



The Unmanaged Third

Why plug and process loads are the biggest uncontrolled load in commercial buildings



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EXECUTIVE SUMMARY

A typical commercial building's electricity goes to HVAC, lighting, other building systems, and plug and process loads (PPL) — the workstations, displays, printers, charging carts, vending machines, water coolers, and window air conditioners and packaged terminal units that plug in or run outside a building's main systems. Plug and process loads are about a third of that electricity (NREL, 2013). HVAC and lighting are almost always automated, in some form, in a modern commercial building. Plug and process loads mostly aren't.

That gap isn't new, and the technology to close it isn't new either. What has kept it open is explained by the industry's own research: split incentives, poor access to cost and savings data, and codes that have started to require some controlled receptacles without closing the rest of the gap. This paper lays out the size of the opportunity, what's actually inside it, why it has persisted, and what becomes possible once it's measured and controlled.

1. Where a Building's Electricity Goes

Building owners and facility teams have spent two decades automating HVAC and lighting: programmable thermostats and building automation systems for the former, occupancy sensors and code-required controls for the latter. Plug and process loads — the devices that plug into a wall outlet or are hardwired outside those two systems — have mostly been left to run on their own schedule, which is to say, no schedule at all.

Plug and process loads are about a third of U.S. commercial building electricity (NREL, 2013); the rest is HVAC, lighting and other systems, with no claimed split between them. And as HVAC and lighting keep getting more efficient, plug and process loads can become a larger share of what's left.

A Typical Commercial Building's Electricity

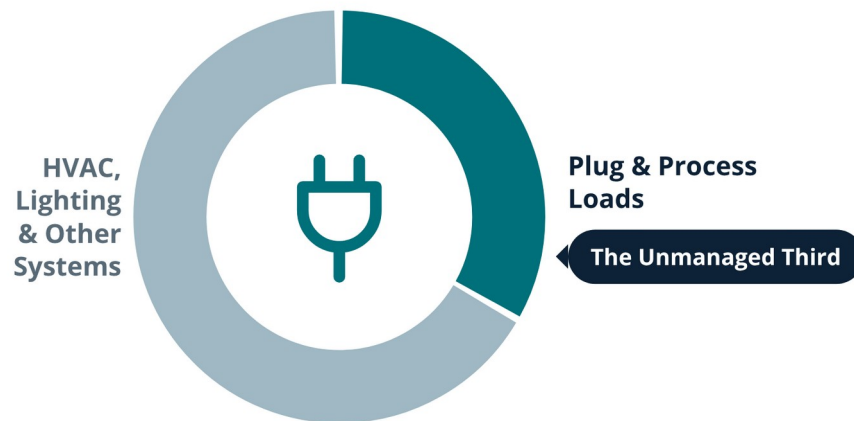


Figure 1. Plug and process loads are about a third of U.S. commercial building electricity; the rest is HVAC, lighting and other systems, with no split claimed. Source: NREL (2013). Chart as published on bertbrain.com.

2. What's Actually in That Third

"Plug and process loads" sounds abstract until you walk a floor and count them. In a typical commercial or institutional building, the equipment inside that third includes:

- Workstations, monitors, docks, and desk accessories
- Printers, copiers, and plotters
- Classroom and meeting-room displays, smartboards, and projectors
- Charging carts for laptops and shared devices
- Vending machines and break-room equipment
- Water coolers, fountains, and bottle fillers
- Window air conditioners and packaged terminal air conditioners and heat pumps (PTAC/PTHP)
- Water heaters and recirculation pumps

None of this is exotic equipment. It's the ordinary contents of an ordinary building — which is exactly why it's easy to overlook. A building automation system was designed around large central plant and major zones; it was never going to reach a desk printer or a break-room coffee maker. Someone has to reach those loads on purpose.

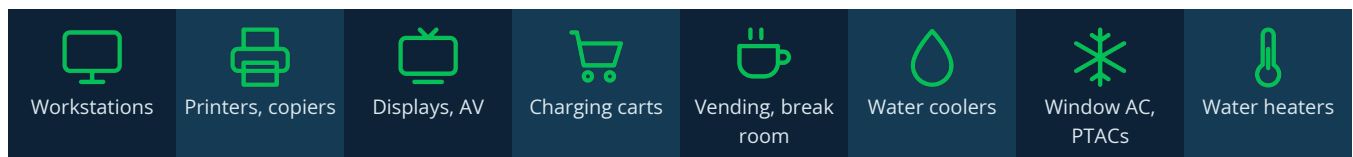


Figure 2. Typical equipment inside the third.

3. Why This Gap Has Persisted

If plug and process loads are a third of the electric bill, why hasn't the market already closed the gap? A 2024 study by researchers at the National Renewable Energy Laboratory (NREL) looked at exactly this question, through 44 interviews with commercial building stakeholders alongside a technical review of existing control

technologies and reduction strategies (Van Sant, Ghatpande, Tuttle & Trenbath, "Pathways to commercial building plug and process load efficiency and control," Energy Efficiency, 2024). Their findings line up with what shows up in the field:

- Split incentives: the person who decides what equipment to buy is often not the person who pays the electric bill, which weakens the case for anyone to act.
- Poor access to cost and savings data: without a clear, credible number, plug load control competes poorly for budget against more visible projects.
- Codes have started, but haven't finished: some energy codes now require automatic control of a portion of receptacles in certain spaces, which is real progress, but a code-required controlled receptacle mostly just switches power — it doesn't measure, report, or reach the equipment outside its own outlet.
- IT and cybersecurity teams need a seat at the table early, since any connected control technology touches the network — projects that don't plan for this can stall.

None of this means the opportunity isn't real. It means the barriers have been organizational and informational as much as technical — which is workable, once a project has better information and the right people involved from the start.

4. What's Achievable Once It's Measured and Controlled

Once plug and process loads are actually controlled, BERT plans around these ranges:

- Up to about 50% less energy on the devices actually controlled, by switching them off when nobody needs them and restoring power before anyone does.
- Typically about 7–10% of whole-facility electricity for a well-qualified building — a planning range, not a promise.
- Payback typically within two to six years.

"Your savings depend on how many devices we control, what they are, and when your building is empty." That's true of any building, and it's why an estimate is always specific to a building rather than a single number for the industry.

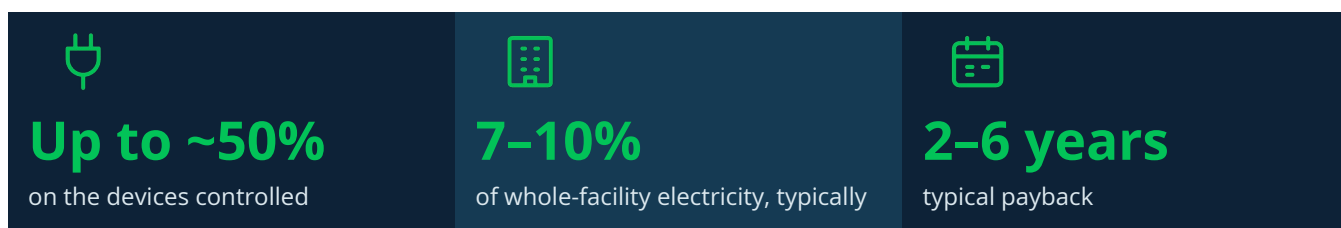


Figure 3. The planning ranges BERT uses. Your savings depend on how many devices we control, what they are, and when your building is empty.

5. Closing the Gap

Closing this gap starts with measurement, not assumption — you can't manage equipment you haven't counted, and you can't prove savings you haven't measured. From there, the equipment that's actually left running needs a control strategy that fits how it's used: a straightforward schedule for equipment that can

simply be off when a building is empty, and load-aware logic for equipment that shouldn't be cut off mid-cycle, like a projector cooling down or a compressor mid-cycle.

None of this requires replacing what's already working. HVAC and lighting keep doing what they do well. Plug and process load management is the layer that reaches what they don't.

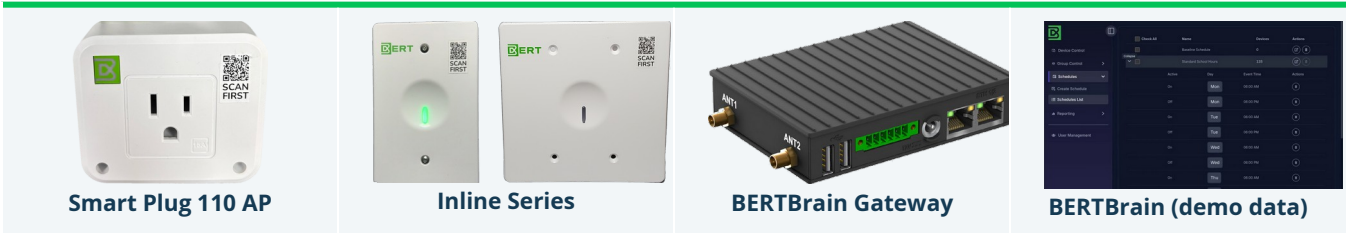


Figure 4. The BERT system: plug-in and hardwired controllers, the on-site BERTBrain Gateway, and BERTBrain software.

Sources

1. NREL, Assessing and Reducing Plug and Process Loads in Office Buildings (PDF, 2013).
2. Van Sant, A., Ghatpande, O., Tuttle, R., & Trenbath, K. "Pathways to commercial building plug and process load efficiency and control." Energy Efficiency (2024) 17:96. National Renewable Energy Laboratory.



About BERT

BERT (Best Energy Reduction Technologies, LLC) has focused on commercial plug and process load management since 2011, based in Wayne, PA, just outside Philadelphia. bertbrain.com