FUTURE–PROOFING AI DATA CENTERS THROUGH RENEWABLE POWER

(Waste Heat Recovery)

Albert Einstein was right on in 1930 when he patented the first heat pump to support a refrigerator. He was right on because heat pumps leverage the energy used to yield a higher output. In 2020, Tesla started adding heat pumps to their cars and in some cases getting a 5-1 leverage on energy consumed. The US has millions of heat pumps in homes, and now heat pumps are available for AI data centers.

Data centers are the perfect fit, with over 90% of the energy consumed generating recoverable heat. It is low quality in many cases, but that is where the heat pump energy leverage pays off. Technology today can take low-quality waste heat and improve it, combining it with other sources of renewable energy, and store the energy to reduce peak load and improve ROI. Unlike other technologies that may use batteries, the heat pump technology can store energy in a closed loop, not only adding value in return but also protecting the environment. The results:

- Reduced CAPEX & OPEX
- Improved reliability
- Protecting the environment
- Creating US jobs
- Conserving water

In this 5-part series, American Tank & Vessel will break down the use of industrial heat pumps and clean energy storage for AI data centers.

PART 1 – DATA CENTER WASTE HEAT RECOVERY

Basic waste heat recovery is through technology known as ALBERT (Accumulating Latent BTUs with Energy Retention Technology). ALBERT was named after Albert Einstein for his introduction of the original heat pump.

Today, ALBERT technology leverages a range of innovative technologies in conjunction with its original premise of achieving higher levels of energy efficiency. Some AI data center waste heat sources originate from:

- Cooling systems
- CPU/GPU processing
- On-site power generation

By designing energy efficiency around waste heat utilization, data center growth yields more waste heat to future-proof the power supply. Future-proofing with heat pumps and energy storage support:

- Scalability
- Compatibility (renewable & non-renewable)
- Smart grid readiness
- Environmentally friendly energy storage integration
- Resilience and redundancy
- Environmental and regulatory compliance
- Cybersecurity with remote monitoring
- Flexible voltage and frequency capabilities

In summation, future-proofing with ALBERT technology helps to mitigate technical, economic, and regulatory risks over the lifetime of the data center. Furthermore, data centers with ALBERT technology also lend themselves to an environmentally friendly way to store energy. CRCES™ (Carbon Reduction Clean Energy Storage) technology works with heat pumps to help store the energy in combination with the heat pump's performance. CRCES™ is a closed loop system and has LDES (Long Duration Energy Storage) that outperforms Lithium-ion batteries for applications of 4 or more hours.With maturing markets realizing the need for improved LDES, it is common for customers to look for greater value in performance. CRCES™ has a positive economic advantage for data centers and is 100% US technology, materials, and labor.

CRCES™ technology can give the data center the ability to act like a peak shaver, yielding an arbitrage ability over the power price. Even if the data center has negotiated a flat price, often there are benefits for providing additional power to the grid at peak times. The details of how this would be structured with each power market can be very beneficial to the data center's ROI. This ability to arbitrage, combined with CRCES™, LDES provides a double punch in enhancing the value of the recovered energy for data center use or to supplement the local grid.

PART 2 – OPTIMIZATION OF ON-SITE POWER GENERATION

Stay tuned for Part 2, where AT&V will address Optimization of On-Site Power Generation with ALBERT and CRCES™ technology support.

Visit AT&V's website and read "Powering the Future with Waste Heat and Clean Energy Storage (TES Tanks)" to learn more.