LEVERAGING EVALUATED ENERGY EFFICIENCY SAVINGS FOR GHG REDUCTION

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ABSTRACT

This paper shows that modeling deployed EE across energy transmission systems leads to GHG reductions - once EE is deployed for GHG savings, state policies and tracking systems are needed for the GHG savings.

- There have been great improvements in deploying energy efficiency (EE) measures and projects across the US and European Union (EU) over the past few decades.
- EE has mostly been deployed in the US to meet kWh savings goals, while in the EU, EE is deployed to reduce greenhouse gas (GHG) emissions. But a chasm exists in the US in leveraging evaluated EE for GHG reduction goals even though this is possible today.
- EE can be used to reduce demand and GHG across the US. There should be an established approach in the US for leveraging evaluated EE savings for GHG reduction given the substantial number of EE programs deployed.

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CARBON METRICS AND ACHIEVING CLIMATE GOALS

- **EE is used mostly in the US for energy and demand reduction. In the EU, EE is mostly deployed to reduce GHG and carbon.** While in the US, GHG or carbon reduction is not tracked, except for CA and the Regional Greenhouse Gas Initiative states (RGGI Initiative*).

- **EE program and portfolio development in the US requires a paradigm shift to transition away from energy savings goals towards carbon reduction goals**.
  - These goals should be set by state legislatures and implemented by state commissions
  - Change needs to happen during the EE planning process in to establish goals
  - Program design can drive changes by signaling to utilities, program administrators, and others how to align programs with state climate policy.

* RGGI is a cooperative effort to reduce CO2 emissions from power generation - states include CT, DE, ME, MD, MA, NH, NJ, NY, RI, VT, and VA. ww.rggi.org

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CARBON METRICS T0 ACHIEVE CLIMATE GOALS

In the US, EE savings goals are mostly focused on first-year or near-term energy savings since this approach is easier to implement, measure, and plan programs.

- IL is a good example of a state that has moved to counting savings over multiple years by implementing cumulative persisting annual savings (CPAS) as opposed to annual savings goals.
- Four metrics can be used to move toward incorporating climate and decarbonization policy into EE program goals.

Set GHG Goals	Total System Benefit Goals	Lifetime Energy Savings Goal	Fuel Neutral GHG & Savings Goals
• The most direct way to lower GHG emissions and a clear way to implement a GHG emissions goal • EE programs directed to meet specific GHG goals with no link to EE savings goals	• Goal is to reach a dollar value translated to savings & load shape of an EE resource • Done by using hourly values for energy, capacity, and GHG compliance costs • CA PUC adopted this metric	• Lifetime goals typically do not account for carbon, although shifts EE focus to long-term energy savings (i.e., longer expected useful measure lives) • A step toward GHG reduction - not a carbon or GHG policy	• Most direct way to lower GHG emissions and a clear way to implement GHG emissions goals • EE programs directed to meet specific GHG goals which have no link to EE energy savings goals

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MODELING DEPLOYED EE SHOWS SIGNIFICANT REDUCTIONS

Benefits of deployed EE can be seen by modeling deployed EE across regions and assessing the GHG savings.

- Transmission modeling of EE savings shows corresponding GHG reductions.
- This analysis focuses on PJM's transmission territory and the State of California for comparative purposes, geographical diversity, and the ability to access data accessibility.
- The analysis leverages a production cost software model (e.g., PROMOD) to assess how: (i) varying levels of additional EE lowers GHG and potentially relieves interfaces, and (ii) the impact on total system cost to serve customers is potentially lowered.
  - PROMOD modeling uses a detailed hourly chronological market model that simulates the dispatch and operation of the wholesale electricity market. It replicates the least cost optimization decision criteria used by system operators and utilities.

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MODELING DEPLOYED EE SHOWS SIGNIFICANT REDUCTIONS

Deployed EE Across Regions (CA and PJM) - Modeled High-Level Findings

- **EE drives overall cost reductions (i.e., consumer costs) and reduces GHG** - EE is shown to reduce costs (in the order of billions of dollars) and reduces GHG
- **More EE means less absolute demand for natural gas**, but gas makes up slightly larger percentage of total generation because EE pushes out additional fossil fuels
- **Coal retirements occur in all regions** - Most significant retirements in the Eastern US
- **Renewables added to meet Renewable Portfolio Standards in early years** Significant solar in California approximately one-third of generation in 2030 - significant wind in Midwest and Texas

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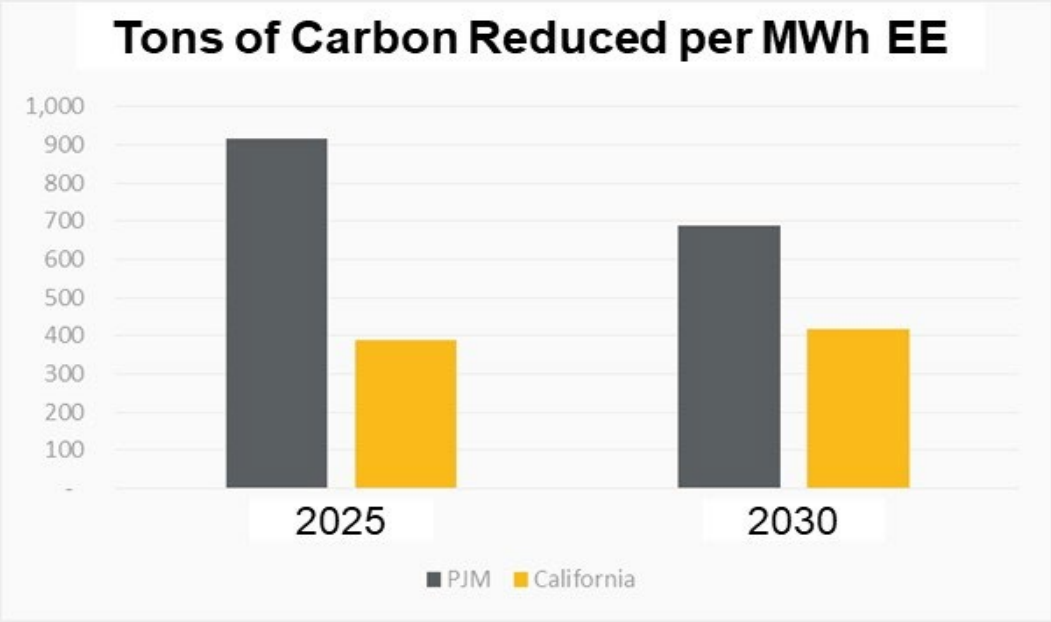
MODELING DEPLOYED EE SHOWS SIGNIFICANT REDUCTIONS

Figure 1 shows that EE displaces 9,000 and 700 tons of carbon in PJM and 390 and 510 tons of carbon in California in 2025 and 2030, respectively.

This is primarily based on the expectation of coal retirements being replaced by natural gas and renewable additions.



2025 (tons)

900 = PJM

390 = CA

2030 (tons)

700 = PJM

510 = CA

Figure 1: Modeling of Carbon Reduction per Deployed EE – in tons

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MODELING DEPLOYED EE SHOWS SIGNIFICANT REDUCTIONS

Table 1 shows PJM costs savings of $1.3 Billion based on analysis of the estimated low and high case PROMOD modeling.

In California, savings are nearly $1 Billion in 2030 even with significant renewables already have been deployed and overall system GHG and congestion already lower in 2022.

Modeled Costs Savings of Deployed EE in 2025 and 2030

	PJM Cost Savings	California Cost Savings
2025	$1,309,204,480	$488,086,000
2030	$1,517,684,440	$827,530,000

Table 1: PJM Cost Savings vs. CA Cost Savings

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METHODOLOGY FOR TRACKING GHG REDUCTION

There is a need for a standard tracking approach to track and measure GHG reductions based on deployed EE.

Long-Range Energy Alternatives Planning System (LEAP)

- LEAP is an econometric model developed by the Stockholm Environment Institute and Boston University – used as an energy environment modeling tool based on scenario analysis assessing energy demand, environmental impacts, and costs and benefits.

- Used primarily for national and municipal mid-term to long-term energy and environmental planning.

Verified Carbon Standard (VCS)

- VCS is the predominant and voluntary GHG program tracking system that is used in the energy industry today.

- VCS can be used to access carbon markets to aid in reaching GHG reduction goals.

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GHG REDUCTION AND NEW MODELS

California and RGGI states have successfully implemented GHG reduction models – another example is the EU's successful GHG reduction model.

California

- In July 2017, California's state legislature passed assembly bill (AB) 398 to reauthorize and extend until 2030 the state's economy wide GHG reduction program. The bill sets a new GHG target of at least 40% below the 1990 level of emissions by 2030.

- An executive order from California's governor targets an 80% reduction from 1990 levels by 2050. A large portion of the reductions are expected to come from energy efficiency.

RGGI

- RGGI is the first mandatory market-based program in the US to reduce GHG. The RGGI states implemented a new cap reduction trajectory of 30% over the period 2020 to 2030.

- The CO_2 cap represents a regional budget for CO_2 emissions. RGGI states auction most CO2 allowances, and the proceeds are invested in EE, renewables, and other resources.

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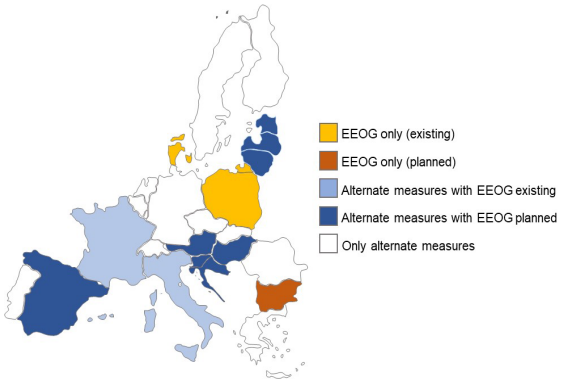
GHG REDUCTION AND NEW MODELS

(con't.) California and RGGI states have successfully implement GHG reduction models as well as the European Union.

European Union

- **A key difference between the EU and US on EE policy is that there is an overall EU directive to reduce GHG by 20% by 2020 and 32.5% by 2030 – the US has no national energy policy**
- The EU deploys EE to meet climate and energy goals – EE is recognized as central to meeting goals.
- In the EU, deployed EE focuses on decarbonization in the power, heating, and transportation sectors. The EU will have to decrease energy use by approximately 17% by 2030 compared to 2015 levels.

Figure 2: Map of EU Member States with Existing or Planned EE Obligations



Source: Study Evaluating the National Energy Policy Measures and Methodologies to Implement EU Article 7 of EED

STATE STRUCTURES FOR COOPERATION & GHG REDUCTION

Illinois Stakeholder Advisory Group

- SAG is a statewide approach through the Illinois SAG has led to joint utility EE programs and consistent Illinois Commerce Commission policy.

Arkansas Statewide

- A permanent statewide collaborative in Arkansas was established in 2006. The original expectation was that it would change over time as the issues evolved.

California

- In 2008, the CPUC adopted the state's first Long Term Energy Efficiency Strategic Plan (Strategic Plan), presenting a roadmap for maximum savings across all sectors in California.

Massachusetts

- Massachusetts created its joint-statewide effort and published the Joint Statewide Three-Year Electric and Gas Energy Efficiency Plan (Three Year Plan - 2019).

New Hampshire

- New Hampshire also has a statewide planning, implementation and evaluation approach for electricity and natural gas programs.

Wisconsin

- Wisconsin's Focus on Energy is a consortium delivering EE programs across the state. Focus is Wisconsin utilities' statewide EE and renewable resource – operating since 2001.

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CONCLUSION

Given that the US does not have any national energy policy today, implementing these concepts and models would be a large step forward.

- Deploying EE across more US states would accelerate US GHG reduction goals. Modeled examples of deployed EE show significant GHG reduction that results from demand reduction.
- Fostering development of statewide EE program oversight and development will require incremental state regulatory changes and new ideas for cooperation between utilities, stakeholders, municipalities, and stakeholders.
- Cooperative approaches can also be applied to leverage EE programs for carbon and GHG reduction.
- Like the EU, California and the RGGI states recognize EE as a resource to reduce demand and GHG. Other US states should consider adopting similar GHG goals and standards like California or RGGI. EU's is impressive and could be central to national US energy policy.

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