The Future of Energy

We consume energy for cooling, heating, lighting, industrial processes, transportation, food service, ventilation, and many other things. This consumption costs us money and has a substantial environmental impact due to greenhouse gas emissions from traditional energy production. While renewable energy is a climate-friendly alternative to conventional methods of energy production, we will have to use less energy first and perform energy-consuming activities as efficiently as possible to expedite the transition to renewable energy and balancing production with demand. Energy efficiency projects are a primary driver in this direction and a cornerstone for getting the future of energy in balance. According to Guidehouse Insights (https://guidehouseinsights.com/), global electric energy efficiency spending by governments and utilities is anticipated to increase from nearly $30 billion in 2019 to almost $60 billion by 2028.

How does the future of energy look?

1-Beneficial Electrification

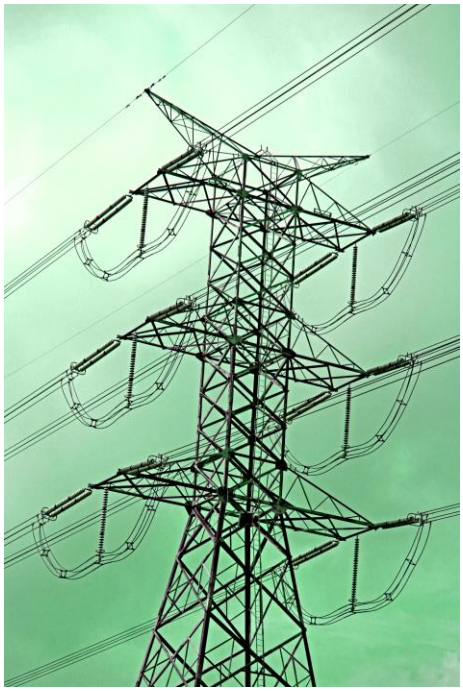
Beneficial electrification (or strategic electrification), as defined by the Environmental and Energy Study Institute (EESI) is replacing direct fossil fuel use (e.g., propane, heating oil, gasoline) with electricity in a way that reduces overall emissions and energy costs. While beneficial electrification aims to target the most viable and promising fuel switching opportunities, full-scale electrification might significantly increase electricity use! While moving forward with electrification, we need to make sure that:

1. The electricity is climate-friendly and;

2. the grid can handle the extra load.

The transition to 100% renewable energy will help make electricity more climate-friendly, and the focus on energy efficiency projects will help with the grid demand-side management. Electric heat pump technology has improved significantly, making this system type more effective in colder climates with low ambient temperatures. The efficiency of electric-powered appliances has also increased in recent years, making both electric heating systems and electric-powered appliances great candidates for beneficial electrification. As far as electric vehicle use, it should be evaluated based on the lifecycle carbon savings as compared to a gas-powered vehicle; the actual carbon savings depends on how the electricity is being generated.

2-Distributed Energy Resources



Distributed energy resources (DER), as defined by the Whole Building Design Guide (WBDG - https://wbdg.org/), are electric generation units (typically in the range of 3 kW to 50 MW) located within the electric distribution system at or near the end-user. They consist primarily of energy generation and storage systems. A few examples of DER strategies or technologies, as defined by the American Council for an Energy-Efficient Economy (ACEEE - https://www.aceee.org/), are energy storage, combined heat and power, and renewable energy, such as solar photovoltaics. While on-site generation can reduce power costs for the end-user and improve grid reliability and resiliency, the best value is to combine energy efficiency and on-site generation renewable DER technologies in a holistic approach.

Major Take Away

While Beneficial Electrification, Distributed Energy Resources, and Renewable Energy provide the "road" to the future of energy, the success of this journey relies on the intersection of all these domains with energy efficiency. We must use less first!

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