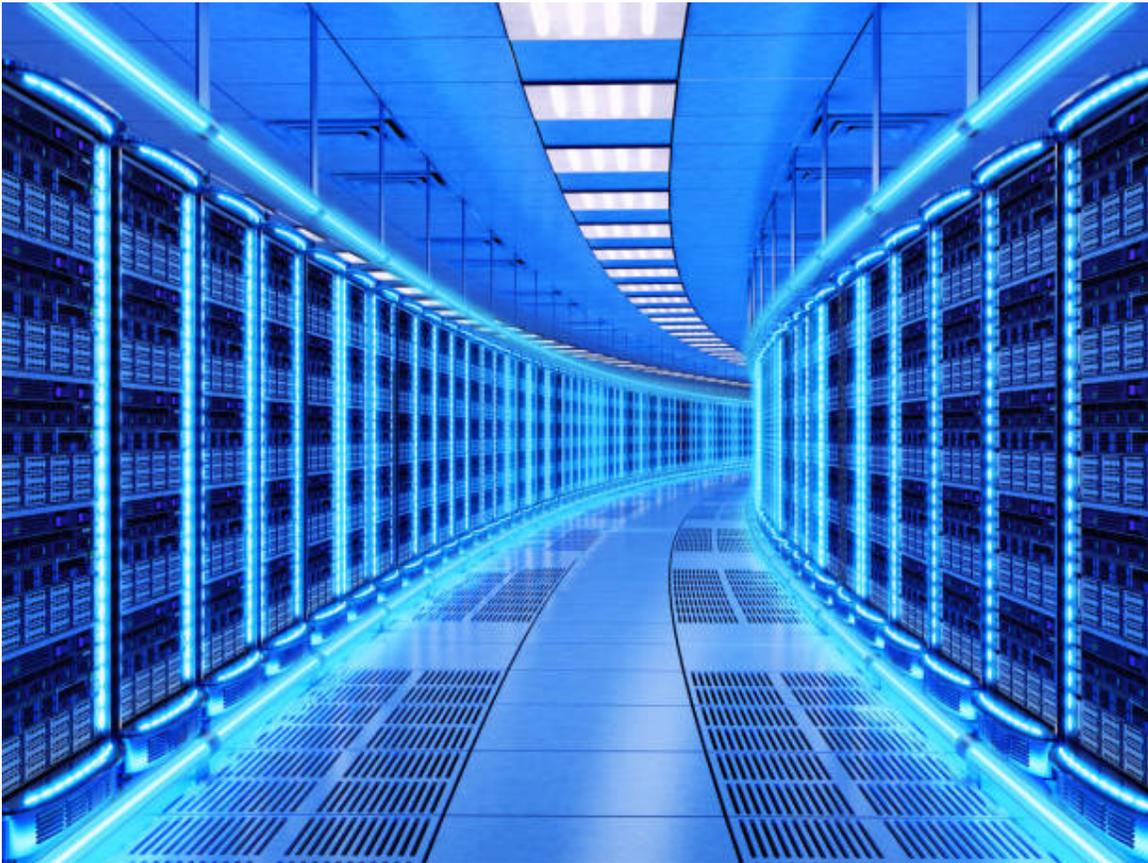




Gas Pressure to Green Energy™

Gas Letdown Generator™ for Data Centers



Langson Energy's Gas Letdown Generator™ or GLG™ is an economically viable solution to reduce energy demands at Data Centers with a nearby PRV (Pressure Reduction Valve). This revolutionary process not only utilizes the wasted kinetic energy during the pressure letdown process at the gas line, but also generates valuable cooling for liquids or air from the pressure reduction.

I. Introduction

Data centers process, store, and communicate data behind the myriad information services the world relies on every day, whether it be streaming video, email, social media, online collaboration, or scientific computing.

Data centers utilize many Information Technology (IT) devices to provide these services, ALL of which are powered by electricity. Servers provide computations and logic in response to information requests, while storage drives house the files and data needed to meet those requests. Network devices connect the data center to the internet, enabling incoming and outgoing data flows. The electricity used by these IT devices is ultimately converted into heat, which must be removed from the data center by cooling equipment that also uses electricity.

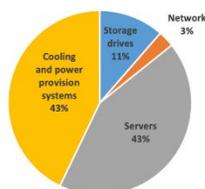


Figure 1. Fraction of U.S. data center electricity use in 2014, by end use. Source: Shehabi 2016.

Generally, servers and cooling systems account for the greatest shares of direct electricity use in data centers, followed by storage drives and network devices. Some of the world’s largest data centers can each contain many tens of thousands of IT devices and require more than 100 megawatts (MW) of power capacity—enough to power around 80,000 U.S. households (U.S. DOE 2020).

As global internet use increases, the need for data center services increases and even more energy will be needed. These strong growth trends are expected to continue as the world consumes more and more data. And new forms of information services such as artificial intelligence (AI), which are particularly computationally-intensive, may accelerate demand growth further. Therefore, the ability to quantify and project data center energy use is a key energy and climate policy priority.

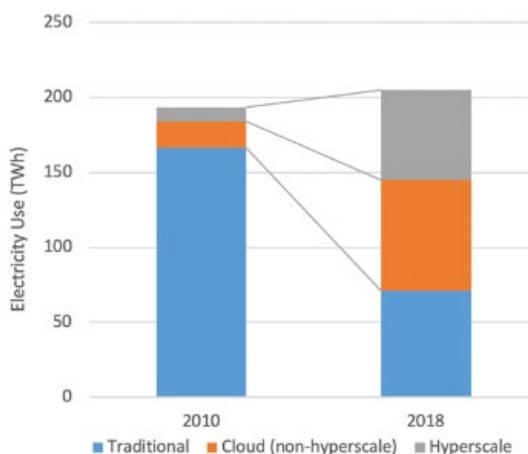


Figure 2. Estimated global data electricity use by data center type, 2010 and 2018. Source: Masanet et al. 2020.

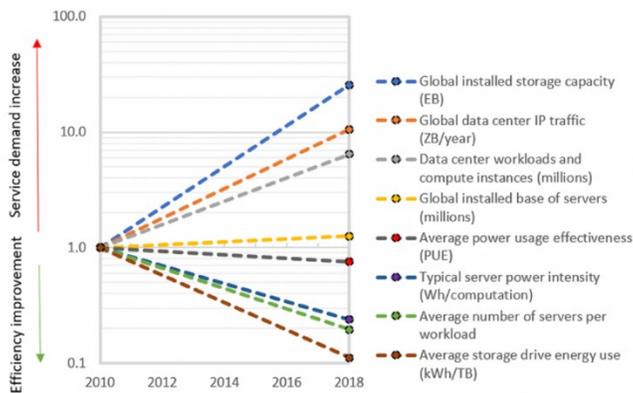


Figure 3. Relative change in global data center energy use drivers (2010=1). Source: Masanet et al. 2020.

The good news is that, thanks to innovations like Langson Energy's GLG, global data center energy use does not need to increase in direct proportion to the internet use! IT devices (especially servers and storage drives) energy efficiency has improved substantially due to steady technological progress by IT manufacturers, greater use of server virtualization

software (which enables multiple applications to run on a single server), and most computer instances have migrated to large cloud and hyperscale-class data centers, which utilize ultra-efficient practices such as Langson Energy offers.¹

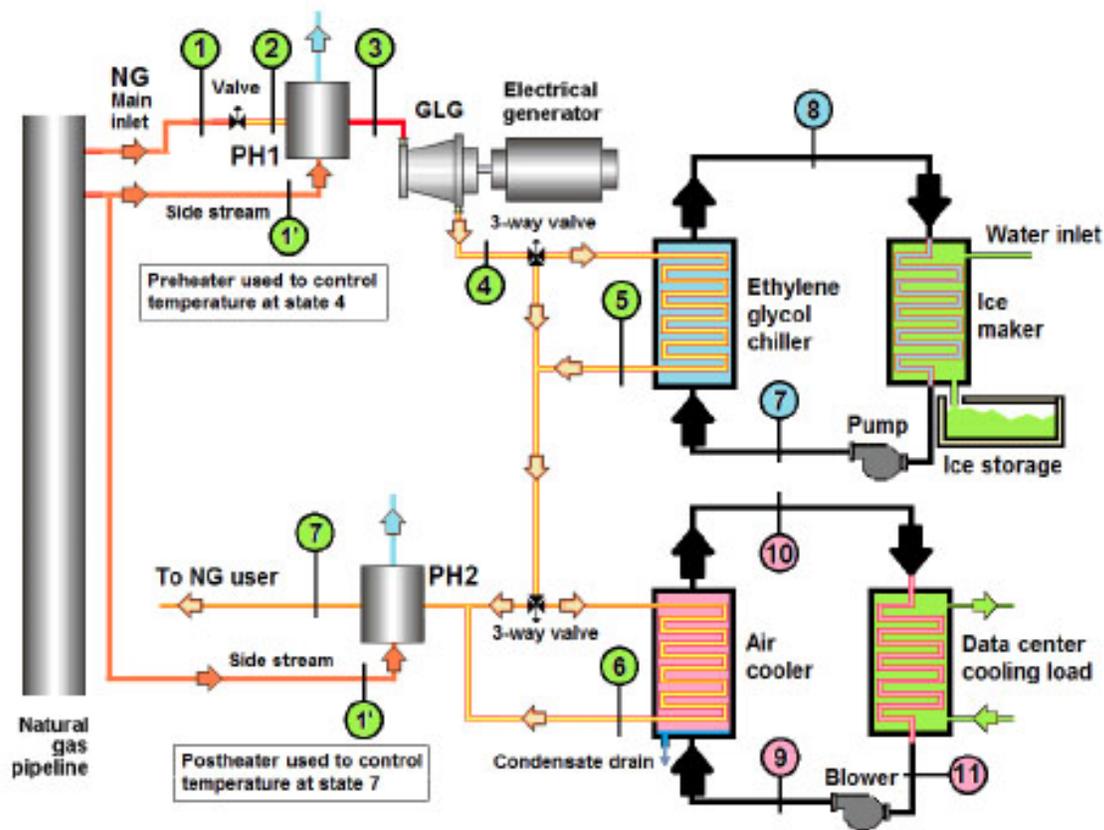
II. Langson Energy's Solution

Energy experts from Elon Musk to data center managers and engineers are searching for solutions to deal with the intense energy demands required in data processing. Industry practices are evolving rapidly from using green energy for air cooling to using multi-level energy-efficiency systems capturing wasted energy to cool liquid immersion solutions while also generating electricity.

Langson Energy, Inc's Gas Letdown Generator (GLG) is capable of capturing the wasted kinetic energy at the Pressure Reduction Valve (PRV) providing the Data Center with energy from nature gas to not only generate electricity but also provide the valuable cooling for liquids or air from the pressure reduction. Langson's GLG utilizes 2 forms of often wasted energy:

1. The wasted kinetic energy at the PRV, and
2. The wasted cooling, often described as Joule–Thomson effect (or Joule–Kelvin effect), which decreases the temperature of a real gas that is allowed to expand freely at constant enthalpy (or adiabatic free expansion - which means that no heat is transferred to or from the gas, and no external work is extracted).

Data centers utilizing liquid immersion cooling can further improve their efficiency by using a GLG instead of cooling towers that consume enormous amounts of water, need water treatment and maintenance and are frowned on by USA municipalities or use dry cooler systems that are very inefficient and ineffective in warm climates, are very expensive, and consume power to operate.



Capital Costs – The installed capital cost of the GLG System is significantly less than other energy efficiency solutions. Langson Energy's technology is integrated with proven components that have a history of reliable, robust, low-maintenance performance.

Operating Costs – The operating costs of the GLG System are estimated to be significantly less than alternative environmentally friendly systems. The only routine maintenance is a bearing and seal replacement every 50,000 hours on the GLG™ & traditional maintenance on the Cogenerator. The GLG™ will run for countless hours, trouble-free, providing extremely low maintenance and operational costs and with significant advantages in durability.

Base-Load Green Power – Langson's GLG Cogen System operates 24 hours a day, 7 days a week, generating low cost green power capable of fulfilling green energy mandates **while increasing** base-load generating capabilities.

Distributed Power – Another key advantage of the GLG Cogen System is the fact that it is distributed generation. Distributed resources not only provide benefits in the form of more reliable power for industries that require uninterrupted service, they improve the efficiency of providing electric power as the transmission of electricity from a power plant to a typical end user wastes roughly 4.2 to 8.9 percent of the electricity. The use of on-site power equipment can conceivably provide consumers with affordable power at a higher level of quality.²



Blackstart, Stand Alone and Off Grid Capability – In the stand-alone mode, the GLG Cogen System can be used to power motors and other equipment needing electricity of megawatt capacity.

Redundancy Capability – Lower capital investment and GLG Cogen System’s modular and compact design allow for the ability to create parallel, expandable and redundant power generation capabilities on a distributed basis. On those sites with sufficient flows and pressures to warrant multiple units, multiple units could be deployed.

V. Summary



Langson Energy’s Gas Letdown Generator could be a solution to the worldwide energy crisis at Data Centers!

It uses:

- 1. waste energy**
 - 2. energy from pressure reduction to power IT equipment**
 - 3. Provides tremendous cooling from the Joules-Thomson effect.**
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References:

¹ Energy Innovation, <https://energyinnovation.org/2020/03/17/how-much-energy-do-data-centers-really-use>

² Consortium on Energy Restructuring, Virginia Tech, 2007, www.dg.history.vt.edu/ch1/benefits.html