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Energy Efficiency as a Resource:

What's Lost if Efficiency Resources Are Not Part of Utility System Management

ALBERTA ENERGY EFFICIENCY VIRTUAL SUMMIT

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Energy Futures Group

Clean energy consulting firm established in 2010

Expertise

- Distributed resources
 - Energy efficiency
 - Demand response
 - Renewable energy
 - Electrification
- Policy development
- Program design
- Market assessment
- Cost-effectiveness
- Integrated resource planning

Clients

- Government
- Advocates
- Regulators
- Utilities



Clients in 40 U.S. states, 8 Canadian provinces and overseas.

Electric Utility Funded Efficiency Ubiquitous in U.S.

	2007	2014	2019
States w/Electric Utility Funded EE Programs	45	51	51
States with >2.00% Annual Savings (as % of Sales)	0	2	4
States with >1.00% Annual Savings (as % of Sales)	4	16	14
States with >0.50% Annual Savings (as % of Sales)	15	33	33
U.S. Average Annual Savings (as % of Sales)	0.26%	0.69%	0.70%

Notes:

1. Covers 50 states plus District of Columbia (51 total jurisdictions).
2. Data from ACEEE annual State Efficiency Scorecards (2007 was first year for which data collected and reported for all states).
3. Though all states have some programs savings in 2014 and 2019, several are de minimis. For example, in 2019 five states had less than 0.10% savings.
4. 2019 is the most recent year for which data are available.

Electric Efficiency Programs Ubiquitous in Canada too

Province	Year	Savings Achieved (as % of Sales)	Some Notable Changes Post-2019
Nova Scotia	2019	1.19%	1.3% planned for 2022
Prince Edward Island	2019	1.09%	increasing goals
Ontario	2018	1.02%	~37% budget reduction
British Columbia	2018	0.63%	
New Brunswick	2019	0.61%	
Newfoundland & Labrador	2019	0.50%	
Manitoba	2019	0.44%	1.1% planned for 2020-2022
Quebec	2019	0.33%	
Saskatchewan	2019	0.17%	
Alberta	2019	0.06%	

Notes:

1. Historic savings from Efficiency Canada's and Carlton University's "2020 Canadian Provincial Energy Efficiency Scorecard", Table 8.
2. Notes on post-2019 savings targets are selective (not comprehensive), mostly based on info EFG has collected thru work in the noted provinces.
3. Manitoba post-2019 planned savings are from programs only. If codes & standards savings included, post-2019 goals go up to 1.5%.

Potential Benefits of Efficiency Resource Investment

- Utility system benefits
 - Economic – i.e., cost reductions
 - Risk mitigation
- Other benefits
 - Environmental
 - Local jobs & economic development
 - Participating customer benefits
 - Low income customer stability
 - Comfort
 - Health and safety
 - Aesthetics,
 - Building durability
 - Business productivity



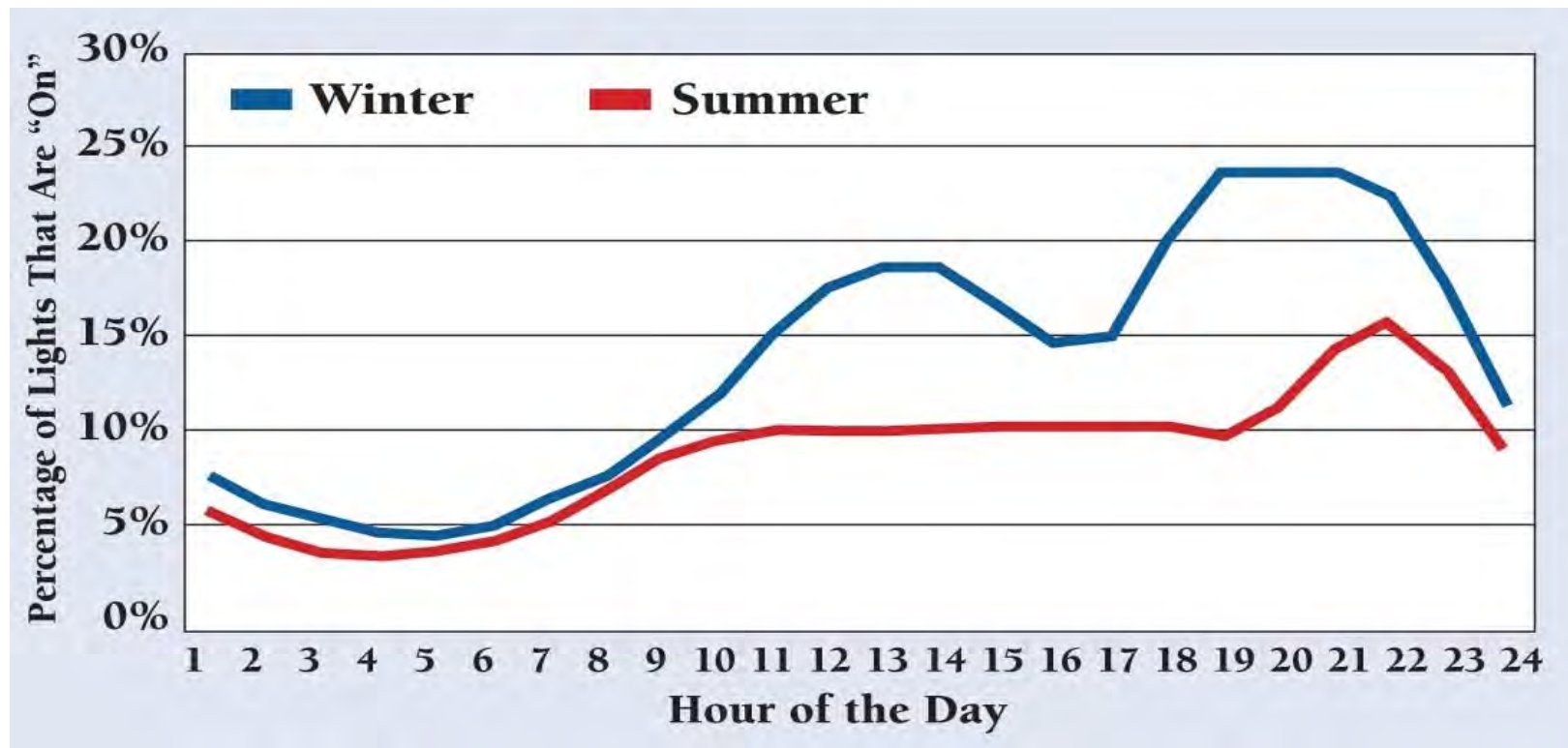
Primary focus of this presentation

Note: focus of presentation is on electric utility efficiency programs, but most points apply equally to gas utility programs.

Electric Utility Cost Reductions (1)

- Avoided generation costs
 - Energy
 - Capacity
- Avoided T&D line losses
- Avoided T&D capital costs
 - Passive deferrals
 - Active deferrals – non-wires solutions

Mapping Efficiency Savings to System Needs (Residential Lighting Load Shape)



Effect of Efficiency Savings on T&D Upgrade Needs (Hypothetical Example)

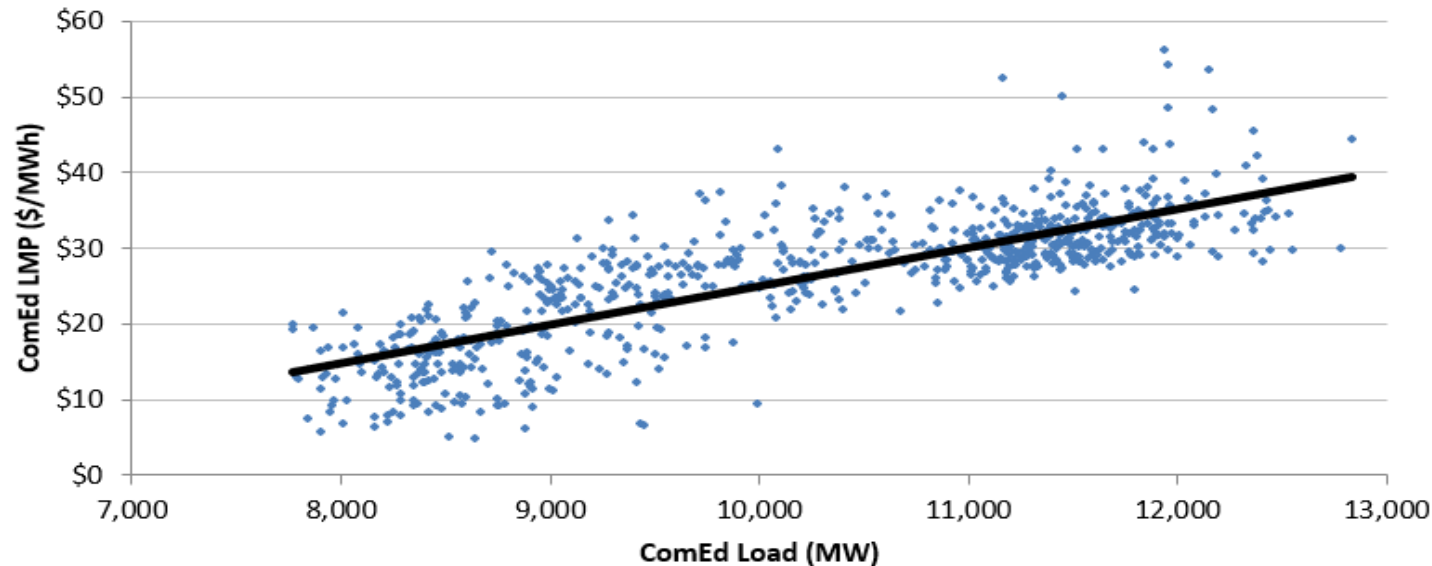
Level of Savings	Net Growth		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
	Rate														
No EE programs	3.0%		90	93	95	98	101	104	107	111	114	117	121	125	128
0.5% savings/year	2.5%		90	92	95	97	99	102	104	107	110	112	115	118	121
1.0% savings/year	2.0%		90	92	94	96	97	99	101	103	105	108	110	112	114
1.5% savings/year	1.5%		90	91	93	94	96	97	98	100	101	103	104	106	108
2.0% savings/year	1.0%		90	91	92	93	94	95	96	96	97	98	99	100	101

Assumed max capacity of 100 and upgrade required at that level of peak demand.

Electric Utility Cost Reductions (2)

- Market price suppression effects
 - Applicable in jurisdictions with competitive wholesale energy and/or capacity markets
 - E.g., 2014 Illinois study: 2% energy price reduction for every 1% demand reduction

Commonwealth Edison Locational Marginal Price as a Function of Load, October 2012



Electric Utility Cost Reductions (3)

- Avoided environmental regulation compliance costs
- Avoided credit and collection costs
- Enabling of other distributed resources
 - Many EE measures enable demand response
 - “smart thermostats”
 - networked lighting controls
 - Ability to bundle efficiency with DR, DG can enhance attractiveness to customers

Efficiency Investments Reduce Risk (1)

- Reduced exposure to future fuel price uncertainty
 - Efficiency investments analogous to a long-term fixed price contract
 - New England studies have estimated ~8% premiums paid for up to 3-year contracts
- Reduced exposure to future environmental regulation costs
- Option value
 - Very granular nature of EE “buys time” to calibrate load forecasts
 - ConEd (New York) non-wires project experience:
 - Only planned to defer substation upgrades...
 - ...but found in one-third of cases that upgrades never actually needed

Efficiency Investments Reduce Risk (2)

- “Load following” nature of many efficiency programs
 - More savings opportunities when economy booming & greater reductions needed
 - Less savings potential when economy stalls & smaller reductions needed
- Enhanced resiliency
 - Demand spikes will be less “spikey” during extreme weather
 - Outages can be better endured by efficient customers



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