Misconceptions about Decarbonization

It is clear today that fossil fuel-fired equipment has a limited future in buildings due to technology advancements, policy, ESG requirements and other conditions. As asset managers, sustainability managers, and their consultants pursue decarbonization plans, they can often encounter misconceptions about decarbonization that delay action and progress. Below is a list of the misconceptions that came out of the Empire Building Challenge, and our solutions for how to overcome these challenges.

Simple Payback Measures

Instead of looking for tangential ways to create value, energy efficiency and decarbonization projects repeatedly fall into the trap of using energy savings (and some may now include carbon emissions fines savings) to justify investments in energy conservation measures. Often this linear thinking approach yields unattractive investment economics. Alternatively, conduct scenarios analyses including net present value calculations. The lowest net present cost or negative net present value (NPV) over the decarbonization period will provide deep insight into choosing energy conservation measures. Return on investment (ROI) and/or internal rate of return (IRR) on the incremental cost of action over a do-nothing baseline will help persuade real estate owners to prioritize these projects. Rather than a simple payback analysis that looks only at the decarbonization path, the analysis should focus on comparing a decarbonization path with a "business-as-usual" path. This approach helps isolate the incremental cost of decarbonization over a business-as-usual approach. This type of analysis requires completing a Strategic Decarbonization Assessment (SDA), which is based on a Discounted Cash Flow (DCF) analysis over the decarbonization period. The SDA should include the complexities of a capital refresh, tenant improvements, and non-energy benefits. Asset investment should be in the context of a comprehensive decarbonization roadmap rather than simply reactive maintenance.

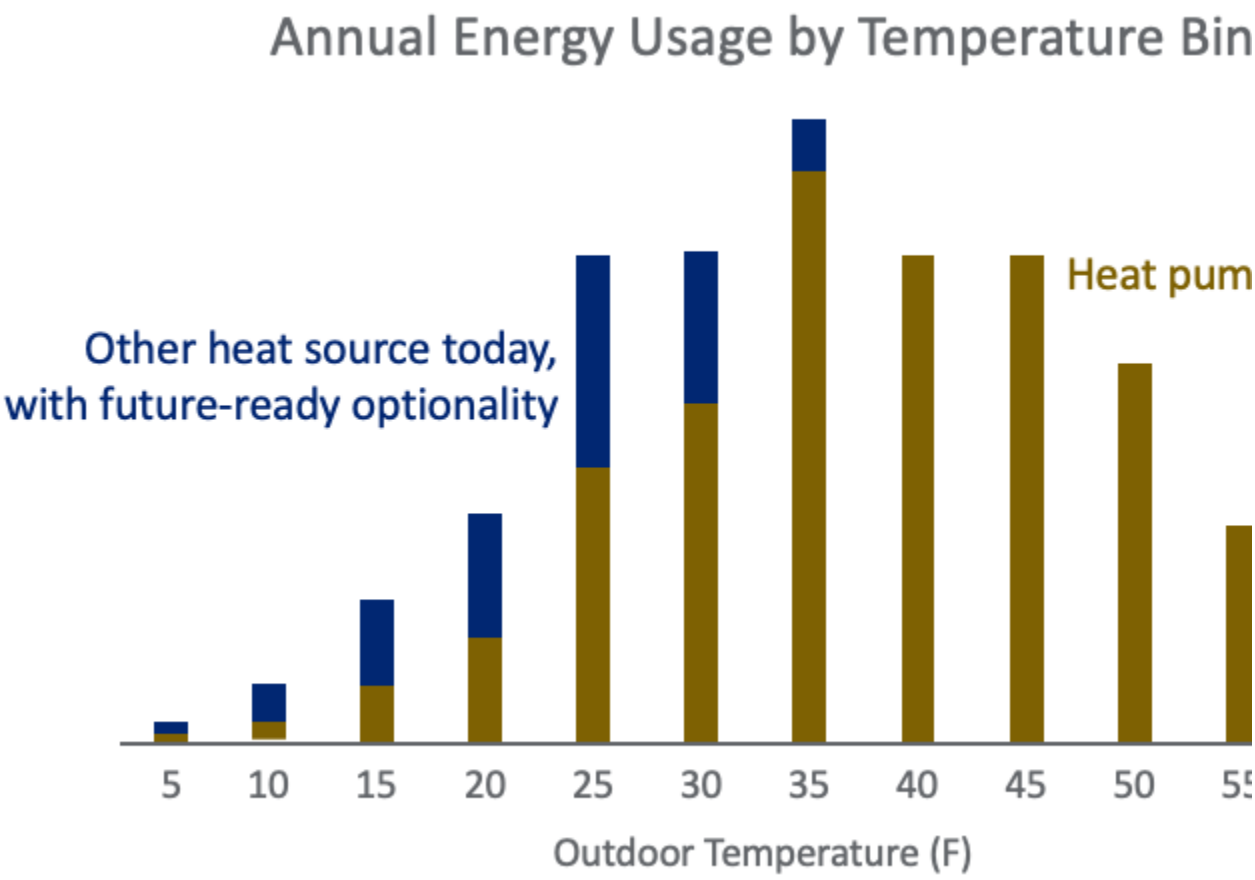
One-to-one Equipment Swap with Air Source Heat Pump

A one-to-one equipment swap with air source heat pumps, which is typically the first full electrification option considered, may not be a realistic decarbonization strategy particularly for owners of large buildings facing various constraints around thermal distribution systems, roof space, tenant disruption, and energy supply. In fact, we are suggesting you determine the building’s need for heat pumps toward the end of the decarbonization road mapping process so these heat pumps can run optimally. Significantly reducing loads, recovering and reusing heat wherever possible by enabling thermal networking, and using a cascading approach to decarbonizing easy-to-electrify loads is likely advantageous. Systems should be optimized to deliver heating or cooling efficiently over the integrated sum of the year’s diverse conditions, the vast majority of which are at part-load. Efforts to reduce and shift loads can help reduce peak capacity, and electrification of more difficult peaks may require special consideration within the building’s roadmap and taking a rational approach to resilience and accounting for evolving electric grid or thermal network supply conditions. This is the foundation of Resource Efficient Electrification (REE).

Electrify Everything . . . And Do it Immediately and in One Move!

Perhaps because the electrification movement was born in mild-climate California, the cold-climate, tall-building narrative has been incomplete. Decarbonization skeptics suggest that if it doesn't make sense to electrify everything in one simple move, then it doesn't make sense to electrify anything. Air source heat pumps have tremendously improved and may be a key component of electrification in cold climates, but they are likely only one part of the complete solution set for large and tall buildings. Such buildings must overcome space constraints and distribution challenges to provide comfort at peak load conditions without straining the electric grid or requiring oversized, sticker-shock-inducing equipment capacity.

A more suitable chant for Northeast electrification cheerleaders should be **Electrify Everything . . . Efficiently**. Engineers should model building energy consumption data across granular temperature bins (see Figure below) and plan for electrification with “easy” loads like domestic hot water, then mild temperature loads (typically representing 80%+ of total loads), and finally for the extremes. This is the cascade approach. Until a viable solution emerges, a building owner might even keep a small gas-fired boiler and their steam radiators around as a reserve as they learn to grapple with resilient functionality at heating design conditions. Despite global average temperatures increasing, cold snaps may even become more extreme thanks to a collapsing winter Polar Vortex.



Technology is Changing So Fast, Isn't Something Better Going to Come Along?

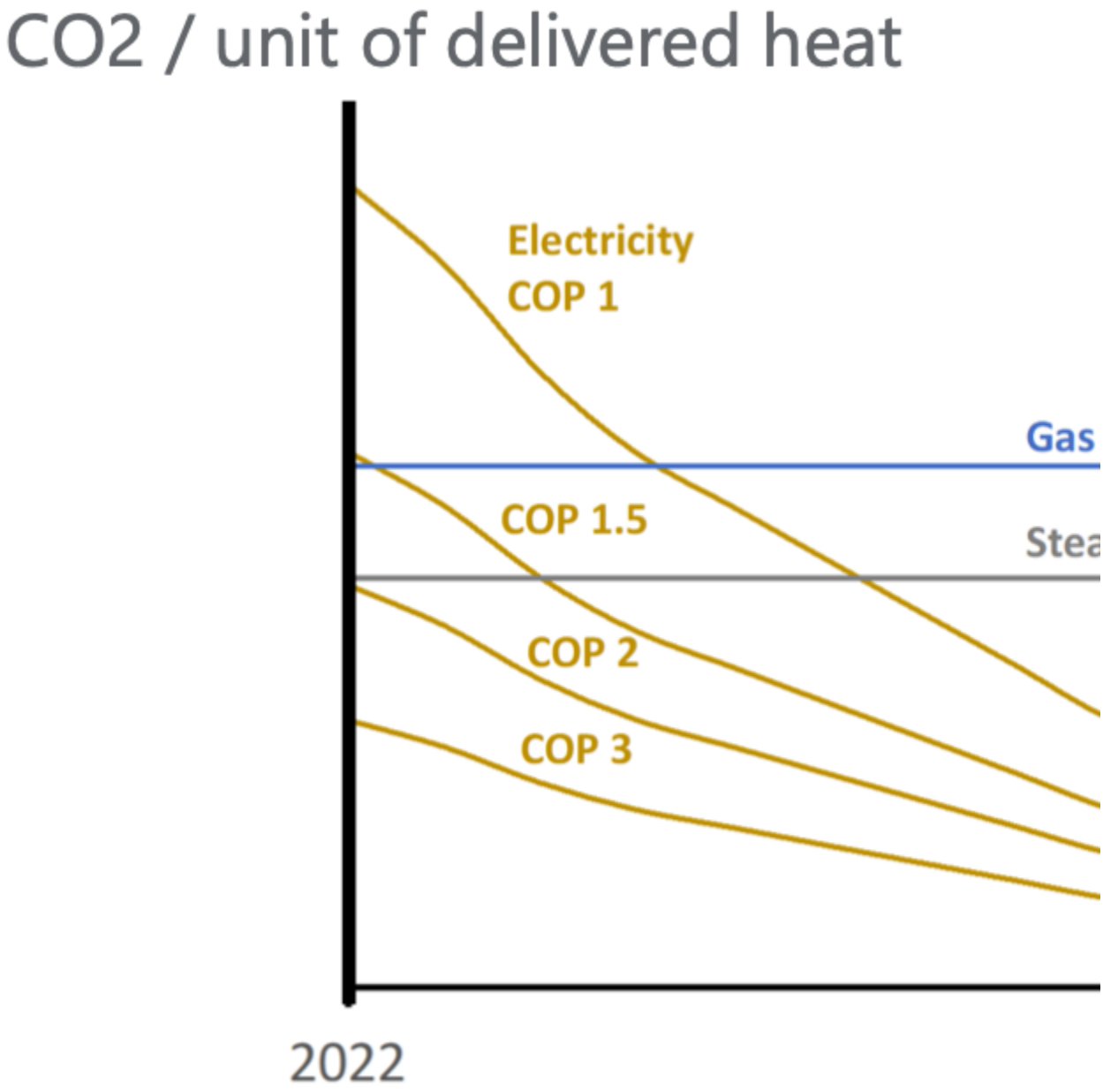
Yes, usually. So, hedge your bets. There are plenty of technology-neutral enabling steps to take prior to committing to a particular low carbon retrofit technology. Buildings are ever-evolving and exist on a continuum unless demolition is planned. Reducing loads, enabling thermal recovery, sharing and networking, and implementing grid interactivity measures are all priority measures that might take place prior to electrifying heat sources. Consultants also must determine the value of inaction and the value at risk if a building owner decides to do nothing. Balancing this risk with technological innovation on a time axis is a delicate analysis and is impossible to conduct without a Strategic Decarbonization Assessment. When in doubt, look to leverage your existing infrastructure like using chilled water loops for heating to replace partial loads. Electrifying perimeter heating used during extreme temperatures may be a later priority or off the critical path on a strategic decarbonization roadmap. Look to the case studies emerging out of the Empire Building Challenge for more information on this strategy.

My Tenants Don't Think This is a Priority

Consider tangential benefits of pursuing decarbonization early. For example, more and more Class A tenants are demanding environmental action from landlords to comply with shareholder environmental, social, and corporate governance (ESG) requirements. Accelerating facade improvements may reduce later invasive and expensive maintenance. Indoor air quality, improved comfort, and operability are emerging priorities among all tenant types. We know these are not fleeting priorities.

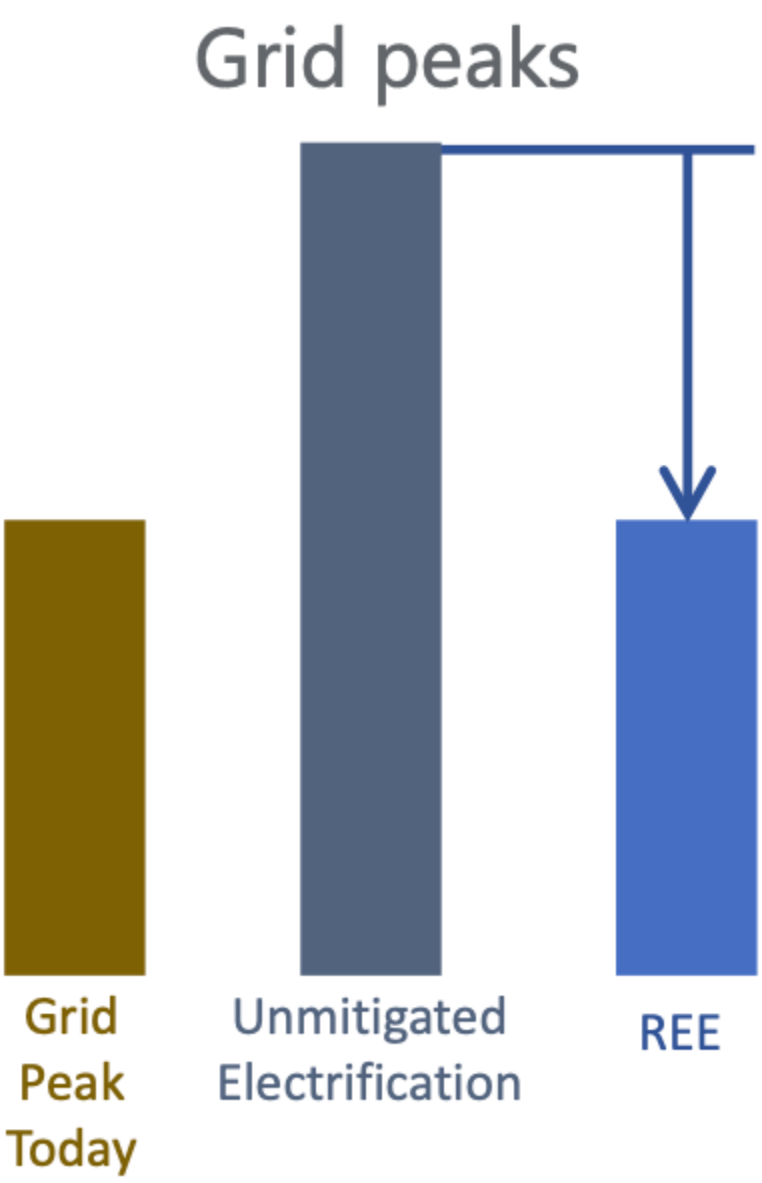
Electricity Produces Emissions

Yes, but not for too long. If the electricity is driving heat pumps, particularly during mild annual part-load conditions, emissions are likely to decrease even today. States are legislating 100% carbon-free electric grids like New York did in the Climate Leadership and Community Protection Act (Climate Act). Modeling total emissions over time using declining electric grid carbon emissions coefficients across multiple decarbonization scenarios is an important task. Phasing in electrification over time and in a strategic way is the only pathway to eliminating on-site emissions.



It’s Too Disruptive and Expensive to Decarbonize a Building All at Once

if this is true today, building owners should not abandon all attempts to decarbonize or plan for ongoing work to achieve carbon neutrality. Phased, incremental implementation of low-carbon retrofits across a continuum is critical to reaching building operations carbon neutrality in cold climates. Evaluate the cost-effectiveness of phasing and maintaining technology optionality and the risk mitigation benefits these efforts might deliver. Decarbonization efforts fall on a decision-making tree, which evolves as time elapses and technology, policy, or other conditions change; each branch of the decision-making tree is a new decision point. Sustainability and asset managers can plan these intervention points over the decarbonization period.



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