ANNUAL SUSTAINABILITY REPORT

December 2015 - December 2016

GREEN HOUSE DATA

Contents

From the CEO

Green House Data is a high-growth company in a high-tech industry that has historically consumed significant resources, including massive amounts of electricity.

When we founded the company a decade ago, we set down in our chartering documents the pursuit of a greener alternative to enterprise computing. Last year's sustainability report set the baseline by which we continue to measure and improve our operations with regard to energy efficiency and environmental responsibility.

While larger data center and cloud service providers are making enormous investments in green power and energy efficient operations within the past few years, Green House Data has been doing it all along.

That's part of the reason why the EPA recognized Green House Data as a Top 30 Technology & Telecom Green Power purchaser once again this year, as we retired over twenty million kilowatt hours of RECs. We also recertified as a B Corp in 2016, passing a more stringent examination compared to our initial certification and also improving our overall score.

We've done a better job in many areas, adding the tracking of air miles and refrigerant gases and implementing the One-for-One program to plant trees for our promotional materials. But we still have room to improve, especially in our social responsibility goals like volunteering and giving back to the communities in which we operate.

Thank you for joining us on this journey. We hope Green House Data can help our customers reach their CSR goals, inspire our representatives to pursue legislation that is beneficial for both companies and the environment, and encourage our employees to be environmentally and socially conscious every day.

Shawn Mills
President, CEO, and Founder

1. Environmental Impact

Green House Data operates in an energy-intensive industry with myriad consequences for the environment. While the primary concern is electricity consumption, and the carbon emissions linked to its generation, computing equipment and associated operations like diesel generators, HVAC chemicals, and typical office functions all contribute to emissions, waste, and environmentally dangerous byproducts.

A founding tenet of the company is operating in as environmentally-friendly a model as possible. The Green House Data charter includes provisions for purchasing Renewable Energy Credits (RECs) for all energy use and striving for low Power Usage Effectiveness (PUE) ratings.

We join industry giants like Google, Facebook, Apple, and Amazon in purchasing green power and focusing on energy efficient improvements. Of course, when one of your largest business expenses is electricity, it makes sense to become more efficient. But we strive to go further than the business rationale might justify in our pursuit of green operations.

The company continues to grow and expand in every data center facility as well as adding additional staff and customers, all of which contributes to a higher carbon footprint year-over-year. We remain carbon-neutral due to the purchase of RECs and carbon credits. All Green House Data facilities are operated at a PUE of 1.3 or less.

Some of the improvements made with efficiency in mind for 2016 included new containment systems in the Seattle data center facility, which will help lower air conditioning requirements, the purchase of a Chevrolet Volt

Power Usage Effectiveness (PUE)

PUE measures the total energy use of the data center compared to the energy used by IT equipment. In other words, for every watt used to power IT equipment, how much is used for cooling, lighting, and additional infrastructure?

Dropping from 1.8 to 1.2 PUE in a 10 MW facility can save between 36,000,000 and 100,770,000 pounds of CO_2 emissions annually, depending on the electric grid region.

The average data center PUE is 1.8 - 2.0. Green House Data averages 1.3, with a low of 1.14 in Cheyenne DC02.

for our managed service team to use in the field, introducing a new program to purchase one tree for each promotional item ordered, and the implementation of a company-wide training program to highlight and reinforce green practices.

1.1. Renewable Energy Credits

Green House Data invests in Renewable Energy Credits to support clean energy generation and the creation of new green energy projects. Each REC stands as a record of one megawatt-hour of renewable energy added to the general pool travelling the electric grid. When a company or individual buys an REC, they claim credit for that green energy.

The income stream from REC purchases travels through brokers and on to renewable energy development companies, who use the extra funds for new projects like wind farms or solar arrays. Where RECs get tricky is when companies use them as part of their claims to be carbon-neutral, or as strictly a marketing trick. An REC alone can not cancel out a company's energy use. It might lead to more renewable energy generation down the line, and it might allow claims for 100% green power. But we are all still drawing from a grid that is 67% powered by fossil fuels. By purchasing RECs, Green House Data support green energy development for the entire grid, not just our own facilities.

The large companies who are withdrawing from RECs are starting to focus more on in-house solutions and reducing energy use rather than offsetting it. These are admirable goals and we applaud them—our strategy, too, has always been a combination of efficiency and RECs. For smaller organizations, however, building an on-site solar farm like Apple's is economically unfeasible. With an enormous upfront cost, plus the fact that even a massive array will still require additional grid power (especially in energy-hungry industries like data centers), the ROI can become decades long. RECs can help bridge this gap, putting investment immediately towards green power generation.

The company invests in RECs from Renewable Choice in Boulder, Colorado. The amount of kWh covered by RECs is estimated in December or January to cover anticipated energy use for the next calendar year. All of these RECs are third-party certified by Green-e.

In 2016, the company acquired 16,627,000 kWh worth of RECs from Renewable Choice, representing 11,630 metric tons of carbon emissions saved. In addition, the company made a one-time investment of 3,643,000 kWh worth of RECs to cover additional electric load not forecasted and due to facility growth. This single purchase was made from Greenlight Energy.

These purchases have helped propel the company to the 27th highest ranked EPA Green Power Partner within the Tech & Telecom space.

1.2. Energy Efficiency

Green House Data takes a number of measures to reduce data center energy consumption, including:

- Free cooling year-round
- Modular data center "pod" design
- Hot/cold aisle containment
- Focus on virtualization
- Energy Star equipment
- Power supply efficiency minimums
- Power and temperature measurements and tracking

Most data centers are using some form of **virtualization** these days, in which servers can run multiple virtual machines (VMs) on a single piece of hardware, using more available power and resources. This is the cornerstone of cloud computing and increases CPU utilization by 40-60%. According to VMware, virtualizing just 100 servers is the equivalent of planting 1,569 trees or taking

89 cars off the street—and a typical data center has far more than 100 servers.

As mentioned in the PUE sidebar above, **by improving our PUE we reduce our carbon emissions by as much as 1/3**, depending on the electric grid subregion (eGRID).

1.3 Green House Data One-for-One Program

In addition to RECs, Green House Data implemented a one-for-one program in 2016 in which each piece of marketing material ordered is paired with the planting of one tree by the Arbor Day Foundation. This includes items like branded water bottles, apparel, and other tradeshow giveaways or internal employee gifts.

As part of the tree purchases, the Arbor Day Foundation also provides carbon credits for a 10 year span, attached to each tree and fully traceable. **With the initial purchase of 1,000 trees, Green House Data retired an additional 167 metric tons of carbon emissions.**

The trees will be planted as part of the Arbor Day Foundation's Mississippi Alluvial Valley project. Green House Data will continue to make periodic purchases to cover the additional 2,500 items from the prior year, and will also continue to purchase trees for promotional items in 2017 and beyond.

1.4. Facility Energy Use

Electricity remains the top contributor to Green House Data's carbon footprint. This is impossible to avoid within the data center industry, but we can reduce this impact through energy efficient improvements. As our facilities continue to fill up with additional clients and equipment, our electric use grows alongside it.

The graphs below illustrate the overall energy consumption, as well as monthly breakdown and a comparison to the 2015 calendar year.

Fig. 1: Energy Consumption From All Locations

Location	eGrid Subregion	kWh Purchased	CO2 Emissions	CH4 Emissions	N20 Emissions
Cheyenne, WY	RMPA	8,136,890	15,433,564.7	184.4	237.7
Portland, OR	NWPP	207,360	174,717.4	3.3	2.7
Newark, NJ	RFCE	103,680	103,858.3	2.8	1.6
Denver, CO	RMPA	50,861	96,469.6	1.2	1.5
Bellingham, WA	NWPP	2,415,874	2,035,567.1	38.8	31.6
Everett, WA	NWPP	1,341,520	1,130,337.9	21.5	17.5
Orangeburg, NY	NYCW	1,153,726	718,102.4	27.5	3.2

Fig. 2: Energy Consumption By Month
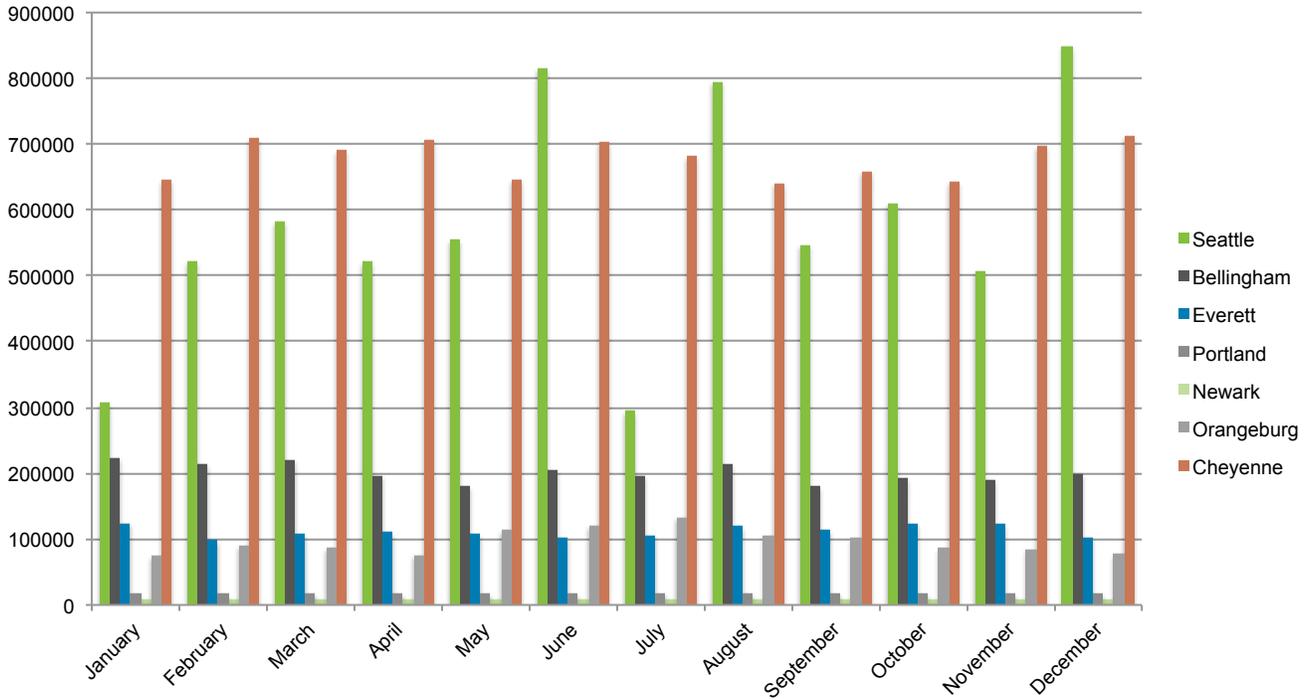
Fig. 3: Energy Consumption, 2016 vs. 2015
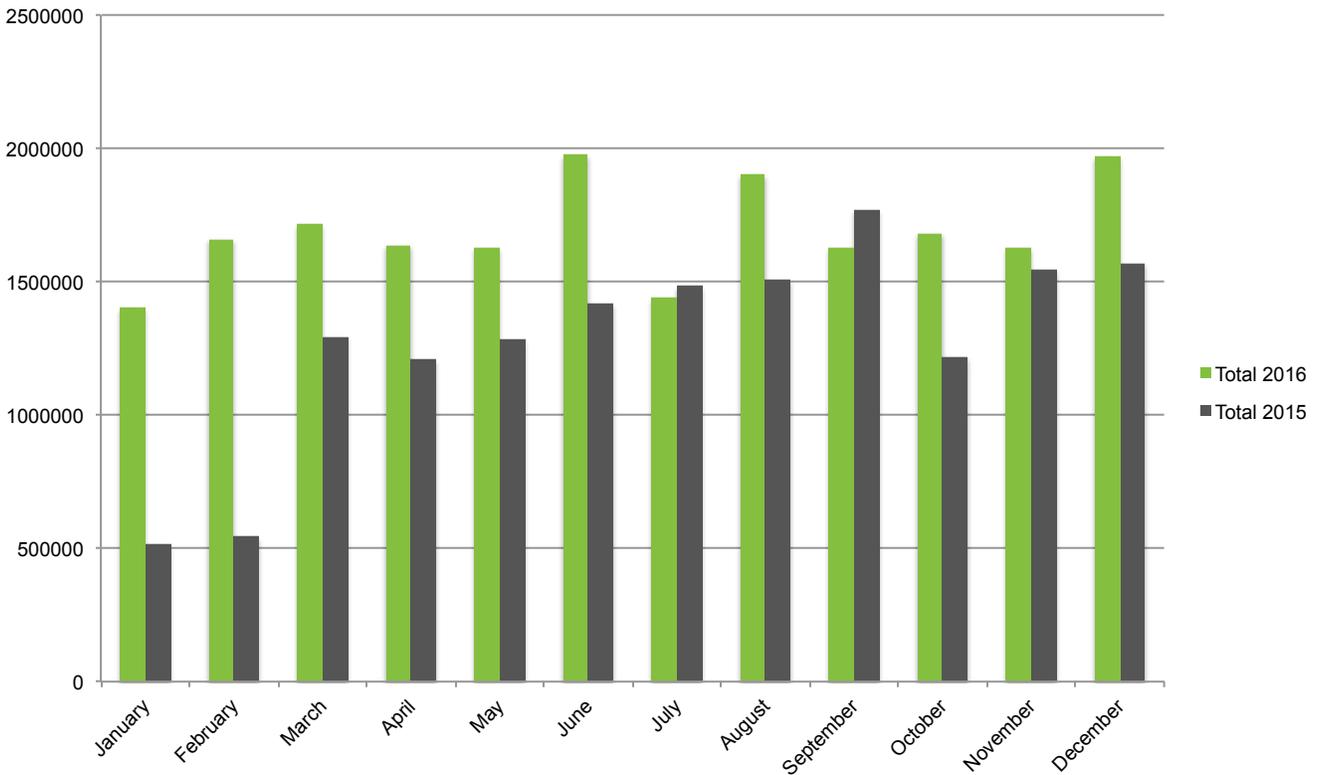
Electricity totals are not provided by building owners in Denver, Portland, or Piscataway. Estimations were therefore made for the Portland and Piscataway locations by assuming a 12 kW rack density running 24/7 for the calendar year. In Denver, the office space energy consumption was calculated using approximate square feet and the national average consumption as described by the EIA: https://www.eia.gov/consumption/commercial/data/2012/c&e/cfm/c13.cfm.

1.5. Facility Water Use

Green House Data facilities and offices used a known 2,909,930 gallons of water in 2016, an increase of almost nine hundred thousand gallons over last year. This increase is largely due to the additional workloads within our facilities, as water consumption is closely tied to HVAC systems.

We estimate an added 1,400,000 gallons in addition to this measured consumption from offices that do not receive individual water bills, as well as colocated server rooms that are using a portion of water from total facility consumption (from chillers, office areas, humidifiers, etc). These colocated facilities are in buildings owned and operated by third party entities that only include the cost of water as part of overall rent, and not as a line item.

Efforts to reduce water consumption have been made in Green House Data offices including low flow aerated faucets and zero-flush urinals, where possible.

1.6. Company Travel

While the Employee Handbook does recommend limited and shared travel when possible, Green House Data owns three vehicles for on-call technicians and company errands; in addition, mileage may be expensed when personal vehicles are used on company business. In 2016, a new company tool was implemented that allows tracking of flight mileage and associated carbon emissions. The company also purchased a Chevrolet Volt electric vehicle as part of its Cheyenne fleet, replacing a less efficient SUV.

Fig. 4: Mileage Emissions

Transport Type	CO_2 (kg)	CH_4 (g)	N20 (g)
Passenger Car	18,133	887	641
Light-Duty Truck	2,796	134	106
Airplane	19.280	18	120

1.7. Diesel Emissions

Data centers must remain online at all times, so diesel powered generators are a common fixture at the vast majority of facilities. Green House Data must purchase and burn some diesel for testing and to use up fuel that will expire on occasion.

Green House Data only required diesel purchases in Everett, WA and Cheyenne, WY in 2016, with purchases totaling 2,702.9 gallons.

1.8. Refrigerant Emissions

A major part of data center operations is maintaining a constant, efficient temperature for computing equipment, necessitating the purchase and maintenance of large-scale refrigeration units. While Green House Data implements a variety of energy efficient methods to minimize the amount of refrigeration required, the Data Center Operations team must still recharge the units periodically.

In 2016, Green House Data had an inventory change of approximately 50 pounds of R-407C gas and 30 pounds of R410A gas. The CO_2 emissions equivalent of these gases is 68.6 metric tons.

While R22 has been phased out of production in the United States due to its high Global Warming Potential, the expense involved in replacing the air conditioning units that use R22 is significant. When these units reach their end of life, or recycled R22 is no longer available, Green House Data will replace them. **In 2016, the company purchased approximately 70 pounds of R22, but was unable to find a CO_2 equivalent to include in the overall Green House Gas Emissions tracking.**

1.9. Total Green House Gas Emissions

The combination of Renewable Energy Credits and carbon credits from tree purchase helped to bring us below net zero for the calendar year of 2017.

Fig. 5: Net Emissions by Source

Emissions Category	CO2-e (metric tons)
Stationary Combustion	7
Refrigeration / AC	69
Purchased and Consumed Electricity	11,630
Employee Business Travel	40
RECs and Green Power Purchases	-11,630
Offsets	-167
NET GHG EMISSIONS	**-50**

2. Green House Gives: Community Engagement

Green House Data encourages volunteering through corporate and personal channels, with company-organized outings, monetary and labor donations, and dedicated resources for both employees and nonprofit organizations. Employees are allowed to take 5% of their billable hours as personal time to volunteer in their communities.

2.1. Green House Gives Nonprofit Program

In addition, 5% of staff hours and infrastructure resources are reserved for nonprofit organizations, which receive services as part of the Green House Gives Program. This program is designed to support the launch, growth, and on-going support of social and environmental nonprofit entrepreneurs.

3. Corporate Ethics and Transparency

Green House Data strives to operate in a transparent, ethical manner, going beyond sustainability efforts and encouraging an open and honest business environment within our offices and when dealing with customers, vendors, board members, and the public.

As part of this goal, Green House Data was certified as the first B Corp in Wyoming in 2014. B Corporations are certified by the nonprofit organization B Lab as having voluntarily met the rigorous standards of social and environmental performance, accountability, and transparency within the overall goal of redefining success in business. Green House Data joins other B Corps like New Belgium Brewing, Etsy, Renewable Choice and Patagonia. There are more than 1,800 Certified B Corporations from over 130 industries and 50 countries, representing a diverse multi-billion dollar marketplace.
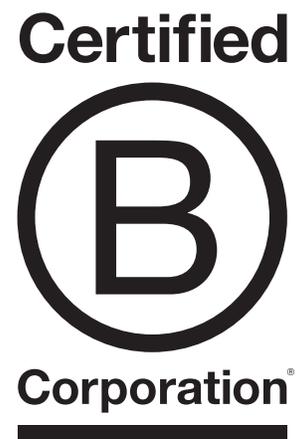
In 2016, the company recertified with B Lab and improved its score on the assessment significantly. Highlights included equal pay for employees of any sex, environmental commitment, and reinvestment in employee training and professional development.

Supervisors practice an open-door style of management all the way up to the CEO, who holds quarterly meetings informing the entire staff of the strategic direction of the company. Financial details including the Profit and Loss sheet are shared with employees upon request.

Green House Data governing policies and the Employee Handbook include policies preventing discrimination and child labor. Policies also encourage or enforce confidential whistleblowing, the facilitation of employee training and ongoing education, grievance resolution, and local purchasing and supplying preferences.

4. Office Environments

The company launched a "green captain" program in 2016 to provide leadership within each office location centered around sustainability and minimizing waste. Efforts included new signage encouraging less printing and turning off the lights. A new sustainability training deck was created as part of new hire orientation. Battery and plastic bag recycling was implemented in each office. Low-flow faucets were installed where possible.

Green House Data also offers a reimbursement of up to $50 to employees who wish to plant a tree or bushes on their home property.

5. Data Privacy and Security

Green House Data takes strong measures to segregate and protect customer data. With audits to certify SSAE 16 Type II and HIPAA compliance, the company has proven to external parties that its data security software, hardware, and employee practices are sound.

The company suffered no known data breaches in 2016 affecting customer data.

6. Future Goals

Goals for 2016 from last year's report included the tracking of air travel miles for more precise emissions data, the implementation of company guidelines and a green training program for all employees, an improvement in our B Corp assessment score, and the addition of containment within data centers in Washington state.

We are pleased to announce that we met all of these goals in some capacity, falling short only in that the Seattle data center was the only facility in Washington to add new containment.

For 2017, the company will continue to pursue efficiency improvements across the entirety of the organization, focusing on data center facilities. Green House Data purchased Cirracore, an Atlanta-based provider of cloud and colocation, in Q1 2017. One of our primary goals is to ensure their operations meet our standards of efficiency and sustainability, including purchasing RECs for this new location.

As part of the company's expansion, a further goal is to continue to climb up the EPA Green Power Partner Top 30 Tech & Telecom list, a ranking of the most renewable energy purchased by corporate and nonprofit entities in the United States, specifically those within the technology and telecommunications world. As of 2016, Green House Data was the 27th highest on the list.

In Green House Data offices, a stretch goal for 2017 is to implement some mechanism to track waste and recycling in order to improve the amount recycled and to decrease the amount sent to the landfill.

Thanks for reading. This concludes the 2016 Green House Data Sustainability Report.