



Data centers—buildings that house and protect large numbers of computer servers—are essential for any business that, like ours, is IT-intensive. But powering and cooling data centers also requires large amounts of energy. In our continuing efforts to manage energy consumption and greenhouse gas emissions as our Company grows, we are utilizing creative solutions as we deploy new data centers at our Company headquarters.

In 2010, we deployed our first HP Performance Optimized Data Center, or POD. Housed in a shipping container, the POD's design dramatically reduces the amount of real estate and power needed to operate a large number of computing systems; it contains more than 1,000 servers in just 320 square feet. A traditional data center would require more than 5,000 square feet to support the same power and heat load. The performance results of our first POD were so impressive that we commissioned a second, even more efficient, POD in October 2012. The new POD is expected to save 575,000 kilowatt-hours and \$78,000 annually.

In 2013, we deployed a prefabricated modular data center, or MOD. Produced at a factory and assembled on our campus, MODs are more cost-effective than traditional brick-and-mortar data centers, in part because they reduce deployment time. Like PODs, they enable us to house more servers in a smaller space.

We have further increased energy efficiency by pairing several of our data centers with our natural gas-powered co-generation plants. The turbines in our co-generation plants run around the clock every day—a perfect match for our data centers' requirement for reliable, 24/7 power. Also, we capture the heat produced as a by-product of power generation and convert its energy to cool our data centers, reducing the burden on the electric chillers and avoiding additional electricity usage. Finally, by placing our data centers as close as possible to our co-generation plant, we enable more efficient energy transfer. We expect that pairing a MOD with a co-generation plant at just one of our San Diego facilities will allow us to avoid consuming more than 4 million kilowatt-hours annually. We will also avoid 66 percent of the greenhouse gas emissions associated with conventional data center use.

In sum, deploying PODs and MODs along with our co-generation plants enables us to use about 30 percent less energy to cool our servers, lowering our Power Usage Effectiveness (PUE) to 1.18—a level below federal targets for data center efficiency.

Because there are limits to the returns that can be gained by minimizing data centers, we will continue to look beyond PODs and MODs to other solutions for maximizing computing capacity per watt of energy. Among them is Platform as a Service (PaaS) for cloud provisioning, which employs infrastructure-virtualization and application orchestration technology to support more computing with fewer hardware resources.