U.S. Department of Energy, 2016, Industrial Energy Efficiency Potential Analysis

In 2016, U.S. Department of Energy Advanced Manufacturing Office (AMO) developed an analysis that estimates potential 2030 electricity and total fuel savings at the state and national levels that could be achieved through improvements in industrial electricity intensity, based on the U.S. Energy Information Administration 2014 Annual Energy Outlook report.

The results showed national electricity savings potential of 435.8 million MWh in 2030, with state-level potential ranging from 0.1 to 92.7 million MWh in 2030 (Figure 1); whereas for total fuel savings, a national potential of 7,500 trillion Btu, with state-level potential ranging from 2.0 to 1,559.7 trillion Btu (Figure 2).

Purpose:

- The objective of this analysis was to provide estimates of electricity and total fuel savings by 2030 at the state level that could be achieved through improvements in energy efficiency throughout the manufacturing sector.

Methodology:

- The analysis uses historical growth averages for value of shipments to project economic growth out to 2030 for sectors within each state.
- This economic projection is then combined with energy intensity projections to estimate future state electricity consumption for two different scenarios.
    1. The business-as-usual (BAU) scenario utilizes Energy Information Administration (EIA)'s BAU projections of improvements in energy efficiency out to 2030; for example, EIA's industry-wide BAU rate is 1.2%.
    2. The second scenario estimates how much electricity could be saved by 2030 if each sector were to double their BAU rate of energy efficiency improvement, which would be 2.4% industry-wide.
        - Since a 2.5% average annual improvement over 10 years is the Better Buildings Better Plants goal, the doubled rate should be achievable in most sectors.
- The results, shown in figures 1 & 2, indicate that 435.8 million MWh in electricity savings and 7,500 trillion Btu in total fuel savings could be achieved by 2030 across all of the states, if industry were able to realize this doubled rate of energy efficiency improvement.

Assumptions:

In order to perform the analysis, some assumptions had to be made. These included:

- Fuel consumption for specific 3-4 digit NAICS codes is not available at the state level; therefore, this analysis assumed that the sectors in each state have the same electricity intensity as the national average.
- This analysis assumed that economic growth out to 2030 would be consistent with the historical growth seen in that sector from 2004-2012.
    - We wanted our estimate to utilize a conservative approach in projecting economic growth. Therefore, 2004-2012 was used since economic cycles tend to last

approximately 8 years, and this period incorporates a full economic cycle, including both a period of growth and recession.

Data sources:

- U.S. Energy Information Administration 2014 Annual Energy Outlook
- 2012 baseline data:
  - For NAICS 21, 23, & 31-33: Value of shipments data from the U.S. Census Bureau 2012 Economic Census.
  - For NAICS 11 (Agriculture): Value of shipments data from the U.S. Census Bureau 2012 Survey of Business Owners.
- Projecting growth multiplier to 2030:
  - For NAICS 31-33: Annual change in value of shipments data from the U.C. Census Bureau Annual Survey of Manufactures (ASM).
  - For NAICS 11, 21, & 23: Average annual change in Gross Domestic Product (GDP), using data from the U.S. Department of Commerce Bureau of Economic Analysis (BEA).

Results

Figure 1. Estimated Economic Potential Electricity Savings by State (2030) from Industrial EE (million MWh)

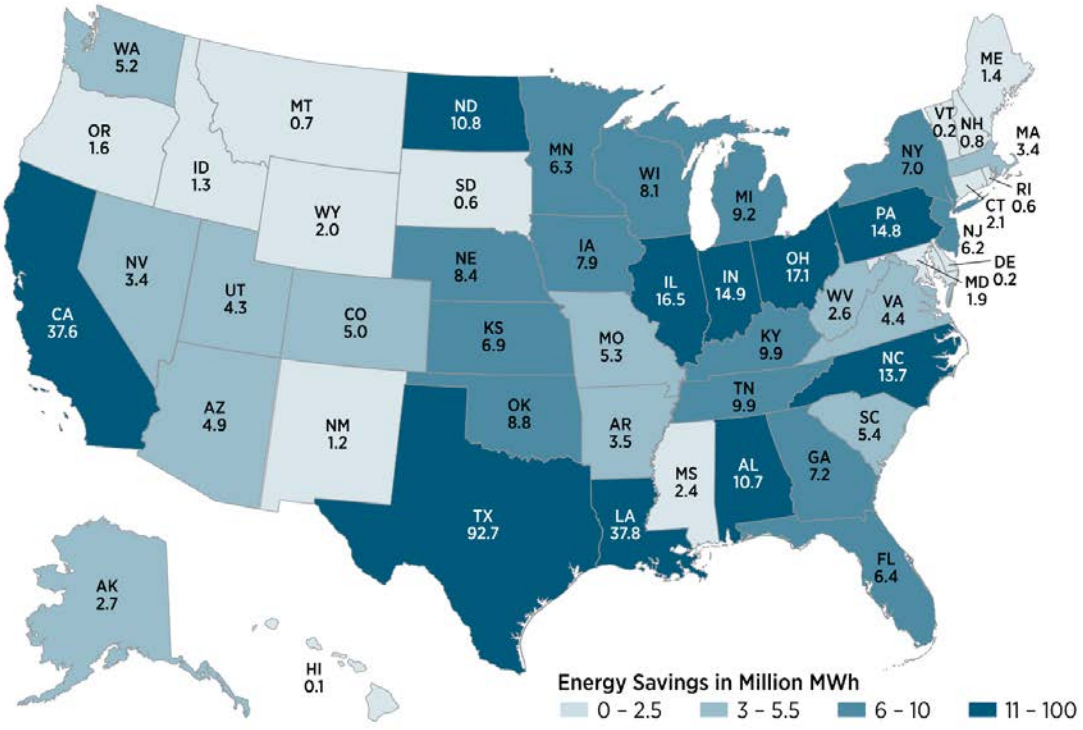

Figure 2. Estimated Economic Potential Energy Savings (all fuels) by State (2030) from Industrial EE (trillion Btu)