is some market transformation in every energy efficiency program
    - May focus "upstream" or "mid-stream"
    - Some program "designs" can have little or no ability to measure savings
    - Requires regulators to take long view

Program Are Strategies, Constantly Evolving as Target Markets Evolve

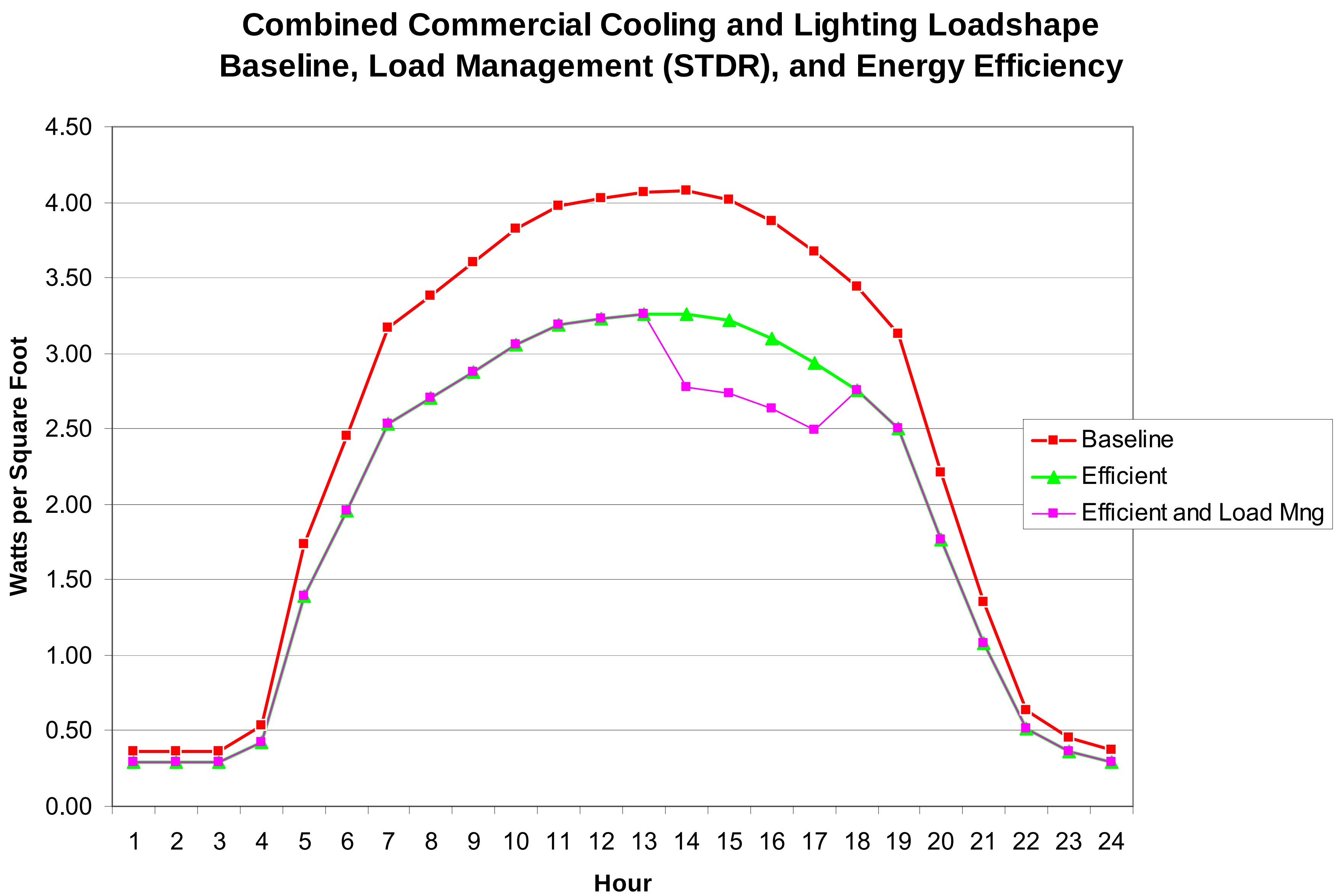
- Beware of locking into program details
  - Free riders inevitable, but too many signal a need for changes
- Flexibility important
- But target markets in R, C and I and in existing and new buildings and systems will provide continuous opportunities

Energy Efficiency and Demand Response

- Most energy efficiency programs don't include demand response, and vice versa
  - Some third parties are trailblazing
  - Some urban utilities are working this
- Advantages: coherence for the customer, and in utility planning
- Challenge: utility delivery systems are often separate and hard to merge



Optimal Energy


Combined Commercial Cooling and Lighting Loadshape
Baseline, Load Management (STDR), and Energy Efficiency
Watts per Square Foot
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
Hour
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Baseline
Efficient
Efficient and Load Mng

Demand Response and Wind

- Demand response works in two directions
  - Decrease demand when market prices are high or for reliability
  - Increase demand when output from wind generators is high and loads are low
- Loads can help integrate wind generation
  - Including increasing loads when needed – e.g., home water heating (increase temperature setting), PHEVs, stored ice, crushed rock, pulped wood, filling reservoirs

Low Income Programs

- Sometimes called “hard to reach customers”
- Programs may qualify with lower B/C ratios
- Financing, to the extent that the cash flow requirement from the customer is reasonable
  - Split savings, positive cash flow outcome
- Integrate with weatherization
  - Pay weatherization out of program $$ to deliver
- Building Energy Codes and Home Energy Ratings raise quality

Industrial Customer Consideration

- "Opt out" or "self-direct" – Some states allow qualifying customers (large manufacturers) to avoid some or all of the cost of energy efficiency programs or use the charge for their own facilities
  - Qualifying means comparable self-directed efficiency efforts
  - Some payment toward system energy efficiency is justified for system benefits

Industrial Customer Perspective

- Industrial customers need to be competitive
- Energy efficiency helps industrial customers be more competitive by lowering production costs and also by inspiring process improvements that can raise quality
- Energy efficiency projects compete with other projects for limited capital
- Winning projects often have payback periods of 24, 18 or even 12 months
- These are projects a motivated industrial customer will do and define as “all cost-effective”

Industrial Customers

- <2% of facilities have on-site energy manager*
  - Need help from programs and outside experts
- Industrial customers prioritize efforts in their plants where they get assistance
- 40% of end-use efficiency potential in US is in industrial sector, according to McKinsey study
- PacifiCorp forecasts industrial sales to grow 4.1% from 2009 to 2018, far higher than other sectors

*2002 data. From McKinsey & Company, 2009, *Unlocking Energy Efficiency in the U.S. Economy*, at www.mckinsey.com/USenergyefficiency

Ratepayer Perspective

- Ratepayers have a different perspective
- Ratepayers want to avoid more expensive new resources
- Total Resource Cost reveals programs that are cost-effective for ratepayers and for society
- Programs and measures with participant paybacks of 5 or even 7 years without incentives (incentives create acceptable payback) will screen via TRC
- Industrial customers will not do these on their own, but they will if given an offer as part of an energy efficiency program that makes it look good enough

Public Interest Perspective

- In that event, the participant wins
  - Gets a capital infusion for plant or process improvement that now meets internal budget screen
  - Lowers operating costs and improves quality
- And the ratepayer wins
  - Gets more cost-effective energy efficiency deployed to avoid more expensive choices
- Promoting industrial customer participation in energy efficiency programs is in the public interest

Customer Focus of Energy Efficiency

- Consumers want service, not programs
  - Avoid "silo effect" when managing programs
- Education and Market Transformation
  - Integrate with programs as much as possible
- Bang for the buck
  - Point of decision/purchase
  - "Train the trainer" (contractors, vendors, retail)

Administration of Energy Efficiency

- Utility – builds on customer relationship, opportunity to integrate into other resources
- State – addresses throughput conflict
- Third Party –government in its "overseer" role, can add competitive element, provides consistency, scale for smaller utilities

- All can work well or fail, and the choice is a preference for what works best, or political

Hybrid Administration in Michigan

- All utilities responsible for energy efficiency performance
- Utilities can "opt in" to a third party administration service
  - Happy to avoid direct administrative responsibility (roughly a dozen utilities)
  - "Efficiency United"

Role of Regulator Overseeing Energy Efficiency Programs

- EE budget is the consumer's money
- Evaluation, Measurement and Verification are vital parts of the EE effort
  - Some states require EM&V independence from the administrator
  - Rough cost: 5% of total, could be more at the beginning, for smaller programs, or could be less in years with a greater EM&V effort
  - Good models in US to draw from

EM&V Gets Everyone on the Same Page

- Types of evaluations and definitions
  - Impact evaluation
  - Process evaluation
  - Market evaluation
- Objectives of Evaluation and M&V
  - Improvement
  - Accountability
  - Reliability

Important Impact Evaluation Concerns

- Accuracy vs. Precision
- Bias

Approaches for Impact Evaluation

- Deemed measures
- Deemed calculated measures
- Custom and mass market measures
  - Statistical studies
  - Site visits
  - Direct measurement

Evaluator
Roles and Schedule

- Should there be an independent Program Evaluator?
- Roles and responsibilities of Utility EM&V Contractor
- An EM&V schedule
- An EM&V template

Technical Reference Manual

- A common basis for evaluating savings
  - By program
  - Differentiated by climate zone as needed
  - Defining baselines
- Slick on-line versions in Pacific Northwest and California
  - http://www.nwcouncil.org/energy/rtf/reports.htm#ptcs
  - http://www.deeresources.com/
    http://www.energy.ca.gov/deer/

Discussion of Net to Gross Ratio

- The direct effects of programs is the value for ratepayer dollars >>> NET
- The economy needs savings from wherever they can come from, and the utility administrator should be motivated to enable them, regardless of who gets credit, plus, there are so many motivators to get decision-makers to act >>> GROSS

Results and Attribution: Policy Tension

- Program Savings
  - Attribution becomes a very important exercise
  - Fixed costs will not match revenue
  - Matches traditional expectation of regulation

- All Changes to Sales
  - "We all did it" – reductions influenced by utility will produce an adjustment even if second or third order
  - Fixed costs will closely match revenue
  - A leap from traditional regulatory practice
  - Innovation, decoupling

Integration of EE into Resource Planning and Investment

- Is EE an afterthought?
  - Are utility generation expansion plans created with a static load forecast?
  - Are transmission expansion plans created with a static load forecast?
  - Is energy efficiency deployed without consideration of avoiding generation or wires?
- EE can add value, insight in each of these

Integration of EE into Resource Planning and Investment

- Energy efficiency can be the least cost alternative for meeting consumer electricity needs if planners ask the right questions
  - How much energy efficiency (reduced load growth) would alleviate the need for this new transmission line?
  - How much energy efficiency would it take to achieve sustained zero load growth?

Treatment of Energy Efficiency in Resource Plans

- All known supply-side and demand-side options evaluated on a consistent and comparable basis
  - EE reduces fuel price, market price and carbon risk
  - EE can be sizable and delay costly, riskier power plant
    - NWPCC market price adder for EE - Difference between max. EE cost on supply curve and cost of avoided resource
  - EE supply curves allow cost/risk tradeoff in modeling
- EE potential study should be done periodically
- Action plan should include all EE that is part of the best cost/risk portfolio

“Is Energy Efficiency ‘Real’?”

- Utilities, especially system operators, ask an important question
  - They want to know that when the system needs the promised effects of energy efficiency that EE will deliver, and they start out skeptics
  - EM&V is key (when are “deemed savings” OK?)
  - Some savings are more “hard wired” than others
  - All programs deliver some resource benefit
  - Better question: “How to get an accurate measure of system benefit from energy efficiency?”

Performance Goals for Energy Efficiency Program or Portfolio

- Many examples
- Some come from performance measures
  - Amount of saved kWh, penetration of certain appliances, number of buildings
- Some are policy or resource driven
  - Savings equal to x% of sales or peak demand

Funding Energy Efficiency

- Efficiency is a resource, like any other resource necessary to the least-cost provision of service
- How much EE should be purchased?
  - Ideal: all societally cost-effective measures
    - Legal requirement in some states: e.g., CA, VT
  - Practical: Budgets constrained by a variety of considerations

EE Cost Recovery

- Utility EE costs should be treated as any other prudent cost of service item
  - Rate based: Amortized over a specified period (life of measure or less); unamortized portion earns a return
    - Logic: Reduces initial rate impacts and links cost recovery to the useful life of the investment, similar to supply-side investments; allows earning opportunity
    - Many states took and abandoned this approach
  - Expensed: Current year cost recovery; no return on investment but also no risk of stranded regulatory asset
    - With a fuel-adjustment clause and annual adjustments to base rates, net lost revenue impacts are minimized
    - Preference of most utilities now to avoid regulatory asset

Performance Incentives

- Decoupling and, to a lesser extent, net lost revenue recovery remove the profit disincentive to EE investment
- To encourage superior performance, some states offer utilities financial incentives
- Penalties for non-performance?

Performance Incentives Can Apply in All Forms of Reg.

- Shared savings
  - Return to utility of some fraction (say, 10-20%) of the savings (avoided costs) from the EE
    - Goes directly to utility's bottom line
  - Collars and deadbands
- Performance targets
  - Specified rewards (e.g., % of EE budget) for achieving a mix of targets
    - Energy savings, capacity reductions, customer installations, reductions in program administration costs, etc.
- ROE adder
  - A premium on the ROE applied to unamortized portion of EE costs included in ratebase

Periodic Reconciliation Supports Performance System

- At the time rates are changed to reconcile revenues, that change can also reflect financial performance incentives (+ or -)
  - An old idea, this is why decoupling is sometimes called performance based regulation (PBR)

1989 NARUC Resolution

- “Reform regulation so that successful implementation of a utility’s least-cost plan is its most profitable course of action”

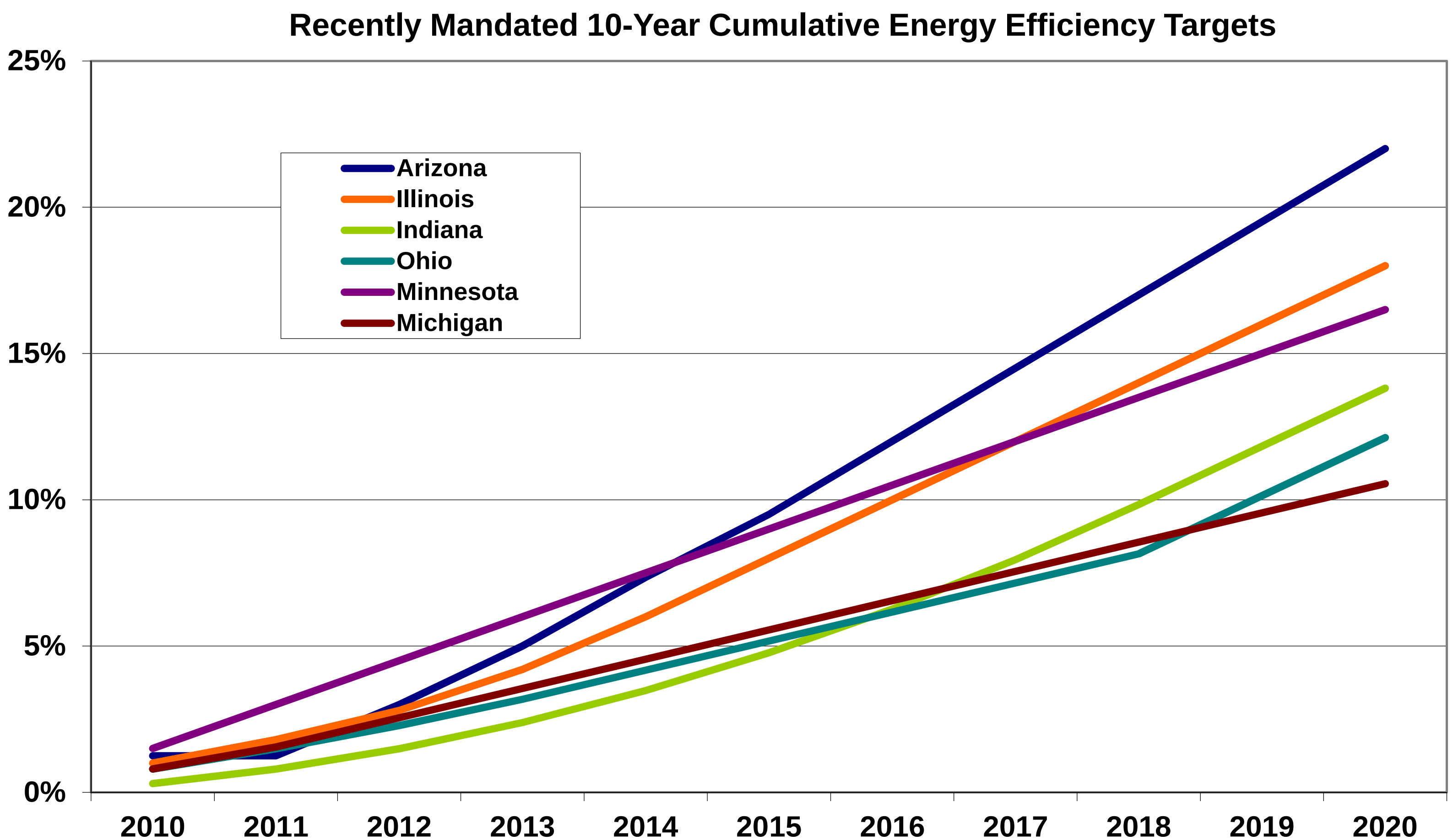
Oregon PUC Order 09-020 pg 27

"… PGE does have the ability to influence individual customers through direct contacts and referrals to the ETO. PGE is also able to affect usage in other ways, including how aggressively it pursues distributed generation and on-site solar installations; whether it supports improvements to building codes; or whether it provides timely, useful information to customers on energy efficiency programs. We expect energy efficiency and on-site power generation will have an increasing role in meeting energy needs, underscoring the need for appropriate incentives for PGE."

Performance Incentives and EM&V

- EM&V for compliance is one task
- EM&V for compliance plus calculating financial performance incentives raises the profile
  - Utility will be more anxious

Savings Trajectories for Several States



IV. Next Steps

- Further internal training
- Stakeholder workshops
- Get some experience!
- Dockets designed to make and consolidate progress in energy efficiency

Resources

- RAP EE Policy Database Grid
  - http://www.raponline.org/Feature.asp?select=116
- Energy Efficiency Toolbox
  - http://www.raponline.org/Pubs/General/EfficiencyPolicyToolkit106.pdf
- www.aceee.org
- National Action Plan for Energy Efficiency
  - http://www.epa.gov/cleanenergy/energy-programs/napee/resources/guides.html
- RAP – Summit Blue Report to Canadian Regulators
  - http://www.raponline.org/Pubs/CAMPUT_Executive_Summary_1_30_06.pdf

National Action Plan Resources
(a partial list)

- Model Energy Efficiency Program Impact Evaluation Guide
- Understanding Cost-Effectiveness of Energy Efficiency Programs
- Guide for Conducting Energy Efficiency Potential Studies
- Guide to Resource Planning with Energy Efficiency
- Aligning Utility Incentives with Investment in Energy Efficiency
- National Action Plan for Energy Efficiency Report

RAP Energy solutions for a changing world

About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power and natural gas sectors. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at www.raponline.org

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Supplemental Slides

- Avoided Cost

Developing Avoided Costs

Electric Avoided Cost Components

- Range of avoided cost components that are considered in developing the benefits for EE
- Each state selects their own elements and methods for quantification

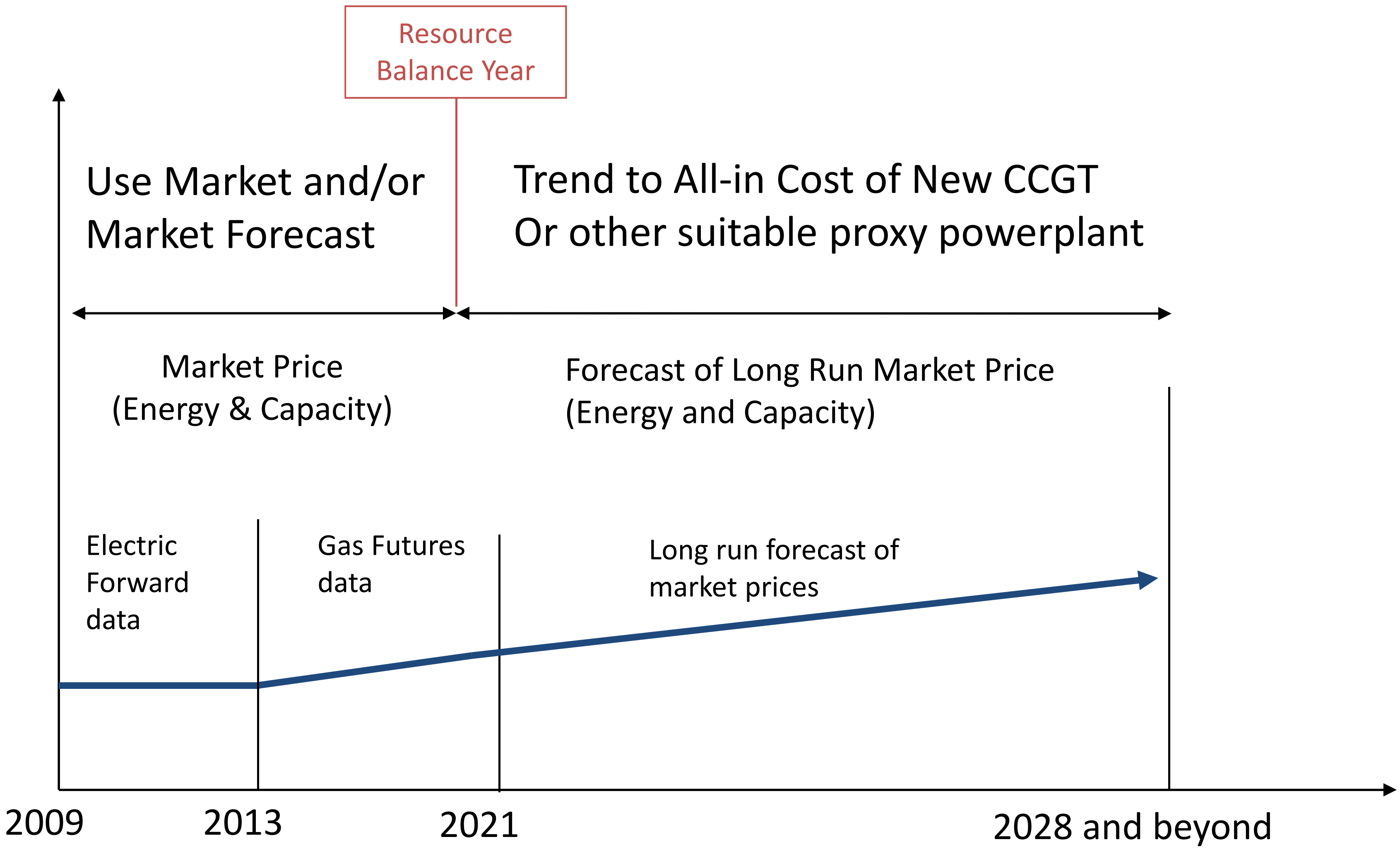
Electricity Energy Efficiency	
Energy Savings	Capacity Savings
Market purchases *or* fuel and O&M costs	**Capacity purchases *or* generator construction**
System Losses	**System losses (Peak load)**
Ancillary services related to energy	**Transmission facilities**
Energy market price reductions	**Distribution facilities**
Co-benefits of water, natural gas, fuel oil savings (if applicable)	**Ancillary services related to capacity**
Air emissions	**Capacity market price reductions**
Hedging costs	**Land use**

Methodology of Avoided Costs

- Methodology depends on market structure
- Lots of variation across states

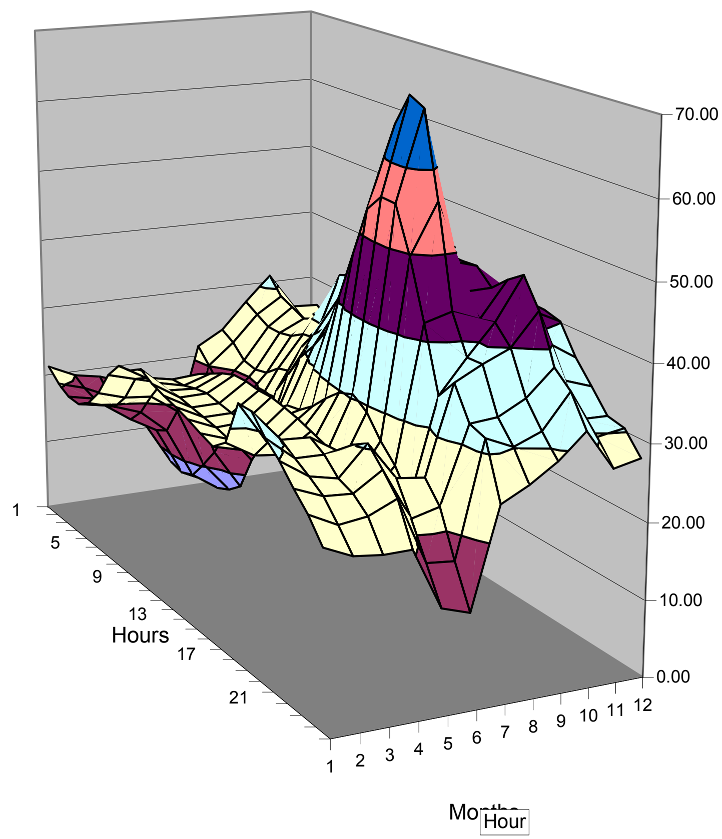
Approaches to Value Energy and Capacity		
	Near Term (Market data is available)	Long Term (No market data available)
Distribution electric or natural gas utility	**Current forward market prices of energy and capacity**	**Long-term forecast of market prices of energy and capacity**
Electric vertically-integrated utility	**Current forward market prices of energy and capacity** ***or*** **Expected production cost of electricity and value of deferring generation projects**	**Long-term forecast of market prices of energy and capacity** ***or*** **Expected production cost of electricity and value of deferring generation projects**

Generation Marginal Cost Forecast

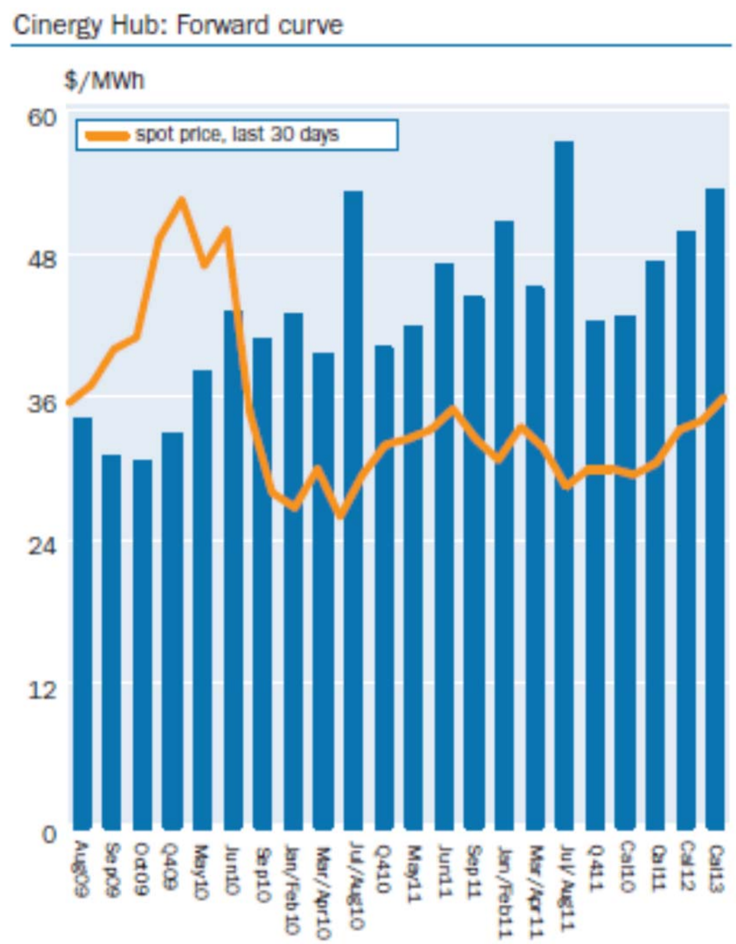


Market Data Available

Hourly Day-ahead Market Prices
MISO and PJM

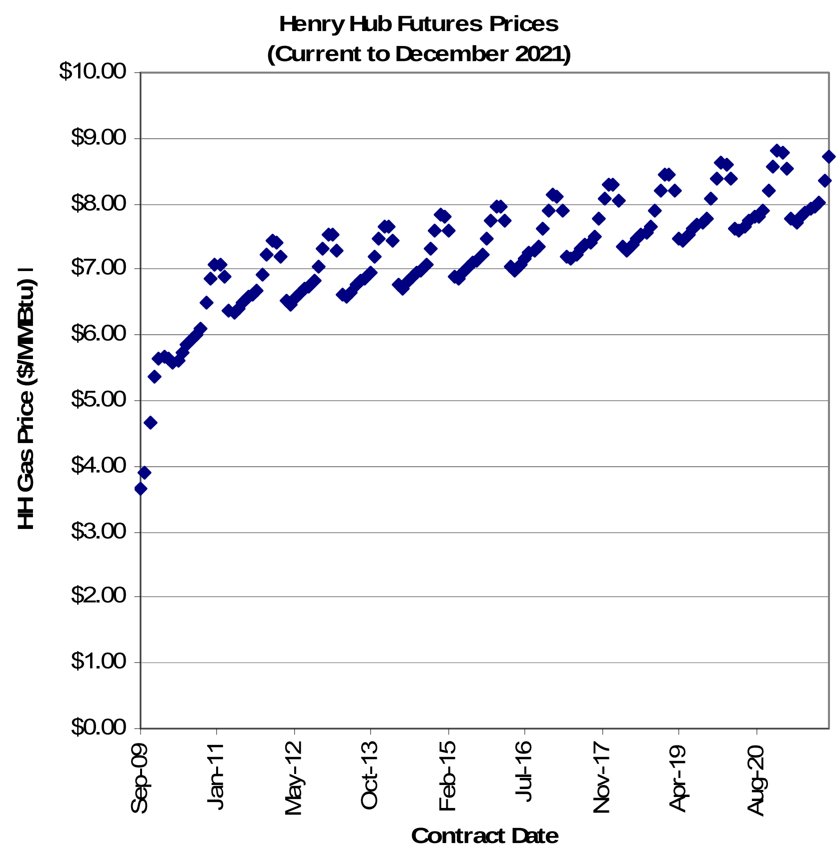


Long-term Forward Curve



Natural Gas Price Data

- Natural Gas Combined Cycle powerplan most common long-run proxy
- Varying degrees of linkage to utility-specific resource plans or market data
- For Natural Gas Combined Cycle, gas price sum of;
  - Henry Hub Futures
  - Basis Differential to nearest gas market hub
  - Delivery cost to electric generation customers



from nymex.com 8/3/2009

Available Forecasts

- Publicly Available Forecasts
  - Department of Energy EIA
    - Annual Energy Outlook has most comprehensive set of long-run forecasts by region for the US
  - State Energy Offices
    - May produce a forecast of natural gas prices based on specific local market, storage, and supply
- Non-public Forecasts
  - Each utility with market operations typically would maintain a proprietary forward curve

Generation Capacity Value

- Near term, use capacity market prices
  - PJM has established market, MISO developing
- Long term, use established CONE methodology

Net Capacity Value = Cost of New Entrant – Margin

Table 1: CONE Areas used for LDA VRR Curves

	CONE Area 1	CONE Area 2	CONE Area 3
CONE: Levelized Revenue Requirement, $/MW-Year	$122,040	$112,868	$115,479
Historic (2006-2008) Net Energy Offset, $/MW-Year for the Zone in the CONE Area Specified	$47,275	$50,417	$8,842
Ancillary Services Offset, $/MW-Year per Tariff	$2,199	$2,199	$2,199
Area used for E&AS Calculation	AE zonal LMP	BGE zonal LMP	ComEd zonal LMP
Net CONE, $/MW-Day, ICAP Price	**$198.81**	**$165.07**	**$286.13**
Net CONE, $/MW-Day, UCAP Price	**$212.50**	**$176.44**	**$305.83**

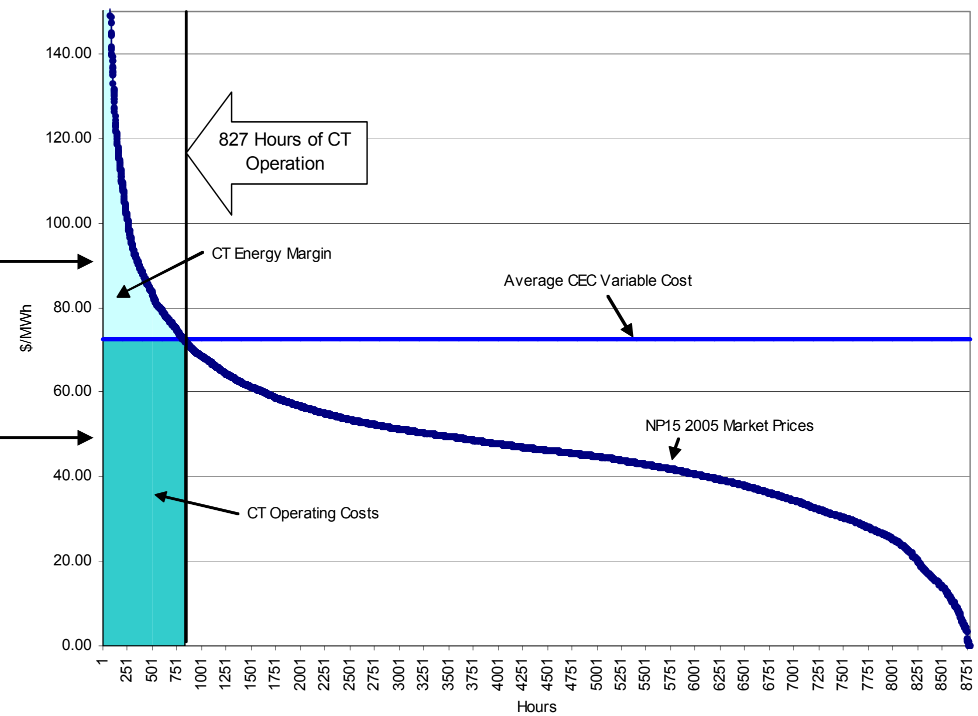
PJM 2012-2013 Net Cone Calculation: see http://www.pjm.com/markets-and-operations/rpm/~/media/markets-ops/rpm/rpm-auction-info/2012-2013-net-cone-calculation.ashx

Hourly Costs Already Reflect Market Prices for Various Generator Types

- Generators that operate few hours (like peakers) will have relatively high average market prices.
- Baseload plants will have relatively low average market prices, as they will be operating when marginal costs are lowest,.

Peaker Average

Baseload Average



T&D Capacity Value

- Forward Estimate of Marginal Avoided Cost
  - Based on T&D Capital Expansion Plan
  - Can capture the block nature of major new transmission projects
- Proxy from Transmission and Distribution Tariff
  - Based on historical data, averages costs that may not be avoidable

Example of Forward-looking T&D Value

Example Marginal Distribution Capacity Cost (MDCC) Calculation			
A	Net Present Value Distribution Growth-related Capital Expenditures (1)	$100	Million
B	Horizon for Net Present Value	5	Years
C	Forecast Inflation	2%	
D	Post-tax Weighted Average Cost of Capital	8%	
E	Average Load Growth per Year	50	MW
F	MDCC ($/kW) MDCC = A * (1 - (1+C)/(1+D))/E * 1000	$111	$/kW
G	MDCC ($/kW-year) (2)	$27.83	$/kW-year
(1) This should include only those distribution capacity investments necessary due to load growth. Costs for new customer connections should not be included. Additional transformers or new substations in areas with service should be included. Typically land costs are also excluded.			
(2) The annualized MDCC is the total MDCC ($/kW) levelized over the horizon used to collect the capital expenditures (from B).			

Allocation of Capacity Costs to Hours or Time Periods

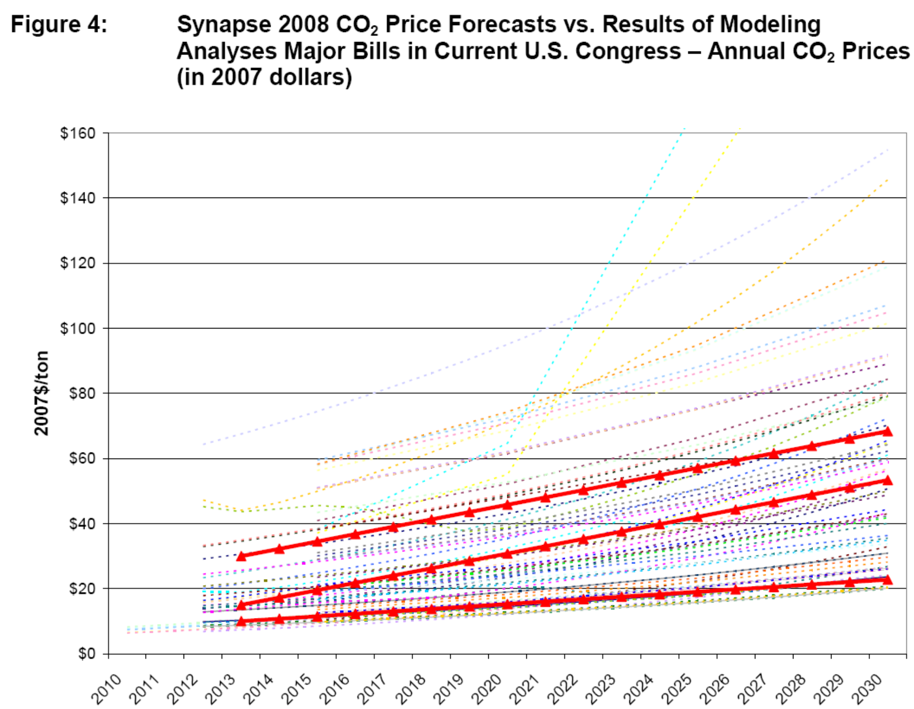
- Generation
  - Simple
    - assign to peak load period – summer peak
  - More Complex
    - Assign to top X hours (100 or 200) in inverse proportion to system reserve margin
  - Simulate
    - Use relative Loss of Load Probabilities by hour – not readily available

- Transmission and Distribution
  - Simple
    - Assign to peak load period – summer peak
  - More Complex
    - Use Peak Capacity Allocation Factor method – similar to reserve margin concept
  - Engineering Assessment
    - Engineering group identifies necessary loads by hours to reduce peak, allocates costs

CO_2 Prices and Emissions Rates

- Two parts to the equation
  - Marginal emissions rate depends on generation type and heat rate
  - Value of reduced CO_2 emissions depends on expectations of future market for CO_2, and forecast
- Variation state to state on whether CO_2 is an 'externality' or should be included in the TRC

Example meta-analysis of CO_2 prices



Energy Losses

- Losses should be applied for both energy and capacity savings
- Average losses are typically used in ratemaking for recovery of losses
- Marginal losses measure the change in losses due to change in load
  - Approximately 2x average losses
- 'Average Marginal' losses are typical – the average of the marginal loss savings over a period of time

Example of Losses as Function of Load