Improving Air Quality with Energy Efficiency and Beneficial Electrification

Metro 4/SESARM Meeting – Atlanta, GA

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Comparison of Growth Areas and Declining Emissions
1970-2016

- Gross Domestic Product
- Vehicles Miles Traveled
- Population
- Energy Consumption
- CO₂ Emissions
- Aggregate Emissions (Six Common Pollutants)

USEPA 2017
Multiple Benefits of Energy Efficiency
The United States has the potential to cost-effectively **reduce** its **electricity** use by **741,000 GWh**.

Saving **741,000 GWh** is equivalent to the **electricity** used across all the highlighted states over a full year!†

It’s equal to **reducing** the nation’s **electricity** needs by about **16%** in 2035.

Every state could save with energy efficiency, ranging from **12%–21%** savings per state.

Energy efficiency is a **low-cost** option, averaging only **4.6¢ per kWh**†.

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†2015 data; from U.S. Energy Information Administration, "Retail Sales of Electricity by State by Sector by Provider (EIA-861)," Detailed State Data, 2016.
Average bill per month

- Georgia $129
- N. Carolina $125
- Kentucky $114
- Tennessee $129
- Massachusetts $119
Regulatory Assistance Project (RAP)

• Georgia 1,122 kWh
• N. Carolina 1,113 kWh
• Kentucky 1,120 kWh
• Tennessee 1,248 kWh
• Massachusetts 602 kWh

But….. look at their usage

Source: EIA 2015 data
So what would bills look like for the other states if we used less?
Energy Efficiency - Cost and Impact

Source: Nadel, ACEEE for Restructuring Roundtable, 10/6/17
What’s 1,000 GWh?

1,000 = 750-1000 tons = 100,000 homes

Six 690 MW natural gas combined cycle power plants

Source: RAP Shenot, MassDEP Footprint permit
Air Quality Benefits of DOE’s Potential Study - NO$_x$

- 39,000 Tons NO$_x$
- 48,000 Tons NO$_x$
- 7,400 Tons NO$_x$
Air Quality Benefits of DOE’s Potential Study – CO₂

5.2 Million Tons CO₂

8.4 Million Tons CO₂

73 Million Tons CO₂
What’s 1,000,000 tons of CO$_2$?

1,700 GWh = 1,000,000 tons = 136,000 homes

35% of a 690 MW natural gas combined cycle power plants

Source: EPA GHG calculator, MassDEP Footprint permit
Linking Air Quality and Energy Efficiency

- Why do we care about energy?
- What’s Energy Efficiency got to do with it?
- How can the two be linked?
Energy Efficiency Improves Air Quality

- NSR offsets
- Regional Haze Compliance Demonstrations
- EGU Emissions Forecasting
- Other Strategies – e.g., Ozone Advance
Energy Efficiency Benefits Facilities

- Saving Facilities Money during Permitting
- Training for Permit Writers considering Energy Efficiency
- Focused Commercial and Industrial Energy Efficiency Efforts, Tailored to a State’s economy
Massachusetts Manufacturer Energy End Use

Source: National Grid MA EE Potential Study October 2015, pages 57 and 58
Energy Efficiency’s Value can be Modeled

- Jointly Achieving State and Local Environmental and Energy goals
  - RAP’s E-Merge
  - Peer to Peer conversations
- Modeling to demonstrate the value of EE
  - ERTAC
  - EPA’s AVERT – epa.gov/avert
Conclusions

Energy Efficiency:

- Reduces Air Pollution
- Helps avoid Additional Regulation
- Can Reduce Permitting Requirements
- Saves Money for Citizens and Businesses
- Has a Bright Future!
Beneficial Electrification
Beneficial Electrification offers a “LEG-up”

- L - Load growth and more service
- E - Environmental benefits and
- G – Grid management

- While Energy Efficiency remains the first “fuel”
What’s at stake?

California Independent System Operator Duck Curve

Teaching the “Duck” to Fly:
10 strategies to control generation, manage demand, & flatten the Duck Curve
New England’s Marginal Emission Rates

PJM NO\textsubscript{x} Marginal Emission Rates

Source: https://www.pjm.com/~/media/library/reports-notices/special-reports/20170317-2016-emissions-report.ashx
Electric Vehicle Energy Impact

Source: NW Energy Coalition research paper, "Building “good load” to reduce carbon emissions", 2016
Heat Pump Water Heater

- Saves ~70% of kWh
- Can be controlled into low-cost and low-emission hours
- Good for warm weather climates
Resources

- Using Energy Efficiency to Advance Air Quality Compliance
- The Next Quantum Leap in Efficiency - 30 Percent Electric Savings in Ten Years
- Beneficial Electrification – blog post series
- Teaching the Duck to Fly
- Opportunity Knocks for Beneficial Electrification – webinar
Conclusions

• Electricity market transformation is happening fast
• Energy Efficiency is one way to ensure Electrification is Beneficial
• Environmental Regulators can play a Key Role
About RAP

The Regulatory Assistance Project (RAP)® is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

Learn more about our work at raponline.org