OVERVIEW OF COST-EFFECTIVENESS PRACTICE & NON-ENERGY IMPACTS/NEBS

State Progression / Dominos – Focus on CO, VT, MD

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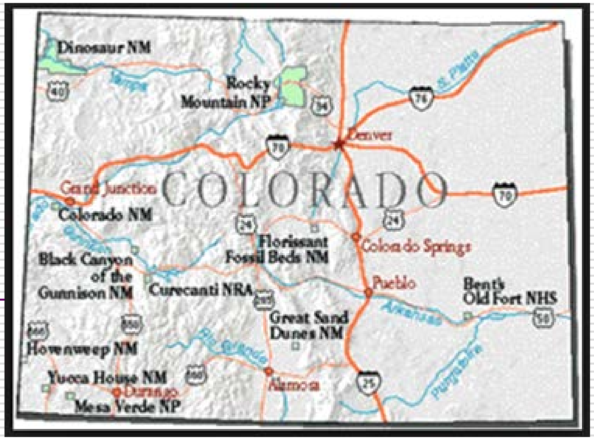
SERA

NEIs AND STATE DOMINOS

- Initial hesitance
- Incubation in numbers, methods (20+ years)
- Policy rationale repetition (bias…, non-zero…)
- Increasing comfort with concept… a few move forward
- … Leading to progression in state consideration

See Malmgren & Skumatz, ACEEE 2014 for more detail

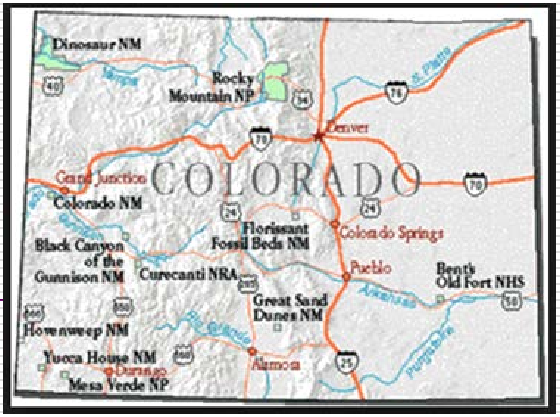
NEIs – COLORADO



- Why interesting:
  - CA, NY came before
  - Early-ish; evidence-based study; early PSCO study
  - 2007 legislation incorporated Modified TRC including proxy adders for avoided emissions & other NEBs
    - 10% elec; 5% gas; CO2 part of that
  - 3-4 year review; 2010 study indicated higher NEBs; 2013 interveners argued NEBs too low
    - Increased LI to 25%; study
  - Modified TRC (incl. Proxy NEBs) by legislation;
    - Could do program by program like MA / allowed, but doesn't yet do that.

State	CO	CO Value
Primary Test/ Others	Modified TRC; not special tests for DR, etc.	
Goals	At least 5% savings over 10 years (2007). Renewed for 10 yrs (2017) w/no sunset for gas. Big new directions being considered - even bigger emphasis on wind and solar. Will affect C/E (expected 7/2017)	
Review Cycle (esp. NEIs)	Every 3-4 years file strategic docs to review C/E, NEBs, AvC. Any party can propose changes & Cx decides (latest to be released 7/2017)	
Discount Rate	After-tax WACC	6.76%
Cost derivation	AvC by utility (MN);3-4 year cycle for refining process; 2 year DSM plan dockets & adjust for new NG prices, etc.	
T&D Impacts	Used to be 0 for both; now $0.12/kW/yr for transmission	
NEIs included	Unattributed overall adders; No add'ls. Not all utilities were required to use, but now they all do.	2007: 5% gas, 10% elec; 2011: changed to 5% gas, 10% elec, 25% low income

Source: Skumatz / SERA Research



NEIs – COLORADO

- Special low income issues
  - 25% helps include more measures, esp. with gas prices falling; tried for 50% NEBs / not successful
  - Need to be careful / can run out of budget before measures so leverage other dollars to stay within budget. High % of gas pgms.
- 6-8 years ago changed perspective
  - Changed names of "programs" to "products". If Products are C/E, then pass. Allows to pass even with a few measures that might not be C/E. Pass/fail at sector level & helps avoids cream-skimming.
- 7/2017 new filing due – BIG changes expected
  - Working on evolving utility – from 25% wind and solar to 40% by 2021 when new projects are finished. Will lead to changes in C/E approach. More focus on load profiles / curves and not all savings are equal. Being brought into docket.

NEIs - VERMONT

- Interesting because:
  - Drivers: available research; progress in other jurisdictions; and collaborative stakeholders
  - Since 1990s enviro adder (currently 5 cents/kWh) and 10% risk benefit for EE-early
    - Not all study based, but “knew it wasn’t zero”.
  - Watched / used CO, NY, other studies
  - 2012: Increased to ADDITIONAL 15% adder for thermal & electric EE and another 15% for low income EE – High
    - Further VT-based studies / analysis planned.

State	VT	VT Value
Primary Test/ Others	SCT (for measure & project screening excl. program costs; and pgm-level screening incl. pgm costs). Also require UCT of 1.2 for the total electric program.	
Goals	2015 - In Renewable Energy Standard, VT can count thermal electrification such as heat pumps. DG also counts. Requires utillities to reduce fossil fuel use thru electrification (and other strategies).	Penalty: alternative compliance payment of \$0.06/kWh for each kWh they were supposed to reduce.
Review Cycle (esp. NEIs)	Usually every 2 years can come up as rebuttal assumption; next in 2017. May be moving toward 3 year schedule to better match AvC schedule.	
Discount Rate	Real dollars specified in 2012; (10% Risk adjustment mentioned in NEBs also included.)	3%
Cost derivation	AvC determine by NE consultant study every 2 years; reviewed / proceeding involving utilities & transmission & EE actors; adopted or modified & adopted. Recently switched to 3-yr cycle to match Plan. Program deliv. & admin. costs are included for initiative & portfolio screening only.	
T&D Impacts	See below	
NEIs included	1990s: VPSB adopted Societal test & set adder for enviro externalities currently 5 cents/kWh (calc. based on calc. of externalities from elec. Nd fossil fuel energy from AvC report - currently \$100/US Ton CO2e) Plus 10% adjustment (discount on measure and program costs for reduced risk assoc. with obtaining EE savings as alt. to Generation).	2012: 15% NEI adder; 15% extra low income ON TOP OF 5 cent enviro and 10% risk factors. May additionally add estimates of O&M, Water savings beyond adder NEIs (Hybrid NEI). Applied to electric and fuel savings, capacity, T&D, DRIPE.

Source: Skumatz / SERA Research

NEIs - VERMONT

- 3% (societal) discount rate
- Big DRIPE discussion in 2015 proceedings
- Unique refinement to Goals / Tests
  - 2015 adopted renewable energy portfolio standards requiring utilities to reduce fossil fuel with clear goals & $0.06/kWh for non-attained reductions.
    - Tier III innovation tier for wide variety of initiatives (EV, HPs, busses) – but they must pass C/E – but adds elec usage…
    - Broader picture

NEIs - MARYLAND

- Interesting because…
  - More recent
  - C/E analysis is product of 8 year evolution
  - Very attractive (potentially template?) language on NEBs in resulting order
- Process is very stakeholder-centric
  - Utilities, private sector companies with role, OPC, PSC, etc.
  - Utility evaluators conduct C/E analyses; policy direction & oversight by PSC evaluator in consultation with stakeholders.
  - DRIPE is stakeholder process (consultant does underlying study)

State	MD	MD Value
Primary Test/ Others	TRC and SCT primary, but PAC, RIM also reported. Tests applied officially at "sub-portfolio" (i.e.sector) level, but program level also considered.	
Goals	2% annual savings goals if PSC determines that cost-effective EE&C programs and services are available. (from MD General Assembly). 3 years considered if fall short the first year/3 year cycle.	
Review Cycle (esp. NEIs)	Some NEIs revised annually (e.g. water rates, O&M benefits) and regular updates for inflation per PSC order.	
Discount Rate	Utility WACC for TRC, PAC, and RIM. 4.7% Societal Discount Rate for SCT	WACC 7.56-8.3%
Cost derivation	Utilities develop in consultation with PSC staff and stakeholders. Often AvC proj'ns developed under other rate cases, not nder EMPOWER. Use standard CA guidance prescribed costs - vary by test.	
T&D Impacts	Included, estimated by utilities in consultation with PSC staff & stakeholders	
NEIs included	Energy & capacity DRIPE are included. TRC & SCT include elec, water, & fuel savings (& penalties); comfort (HVAC, HPwES, LI); O&M (e.g. avoid lamp replacement costs); arrearage finance costs (LI). Jobs and emissions also included. Conservative estimates approved. Order 87082 supports theory; opens door to NEI expansion by participants in future planning cycles.	Air: 0.2 cents/kWh; Comfort $136 (HPwES) /$110 (LI) annually for 15 years; Arrears (LI) 2% of energy savings or lifetime $55PV. Significant numbers for C&I Lighting O&M.

Source: Skumatz / SERA Research

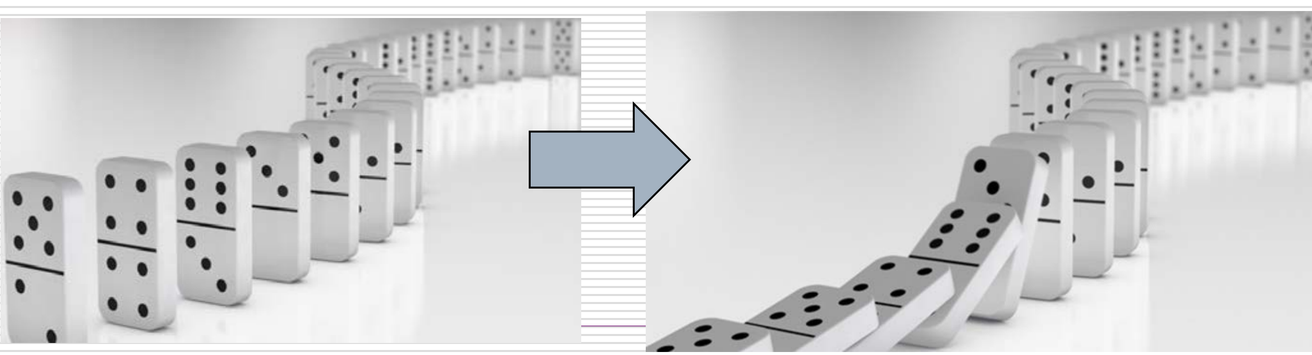
NEIs - MARYLAND

- 2015 process
  - Renewed look in 2015 was triggered by MEA under previous governor initiated stakeholder process on NEBs (2015). Consultant conducted analysis with 3 scenarios per stakeholder request. PSC took lowest as placeholder, but said values should be revisited.
  - Interveners presented values into the process
- 2015 Order 87082– Very attractive language for NEIs
  - Theoretical basis agreed: '... Because TRC includes all participant costs we concur quantified participant NEBs must be included' (paraphrased) and similar language for societal test to include societal NEBs as well. Low income also addressed.
  - Adopted specific values (low/conservative range) for emissions, comfort, arrears (LI), and C&I Lighting O&M. Mentioned jobs.
  - Specifically opened door for more estimates '...should additional Participant, utility, or societal NEBs be quantified (or revised) moving forward... present in future planning cycles...' (paraphrased)
- Directions – may be some concerns with transitions in governor and PUC / MEA changes with more skeptical view of EE benefits

Source: Skumatz / SERA Research

NEIs - SUMMARY

- State Dominos are key (based on takeaways from our work in multiple states)
  - Has direct effects in state comfort with concept/process & numbers
  - More local research needed on some topics – but not essential in short term!
  - Leadership by some states moves the needle
  - Lessons to be learned in approaches across states



(...And NEIs shouldn't be held to higher estimation standards than other C/E equation elements)

THANK YOU / Questions?

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