



Microsoft Corporation

Our mission is to empower every person and every organization on the planet to achieve more

One Microsoft Way
Redmond, WA 98052

Number of Employees: 126,079
Website: Microsoft.com

Year Founded: 1975

Region Served: Worldwide

Profile

Microsoft Corporation is an American multinational corporation headquartered in Redmond, Washington. They develop, manufacture, license, support and sell computer software, consumer electronics and personal computers and services. Its best-known software products are the Microsoft Windows line of operating systems, Microsoft Office suite, and Cloud services. Flagship hardware products are Xbox game console and the Microsoft Surface series of tablets. They are the world's largest software maker measured by revenues.

Last fall, we shared our ambition to substantially simplify the datacenter, or as we have been saying for the past decade, “make the datacenter disappear.” In fact, almost 10 years ago, we rolled out our concept called “Tent City,” where we demonstrated the idea of airside economization to greatly simplify and improve cooling efficiency. Since then, we have been doing that, in part, by increasing our use of renewable energy and using data insights to drive meaningful changes in the way we design, build and operate our datacenters.

The mission of the project is to build the world’s first gas datacenter. In this pilot, racks are directly connected to natural gas pipes and fully powered by integrated fuel cells instead of traditional electrical gear. The Advanced Energy Lab is a 20-rack datacenter located in Seattle. What makes this so disruptive is how radically it simplifies the process of powering servers and how it could almost double the energy efficiency of datacenters—all while reducing costs and improving reliability.

The stark and simple design significantly reduces the amount of energy lost in power generation, transmission and power conversion. Currently, datacenters are powered by the electric grid, which flows from a power plant, through multiple substations and transmission lines, and then must be converted into the right voltage for a datacenter before use. With fuel cells powered directly from a natural gas line, we cut out those steps and remove the energy losses that occur through a long transmission process.

The grant from the Department of Commerce contributed to sophisticated test equipment critical to understanding the air quality, electrical and environmental dynamics within the lab. Our partners include Cummins and McKinstry, who are committed to building clean systems and buildings.

Milestones:

Project kick off - 1/3/2017

Install Horiba Gas Analyzers - 11/30/2017

Install Building Automation System - 02/28/2018

Install Electrical Monitoring and Integration Equipment - 7/31/2019

Install Automated Fuel Cell Repair System - 12/31/2018



Figure 1: Gas supply



Figure 2: Gas clean up system



Figure 3: Fuel cell systems above computer racks

Challenges:

The primary challenge was understanding codes and regulations required for the recent fuel cell technology. The fuel cell equipment was not UL certified, which required us to hire a field UL consultant. The consultant worked closely with the City of Seattle to compare the intricacies of this technology against best in practice safety standards and find a solution that worked well for the project.

Successes:

The project was completed on time and on budget with very little complications, typically seen in datacenter projects. This can be attributed to the very simple architecture. The permitting and city inspection process was also very smooth thanks to all the pre-work with the city before the project began.

What could have been done differently?

Better coordination between the technicians installing the monitoring system and the team installing the fuel cells would have resulted in a faster install.