

Data Center Energy Efficiency: The Power of Compounding - IO



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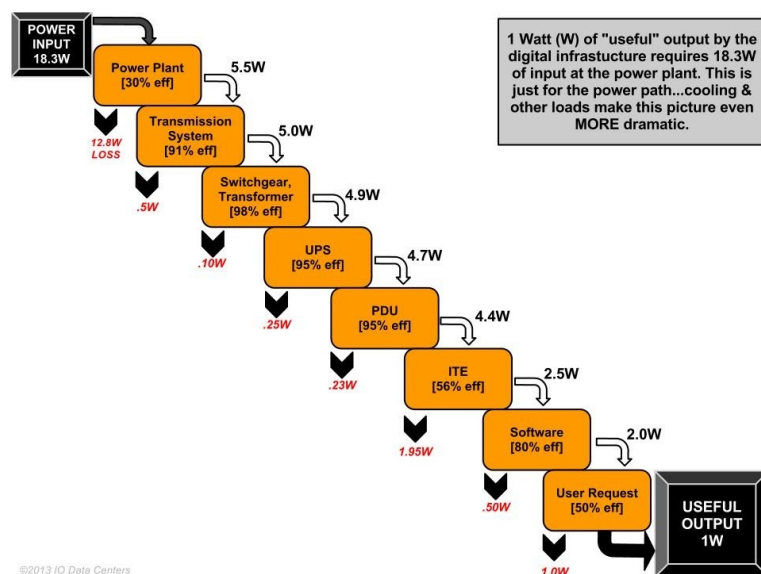
Data Center Energy Efficiency: The Power of Compounding

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Compounding is not just for banks. It applies to energy savings in your data center as well. Small changes downstream can have significant benefits on total system input requirements. Energy efficiency at the end of the power path is more important than at the source due to compounding or cascading savings. It's similar to why you should start saving for retirement today – because each year the savings is compounded.

The trick is to identify where adjustments to systems can be made that will make a difference. Oftentimes, it takes the right tools that can gather and interpret data along the energy usage path. The numbers in the graphic are general approximations and they paint a stark picture of overall system efficiency:



In the graphic you see that 1W of "useful" output requires 18.3W of input power at the power plant. On average, out of 100 units of primary energy

going into a power plant, only 27 units reach the power meter. And, based on our approximations for every 4.4W that reaches the Information Technology Equipment (ITE), only 1W gets put towards “useful” work. In between those tails of the power path, we talk about metrics like Power Usage Effectiveness (PUE). It’s an important metric to look at, but it clearly doesn’t encompass the full story and it is definitely not the point of greatest energy efficiency leverage, the end of the power path is.

The simple system above doesn’t account for any power needed for the cooling system, lighting, etc. so the true full story looks even starker.

As much as this highlights new places to look for energy efficiency in the data center, it also provides some food for thought for our daily lives. Small changes you make in lifestyle have cascading environmental benefits upstream as well. Use one less plastic water bottle each day and what do you have...a reduction of one bottle in landfill? Sure, but you also have energy and water savings all the way through the lifecycle, from creation of the PET plastic and transport, to the bottler, to the production, filling and transport of the bottle, the transport to the store, the transport to you, etc.

It’s the same for the water inside the bottle as well. Think about these examples:

- One liter-sized water bottle requires 3 liters of water to make
- One pound of beef requires 1799 gallons of water in production

You are the small, distributed consumer at the end of the energy and materials economy, just like the individual servers in the data center.

This cascading effect is one of the many reasons why our **IO.OS® software** is so impactful. The very end of the energy path in the data center world is the user. If we can get the users the information they need to be smarter about energy consumption through how they use data services or how they write software, then we can make huge reductions in energy usage, emissions and costs. Reduce energy demand from the end user by one unit and input energy at the power plant drops by almost twenty units!

IO.OS can securely manage and monitor your data centers across the globe and provide business intelligence, real-time visibility, and control of your environment. The ability to monitor, track, and maintain records of all critical systems with continuous feedback allows operations and engineering teams to take actions that help bring increased energy efficiency to your data center. Module-to-module PUE values (one efficiency metric in the data center) are updated through the dashboard every 5 seconds. We even tie this information to utility costs, letting you see the financial impact directly in real-time.

The best path to energy efficiency is to use all of the available data in your data center infrastructure to influence decisions that result in compounding savings.

Patrick Flynn is the Lead Sustainability Strategist at IO. He holds an MBA from the MIT Sloan School of Management as well as a BS in Mechanical Engineering from Stanford University. His work includes identifying, prioritizing and implementing a wide array of projects within IO’s operations and product platform. He is a Professional Engineer (HVAC) and LEED Accredited Professional.

Tags: energy, IO.OS, Patrick Flynn, PDU, power input, useful output

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