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Transformation of Heating in Maine
Heating the State of Maine... with Electricity???
Here are three reasons why…

OIL VS. ELECTRICITY

- 80% of our total energy use comes from oil
  - Transportation = 100%
  - Home Heating = 70%
  - Electricity = 5%

- Technology Advancement – Air Source Heat Pumps
- Natural Gas
10 Years of Oil vs. Electricity Prices

- **Cost of Oil**
  - $1.20
- **Cost of Electricity**
  - $0.149

**Oil prices have TRIPLED since 2002**

**Electric prices only increased 11%**

Electric prices based on Bangor Hydro District Rates
Why Use Electricity

Relative Cost of Various Heating Methods

Cost per Million Btu's

- Heat Pump ($0.11/kWh at 400% & 250% Eff)
- Heat Pump ($0.15/kWh at 400% & 250% Eff)
- Coal ($325/ton at 75% & 60% Eff)
- Mixed Hardwood ($210/cord at 50% & 45% Eff)
- Natural Gas ($1.31/Thermal at 80% & 75% Eff)
- Wood Pellets ($324/ton at 65% & 50% Eff)
- Fuel Oil ($3.50/gal at 80% & 75% Eff)
- Elec. Res. (100% Eff at $0.11/AWh & $0.15/AWh)
- LP ($3.10/gal at 80% & 75% Eff)
The Alternatives

Annual Heating Cost (typical home)

Values from http://www.efficiencymaine.com/pace/compare-heating-options on 12/7/12
Factoids

- Heat Pumps vs. Oil
  - 1/3 operating cost
  - 1/3 energy usage
  - 20% of the carbon emissions
  - Low cost of entry ($3,500 to displace 90% of oil usage)
  - Works well in cold climates

- 180 Million gallons per year of residential oil usage

- Natural gas serves 33,000 out of 800,000 customers in Maine today

- Mainers use more oil per capita for home heating than any other state

- Mainers use less electricity per capita than any other state
Opportunity

- Economic
  - $675 Million total cost with oil
  - -$400 Million/year savings
  - $200 Million/year in electricity
  - $75 Million/year in residual for heating and hot water

- Environmental – reduction of 1.3 Million metric tons of CO2 annually

- Energy – savings of 1.5 Trillion BTUs or 4.4 terawatt-hours (note: entire state electric load is approx. 12 terawatt-hours)

- T&D Investment – 2.2 terawatt-hours of sales for T&D companies
  - $200 Million/year additional revenue (roughly half T&D and half supply)
  - $50 Million/year of additional T&D costs (leaves $50 Million/yr to reduce T&D costs)
Why today?

- Heat pump technology works
- The costs are very manageable – Opex and capex at 55% of the operational costs of oil
- Everyone has access to the infrastructure today
Vision

- Zero upfront capital costs to achieve 45% cost savings (available 2014)
- Hourly dynamic electric rates to incent behaviors and access additional cost savings (could be available today)
- Climate controls managing household heating efficiency through information and automatic decision making take into account:
  - Electricity prices
  - Oil prices
  - System demand
  - Heat pump efficiency
  - Intermittent supply/load matching
- Energy Storage