

LinkedIn Data Center Evolution



Q&A With Partners Who Helped Make It Happen

By Sharon Vollman, ISE magazine

LinkedIn's data center in Hillsboro, Oregon, is an example of sustainable infrastructure and sophisticated design and execution. According to LinkedIn, the primary criteria when selecting the Oregon location were: procuring a direct access contract for 100% renewable energy, network diversity, expansion capabilities, and talent opportunities.

Infomart Data Centers and LinkedIn closely collaborated on design and execution to produce an 8 MW data center that met very demanding goals for both performance and

efficiency. IT loads were expected to be heavy and dynamic. Therefore, meeting both goals was challenging.

Both organizations wanted to make a statement about sustainability. Therefore, the mechanical and electrical designs blended new and traditional efficiency approaches, and the site is powered by low-carbon energy. Affirming the achievement of the vision, the facility and staff were recognized by Uptime Institute with the M&O Stamp of Approval for management and operations as well as the Efficient IT Stamp of Approval.

To understand the process and results better, ISE interviewed 2 executives deeply involved in the process.

Q&A With **Julian Kudritzki**, Chief Operating Officer, Uptime Institute

ISE: What is the Uptime Institute, and why is it important?

Kudritzki: Uptime Institute's role is to develop industry standards, guidelines, and methodologies for the design, implementation, operations, and governance of data center and IT infrastructure. With over 25 years of experience, Uptime Institute ensures adherence to meaningful outcome-based and adaptable criteria for a range of solutions and innovations.

Starting with the Tier Classification System in the 1990s, Uptime Institute has developed rigorous standardization and certification systems to ensure capital project success (Tier Certification), the confirmation of rigorous operations programs (Management & Operations Stamp of Approval), and proven good stewardship of corporate and environmental resources (Efficient IT Stamp of Approval).

With offices around the globe, Uptime Institute is a unique thought leadership resource to steer IT Infrastructure investment and leverage existing assets.

ISE: What criteria did you use to award the LinkedIn Data Center?

Kudritzki: The LinkedIn Data Center at Infomart-Portland underwent a thorough management-level assessment across Leadership, IT Infrastructure, and the Data Center. The Efficient IT Assessment evaluates management processes to identify and redress waste, as well as evaluate and take advantage of innovative technologies to reduce resource consumption.

In the words of Sonu Nayyar, VP of Production and IT Operations for LinkedIn, "Efficient IT is a strong confirmation that the management functions of IT, data center engineering, finance, and sustainability are aligned."

With multiple stakeholders engaged to complete the assessment, Uptime Institute experts traveled to the Portland data center, as well as LinkedIn corporate offices in Silicon Valley.



ISE: What are the data center trends that you see as the most important in 2017?

Kudritzki: From our perspective, one of the most notable trends is the opening up of IT to other corporate stakeholders. Traditionally, IT has not excelled at welcoming new faces to the table. But in 2016, our research shows a higher level of involvement in IT by the functions of risk, finance, and sustainability. This is key to continuing to interlace the “business of IT” into the corporate fabric, and for IT to be both viewed and appreciated as a strategic asset rather than a cost center.

By increasing its transparency in terms of resource consumed -- inclusive of expense, staff time, utilities, and carbon -- IT becomes better at decision-making, and more apt to compete with outsourcing options such as Cloud.

ISE: What influenced you to do the work you do?

Kudritzki: There is tremendous pressure on the IT and data center industry to justify the resources it consumes. As consumers increasingly consider environmental impact of products, IT needs a better story about what resources it puts to work as well as its inherent value. To date, the story has relied on the etherized view of compute infrastructure by end users; self-confirmation, and/or obscure engineering ratios. But, with mounting outside pressure and the increasing demand by IT, the stakes are too high to merely claim that the right thing is being done. Notably, the LinkedIn IT footprint is growing globally -- while many enterprises are shrinking. That said, LinkedIn didn't let an aggressive pace outweigh their commitment to their goals of good stewardship and resource consciousness. And, they submitted to Uptime Institute's rigorous, third-party Efficient IT to prove their claims and identify additional opportunities for continuous improvement.

Q&A With **John Sheputis,** President, Infomart Data Centers

ISE: Talk about why LinkedIn chose Oregon.

Sheputis: LinkedIn's data center is located at 21515 NW Evergreen Parkway, Hillsboro, Oregon. The Portland market captures all that a data center operator should be looking for when selecting a market: sustainability, operating expense, access, and risk. Portland's sustainability starts out strong due to an overall energy mix that is lower in carbon than anywhere else in the country. With Portland's climate, LinkedIn is also able to enjoy free cooling the majority of the year.

With no sales tax and the city's Enterprise Zone status, Portland has one of the lowest operating costs in the US. The Portland area is highly connected, sitting on primary North/South and East/West fiber pathways and has superb access to international subsea cable systems. Because it is the only major city on the West Coast not located on a fault line, Portland's geography presents fewer risks.

ISE: How is it different from other data centers?

Sheputis: The way that the data center is cooled makes the mechanical design and operation very unique. The facility's critical cooling is provided by the world's largest deployment of rear-door heat exchangers (RDHx), which allow for unprecedented resource control in rejecting heat from variable IT loads.

To support fluctuating power density, RDHx technology can control IT heat at the cabinet level. The chilled water supply uses water-side economization for free cooling, and the site runs on low-carbon power sourced from the Bonneville Power Administration. Electrically, the facility relies on industry-leading efficient UPS, and uses 415-volt power distribution to the IT cabinets.

ISE: What thermal management process is used?

Sheputis: Infomart deployed rear-door heat exchangers in LinkedIn's Portland facility, supporting the tenant's cabinet designs up to 24kW while achieving the highest possible level of efficiency. Rear-door heat

exchanger technology removes the heat from server racks, and by utilizing a closely coupled method, higher chilled water temperatures can be used -- so less energy is required compared to more traditional approaches. In addition to closely monitoring air temperature, the building control systems manage air and water pressure as well as water temperature.

ISE: How is energy conserved?

Sheputis: Rear-door heat exchangers allow the management of the cooling resource to exactly where and when cooling is needed, which in turn enables the delivery of water at a raised temperature of 67 degrees. This means the energy needed to cool the water is significantly less, and that ambient cooling can be used to chill water throughout majority of the year. In addition, the facility achieved a 1.06 PUE during commissioning, proving this design to be one of the most energy-efficient in the world.

ISE: What was the biggest challenge they encountered designing and building it?

Sheputis: The biggest challenge was finding a way to cool dynamic loads that could range from 6kW to 24kW at the rack level while still maintaining the highest level of efficiency. We needed to maximize rack power density against design capacity. This effort was a success, creating one of the most sustainable IT operations in the world.

Data Center Building Best Practices

5 Keys for ICT providers looking to better their data center operations and processes

By Julian Kudritzki

1. Schedule periodic asset utilization audits across data center and compute functions.
2. Implement a charge-back or showback system so end users know the costs of provisioning IT. (IT chargeback is an accounting strategy that applies the costs of IT hardware, software, Cloud services, or shared services to the business unit in which they are used. IT showback is similar to IT chargeback, but the prices are for informational purposes only and no one is billed.)
3. Convene a multi-stakeholder Hardware Review Committee that meets periodically to review asset utilization reports, opportunities to refine chargeback or showback, and evaluates requests for new infrastructure spending.
4. The Hardware Review Committee should incorporate the disciplines of server, storage, network, data center, finance, and sustainability.
5. A single committee member may encapsulate multiple disciplines, and an executive sponsor is key to success.



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