Energy Efficiency and other Demand Resources are Generation Alternatives

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Introduction

Regulatory Assistance Project

RAP is a non-profit organization, formed in 1992, that provides workshops and education assistance to state government officials on electric utility regulation. RAP is funded by the Energy Foundation, US EPA & US DOE.

Richard Sedano was Commissioner of the Vermont Department of Public Service, 1991-2001

The Regulatory Assistance Project

- RAP Mission:

  RAP is committed to fostering regulatory policies for the electric industry that encourage economic efficiency, protect environmental quality, assure system reliability, and allocate system benefits fairly to all customers.

Topics for Today

- A viable category of resources is right in front of us every day: demand side resources
  - Energy efficiency opportunities are all around, are not exotic and need just a bit of help
  - Demand response and customer generation are also valuable

Qualities of Generation

- Tangible
- Combustion units are dispatchable
  - Operators can “hit the button”
  - Nuclear, wind, run of river hydro not dispatched, they run when available
- A reliability (adequacy) resource
  - When you need it, you pay what it costs
  - Impact on rates is necessary, if unwelcome

Qualities of Energy Efficiency

- Reduces energy demand whenever in use
  - During peak hours if use occurs then
  - Avoids load-driven capacity, transmission, etc.
- Reduction can be measured
  - Reduction for a single customer may be hard to measure without metering, but measurement across a population of customers is reliable
- There is a huge reservoir available
  - www.epa.gov/cleanenergy/energy-programs/napee/resources/guides.html

Table 2-2: Sample of Electricity Savings Potential Studies

Area(s) Covered	Author(s)	Year Completed	Type of Savings Potential	Estimated Consumption Savings as % of Sales				Estimated Summer Peak Demand Savings as % of Total Capacity	Years to Achieve Estimated Savings Potential	Comments
				Res.	Comm.	Indus.	Total			
New Brunswick	Énergie NB Power	2004	Technical Economic Max. Achievable	32% 7% 3%	32% 14% 6%	13% 12% 1%	24% 10% 3%	N.A.	17	Includes fuel switching; excludes street lights
British Columbia	BC Hydro	2002	Economic Max. Achievable	17% 4%	17% 4%	27% 11%	N.A.	N.A.	9	
California	Xenergy	2002	Technical Economic Max. Achievable Budget Constrained	21% 15% 10% 8%	17% 13% 10% 7%	13% 12% 11% 4%	19% 14% 10% 6%	25% 16% 10% 6%	10	Integrated measures not addressed; agriculture included in industrial sector
Manitoba	Manitoba Hydro	2002	Economic Max. Achievable	19% 4%	19% 6%	5% 1%	N.A.	N.A.	9	Apartment buildings included in commercial
Midwest	ACEEE	2003	Max. Achievable	N.A.	N.A.	N.A.	11%	N.A.	20	
New Mexico	Itron	2006	Max. Achievable	N.A.	N.A.	N.A.	8%	8.90%	10	
Connecticut	GDS Associates/ Quantum Consulting	2003	Technical Max. Achievable	24% 13%	25% 14%	20% 13%	24% 13%	24% 13%	10	Also includes results for Southwest CT region
Georgia	ICF	2005	Technical Economic Max. Achievable	N.A.	N.A.	N.A.	29% 20% 2.3%-8.7%	33% 18% 1.8%-5.5%	5	
Illinois	ACEEE	1998	Achievable	N.A.	N.A.	N.A.	43%	N.A.	20	
Iowa	ORNL	2001	Max. Achievable	5.3%	5.1%	6%	5.4%	N.A.	15	
Massachusetts	RLW Analytics / SFMC	2001	Economic Budget Constrained	31% 5%	21%	N.A.	24% 5%	N.A.	5	Excludes non-utility impacts and low income savings/sales
New York	OEI / VEIC / ACEEE	2002	Technical Economic	37% 26%	41% 38%	22% 16%	37% 30%	N.A.	10	Also 5- and 20-year scenarios
Ontario	ICF	2005	Technical Economic	N.A.	N.A.	N.A.	26% 21%	33% 21%	20	
Oregon	Technical	2003	Ecotope / ACEEE / Tellus	28%	32%	35%	31%	N.A.	10	Residential includes manufactured housing
Puget Sound Region	Puget Sound Energy	2003	Max. Technically Achievable Max. Economically Achievable	17% 7%	7% 6%	0% 0%	12% 6%	33% 11%	20	
Quebec	OEI / VEIC	2004	Max. Technically Achievable Max. Economically Achievable	8% 2%	19% 6%	1% 1%	7% 3%	N.A.	8	Residential sales include farms; no farm savings estimated
Texas	OEI	2007	Max. Achievable	N.A.	N.A.	N.A.	20%	22%	15	
Utah	Tellus Institue	2001	Max. Achievable	N.A.	N.A.	N.A.	9%	N.A.	6	
Vermont	OEI / VEIC	2002	Max. Technically Achievable	30%	32%		31%	37%	10	Includes fuel switching; also 5-year scenario
VELCO	OEI / VEIC	2002	Max. Achievable	18%	17%		17%	23%	10	Excludes measures with little peak demand, that require regional coordination, and emerging technologies; includes fuel switching; also 5-year scenario
AZ,CO,NV,NM,UT,WY	SWEEP / ACEEE / Tellus	2002	Max. Achievable	14%	20%	19%	18%	N.A.	8	Also 18-year scenario
NJ, NY, PA	ACEEE	1997	Max. Achievable	35%	35%	41%	N.A.	N.A.	14	Residential savings are for all fuels, not just electricity

Why is there so much energy efficiency available?

- Barriers to Energy Efficiency:
  - Awareness -- building owners are busy, or take control of the building after key decisions are made; flat prices convey no sense of value
  - Information -- building owners don't know what to do or who to call; their normal vendors may rely on business as usual, not new approaches that might be more efficient
  - Financial -- building owners may not want to or be able to pay more up front for long term savings; real estate markets don't value EE

Quantifying EE Potential

- What's cost-effective?
  - The more value one assigns to EE, the more is justified
  - Do you believe EE is a reliability resource?
- Experience indicates most buildings can reduce total energy use by 10-40%
  - What do EE experts talk about in secret?
    - The customers that say they have done all EE they could, and then get surprising audit results

Resistance to EE as a reliability resource

- Hard to see
- Not dispatchable
- Not precise, and it changes over time
- “Isn’t it just a social program?”
- Customers can frustrate energy efficiency
  - Even though this is the exception and is counted, reliability managers worry about it
- Utility business incentives

Solution: Try It

- Experience
  - New England local reliability emergency in Connecticut
  - Energy efficiency was an allowed resource in competitive process to address emergency
    - RTO managers got experience understanding energy efficiency performance and translating that to contracts
  - Trying it pre-emergency probably better

Evaluation, Monitoring and Verification is Mature

- See National Action Plan for Energy Efficiency report for excellent collection of insights on who, what, where, when, why and how
  - Learn about Net to Gross Ratio
  - www.epa.gov/cleanenergy/energy-programs/napee/resources/guides.html
- EM&V is key to managing EE resource over time, not just about cost recovery

Loading Order

- California's way to expressing priority of energy efficiency and demand resource
  - Utilities are to acquire all cost-effective EE and DR
  - If needs remain, they are to acquire cost-effective renewables and customer-owned CHP
  - If needs remain, then gas central station
  - Generation performance std limits new PCoal

New England Capacity Market

- Current capacity market based on bids for multiple year forward service
  - Energy efficiency accepted
  - Contracting and measurement protocols assure capacity is delivered
- First auction complete, several hundred MW of energy efficiency bids awarded

How did New England system happen?

- General recognition on challenges to new supply (cost, siting, air quality, carbon)
- RTO leadership speaks up for reliability and the value of demand resources
- Political leadership from NECPUC
- FERC sees the same challenges to reliability and potential from demand side, sends signals supporting "comparable treatment"

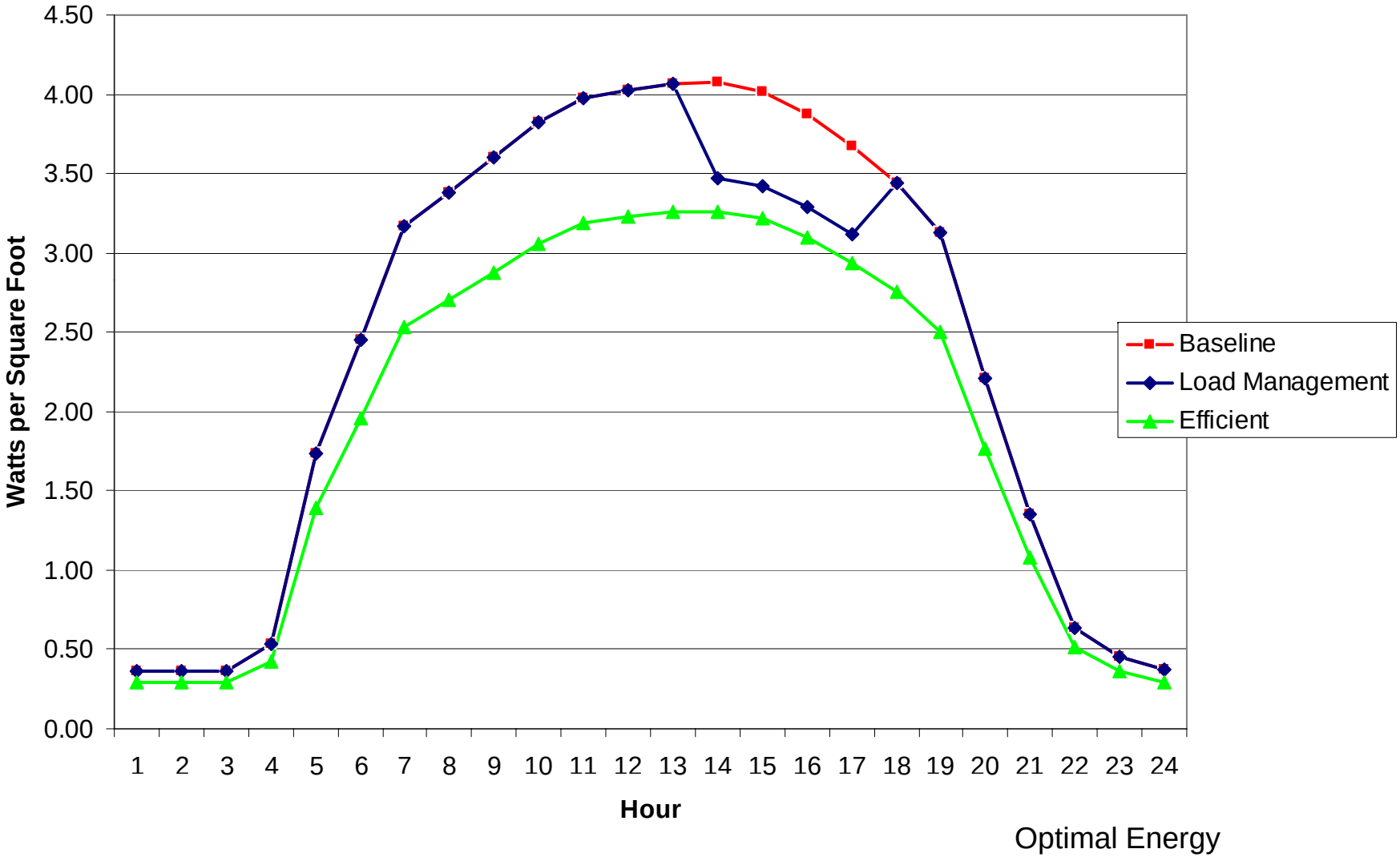
EE in Reliability Planning

- Energy efficiency programs have a resource shape
  - Generation resources do too, EE just looks different -- think of an Efficiency Power Plant
- Imagine choosing EE programs to address forecasted slimming of reliability margins in particular times or seasons or places
  - Not just based on cost or market served
  - Smooth annual additions, not lumpy

Demand Response

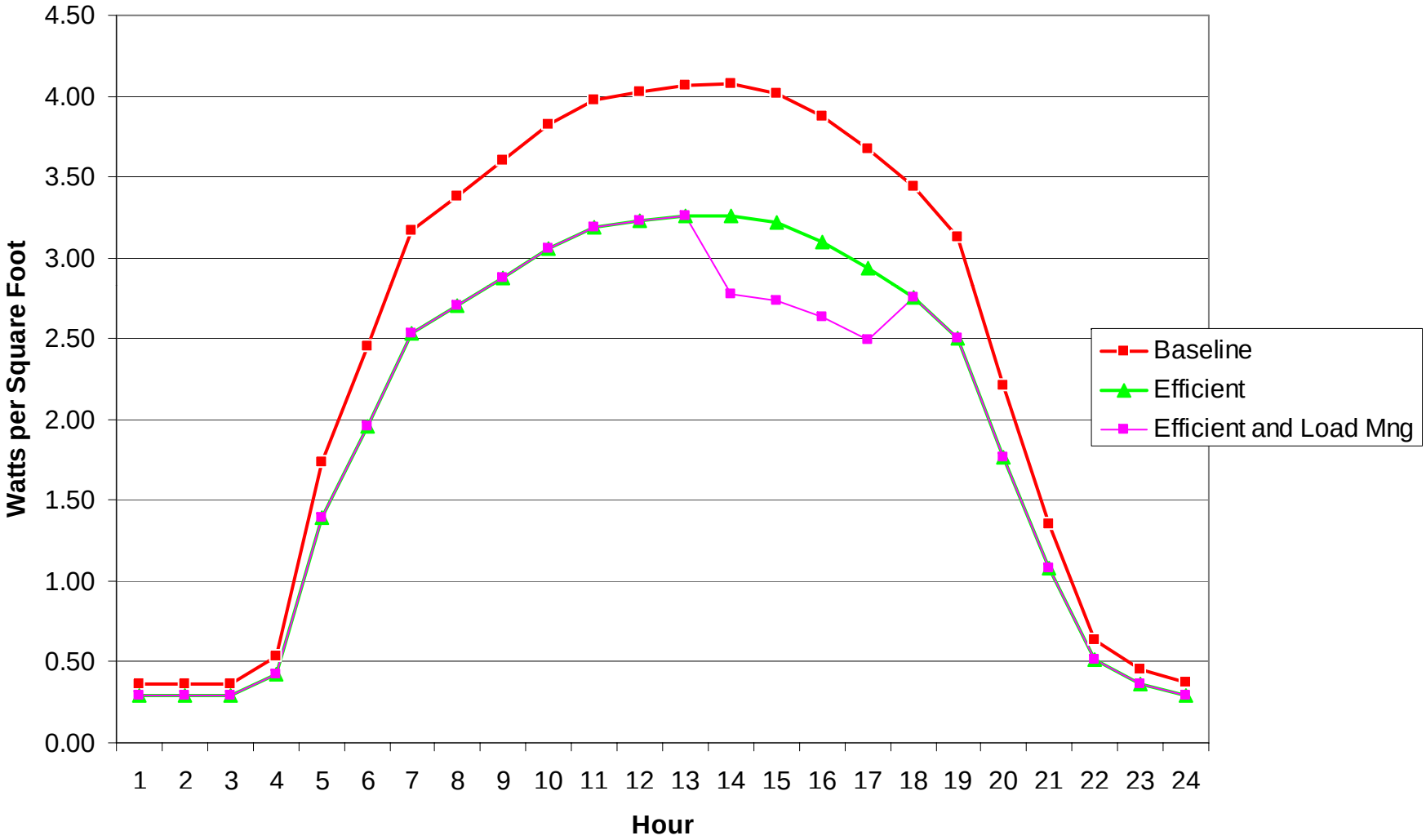
- Easier for operators
  - Push the button, see the response
- Good for peak control, for control of high prices
- Relies on customers
  - EM&V needed to understand results, catch changes in baseline technologies
  - Customer focus combines EE and DR programs

Combined Commercial Cooling and Lighting Loadshape
Baseline, Load Management (STDR), and Energy Efficiency



Optimal Energy

Combined Commercial Cooling and Lighting Loadshape
Baseline, Load Management (STDR), and Energy Efficiency



Customer Generation

- Potential not only untapped but unknown
- Many varieties
  - Wind and solar
  - CHP integrated into customer operation
  - What about a case where optimal energy system produces more energy than customer needs -- can difference be a dispatchable resource?

Utility Business Incentives

- Utilities want some or all of these:
  - Reasonable process for cost recovery
  - Changing regulation to reduce substantially or eliminate the throughput incentive
  - Providing incentives for achieving energy efficiency savings, demand response, or CHP
- Solutions exist for all of these
  - That's another talk

Thanks for your attention

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