

BUILDINGS

ENERGY MANAGEMENT

An Efficiency-First Approach to Decarbonizing Commercial Buildings

Energy efficiency measures play an increasingly important role in the race toward realizing aggressive decarbonization goals. [Learn more.](#)

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In the race towards realizing aggressive global decarbonization goals and the path to net zero in commercial buildings, energy efficiency measures play an increasingly important role and warrants more attention.

Too often, energy efficiency has not received the priority focus it deserves when mapping the steps needed for an energy transition. But today, there is a growing consensus among commercial building owners and thought-leader engineers that energy efficiency measures should be the first actions taken in any decarbonization and energy transition effort, because efficiency measures are often the lowest hanging fruit, offering quick wins and both short- and long-term economic benefits.

Unlike many other decarbonization strategies, energy efficiency measures often generate attractive ROIs, which can help fund other more costly and less ROI-based measures. Lastly, and maybe most importantly, energy efficiency measures reduce the base energy demand in a building, thus dramatically lowering capital costs for many follow-on electrification measures (i.e., converting from natural gas to heat pumps). The results can be dramatic, as is evident in some of the most energy

intensive critical environments, where a dollar spent on energy efficiency can save five dollars in follow-on decarbonization capital costs.

So, when we talk about decarbonization and the energy transition, an “efficiency first” mindset should be adopted. Efficiency first, ahead of solar panels and other forms of clean energy, ahead of clean fuels like hydrogen, and ahead of carbon sequestration. Why is this the right path? Let’s look at the leading strategies for achieving decarbonization and the role energy efficiency plays in reaching net zero by 2050.

The Path to Net Zero: The Four Required Strategies

There are two points of growing consensus regarding climate change. First, we must limit the temperature increase to 1.5 degrees C. above pre-industrial levels. Secondly, we must reach net zero carbon emissions by 2050.

Not only will achieving these goals protect the planet, but reaching net zero also signifies energy independence and resiliency, for both prosperous nations and for those countries that are in earlier stages of growth. So, even though most of the world is completely aligned with the climate imperative, we don’t need to rest on that argument any longer. Today more than ever, we see the importance of energy independence and of a growing economy based on renewable energy sources.

To achieve net zero by 2050, the world must adopt these four strategies:

1. Energy efficiency
2. Clean energy supply (i.e. wind and solar advancements)
3. Clean fuel sources (i.e. hydrogen)
4. Direct air capture of carbon

Each of these strategies will certainly play a critical role and we need them all to succeed, though some will take longer than others. Failing to adopt any one of these strategies could lead to long-term catastrophe and, perhaps worse, short-term unrest in our global interdependent economy.

Achieving net zero will require thoughtful strategy and successful near- and long-term execution. Some technologies offering the most potential impact also have longer roads to full-scale adoption. Both fuel source switching and direct air capture (DAC), for example, offer great promise. However, they still require significant testing and development and are large-scale initiatives that represent costly infrastructure transitions. Like solar, they will evolve over time to become major players in our net zero energy future. Although their timelines may require a decade or more of continued optimization for price and performance, they will both contribute significantly to achieving net zero. Additionally, clean fuel sources, such as hydrogen, will provide increasing levels of resilience and energy independence.

Remember that even the most exciting and innovative technology-driven strategies are not standalone silver bullet solutions. This is both because they are not all available at scale today, and because each will significantly benefit from improved energy efficiency. Every kilowatt of demand that is removed from the built environment through energy efficiency measures represents one less kilowatt of supply that must be replaced. Every ton of CO₂ emissions that is avoided by energy efficiency measures represents one less ton that must be removed by DAC. So, not only does energy efficiency reduce the total amount of capital that must be deployed in hydrogen and DAC capacity, but it also makes the goal infinitely more achievable.

Lastly, and maybe the most important economically, efficiency measures generate positive cash flow today, which can help for-profit businesses fund the cost of developing and deploying the next generation of clean technologies.

What Does Energy Efficiency Look Like in Real-World Deployment?

Most of us know about lighting and many other low-hanging fruit opportunities that we must pursue. But in lighting's case, much has already been done and the impact is significantly less than the next big frontier: HVAC system efficiency.

A significant improvement in HVAC efficiency will play a major role in eliminating

the 28% of CO₂ emissions caused by commercial building operations. A combination of continued heating and cooling innovation, along with wider deployment of proven technologies and strategies is needed. One of these proven strategies is adopting an “efficiency first” approach to ventilation optimization, which is the closest thing we have to a silver bullet today.

Adopting the ‘Efficiency-First’ Mindset

Energy efficiency should be first on the list of net zero strategies because, as stated above, it drives down the required demand in the market and represents an impactful first step on the net-zero journey. With two-thirds of the world’s energy going to waste each year, the opportunity to significantly improve energy efficiency is huge, and deploying this measure first will make the overall energy transition easier to achieve and less costly.

An “Energy Efficiency First” strategy uses proven technology to make an immediate impact in commencing the net zero journey. It provides an economic business ROI that lowers costs and can help fund the more costly or negative ROI transition strategies. Lastly, it leverages the current and growing “carrots” (incentive programs) and “sticks” (cost of carbon, carbon reporting, ESG requirements).

We can make these gains in several areas and we should diligently pursue them all. As noted earlier, lighting efficiency has mostly been done, while other electrical equipment continues to be replaced and upgraded with more efficient versions (think variable frequency drives). HVAC is universally seen as the largest and most impactful target for major improvement, both from a demand and future optimization perspective.

It should be noted that providing ventilation and conditioning the air in buildings typically represents the biggest energy efficiency opportunity, both in terms of carbon reduction and delivered ROI. As a reminder, in many markets each dollar invested in HVAC energy efficiency today can save five dollars in the capital cost of follow-on

decarbonization retrofit measures, making this a truly infinite rate of return.

Of course, not all markets and end customers can benefit equally from ventilation improvement. For example, some potential industrial clients—such as ports and industrial processes, as well as shipping and flight transportation—have very energy-intensive processes. These will rely on the hydrogen revolution and certainly will take longer to achieve. The residential market has some potential, but most existing homes will require massive incentives to switch over and only time and policy changes will deliver real gains.

The World Building Council estimates that 28% of all carbon emissions come from building operations, demonstrating that the built environment offers the greatest potential for energy efficiency gains—all of which can be achieved now. Within this universe, life sciences, higher education and owner-occupied commercial real estate represent the easiest and largest immediate impact.

Why are these industries so appealing? They're the most energy intensive, they have the stakeholders that control the investments, and they benefit most directly from the savings. Plus, they realize and appreciate the core business benefits of improved productivity, safety and talent attraction that result from improved working environments and a demonstrated commitment to addressing climate change.

We expect adoption to continue accelerating with those clients, but achieving the net zero and 1.5 degrees C. challenges requires markets like K-12, government facilities, and investor-owned real estate to embrace an efficiency-first HVAC retrofit strategy. The benefits are the same for the public domain and investor-owned properties, but misaligned incentives and cumbersome decision-making processes have historically slowed or completely hampered adoption. New strategies, including better use of the “carrots and sticks” discussed above, will be required to make these markets achieve the same efficiency benefits.

In both the early adopter and slower-moving markets, tackling ventilation

optimization with an “efficiency first” mindset is one of the most impactful economic and carbon-reducing steps to start with, and it offers the true win/win/win approach that can jump-start the energy transition.

The energy transition is more urgent than ever. Fortunately, we can make significant progress today, on climate change, energy resilience, energy independence and a true net zero world using proven strategies and existing technologies. It really comes down to our commitment to starting this journey in the easiest and most economical manner possible. So, let’s massively reduce the hill we need to climb and get started on this journey with an “efficiency first” approach.

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Source URL: <https://www.buildings.com/energy-management/article/21004598/an-efficiencyfirst-approach-to-decarbonizing-commercial-buildings>