

Vapor Upcycle System

Patented vapor recovery solution to meet EPA compliance on routine flaring & achieve sustainable energy


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Vapor recovery for hazardous air pollutant (HAP) emissions is a critical and mandatory process for industrial operations across the energy sector. Audubon addresses routine flaring and Environmental Protection Agency (EPA) emission regulations with an unprecedented, turnkey solution for vapor recovery that converts your facility's waste stream into power or heat energy. For hydrocarbon liquid-loading applications, we apply our patented [Vapor Upcycle System](#) (VUS), along with our thorough knowledge of regulations and engineering expertise, to deliver vapor recovery, regulatory compliance, and sustainable energy all at once.

The VUS utilizes combined heat and power (CHP) technology consisting of a microturbine generator, continuous emission monitoring system (CEMS) for clean combustion, compression and purification, and storage of flared vapor with the highest level of destruction efficiency. Compared to the traditional methods of recovery and combustion that are inefficient and only remove vapor waste, the VUS captures the waste vapor and reuses it as an energy source for

power generation, electrical grid support, or renewable feedstock. Applying the VUS, facilities can leverage their own waste as a steady-state energy source, reducing strain across the grid and contributing to energy transition and decarbonization initiatives. Its modular design minimizes the system's energy consumption, saves time and cost in operations and maintenance, and enables markedly faster startup.

With our VUS, Audubon is not only meeting the latest EPA requirements for routine flaring, we are turning waste into a reusable resource—and engineering the future of energy.

Applications

- Terminal loading: ship, truck, rail, barge
- Marine loading: platforms, single point mooring (SPM) buoys
- Tank battery systems, tank farms, bulk fuel storage
- Ballast water treatment
- Ethanol production facilities
- Terminal & cavern storage

Turn waste into energy with the Audubon VUS.

- ✓ **Comply with NESHAP & NSPS**
- ✓ **Minimize VOC emissions**
- ✓ **Recover & reuse waste vapor**
- ✓ **Boost grid resiliency & reliability**
- ✓ **Reduce OPEX & downtime**

Did you know?

9,500 gasoline distribution facilities are subject to strict gasoline distribution regulations—are your operations in compliance?

The The National Emission Standards for Hazardous Air Pollutants (NESHAP) and New Source Performance Standards (NSPS) were recently updated. Codified in 40 CFR 60 and 63, the new regulations require a significant reduction in emissions of hazardous volatile organic compounds (VOCs). Among the new regulations is a vapor recovery standard of 10 mg/L, translating to 98% destruction efficiency. Read the entire [NESHAP](#) and [NSPS](#).

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*US Patent 11,879,387



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Operational loading

Refined products such as gasoline and diesel are loaded by barge, ship, rail, or truck, creating toxic vapor emissions. The vapor can have many various characteristics including cleaned/uncleaned, presence of previous product, dedicated service, and top/bottom loading.

Compression & processing

In compression and processing, HAPs such as benzene, toluene, ethyl-benzene, and xylene are eliminated by boosting pressure between 50 to 75 psig. The phase allows recovery of a liquid portion that can be returned to the terminal. A filtering process eliminates water and particulate content.

Natural gas injection

Skid-mounted natural gas is injected into the compressed vapor as assistance or enrichment gas. The system allows for 100% bypass for safe startup/shutdown, an eductor for mixing, and a calorimeter to analyze BTUs and ensure minimum methane content.

Waste heat recovery

The microturbine's CHP module recovers previously wasted heat that can be used to heat buildings, process piping, tankage, or renewable feedstock requiring thermal stabilization. Regulatory thermal CO₂ credits can be obtained with the recovered carbon.

Storage

The storage phase is where intermittent loading turns into steady-state fuel generation. In its main-regen-guard system, the main is pressurized and feeds the microturbine, the regen is pressurized from the loading operation, and the guard is on standby for pressurization.

Microturbine

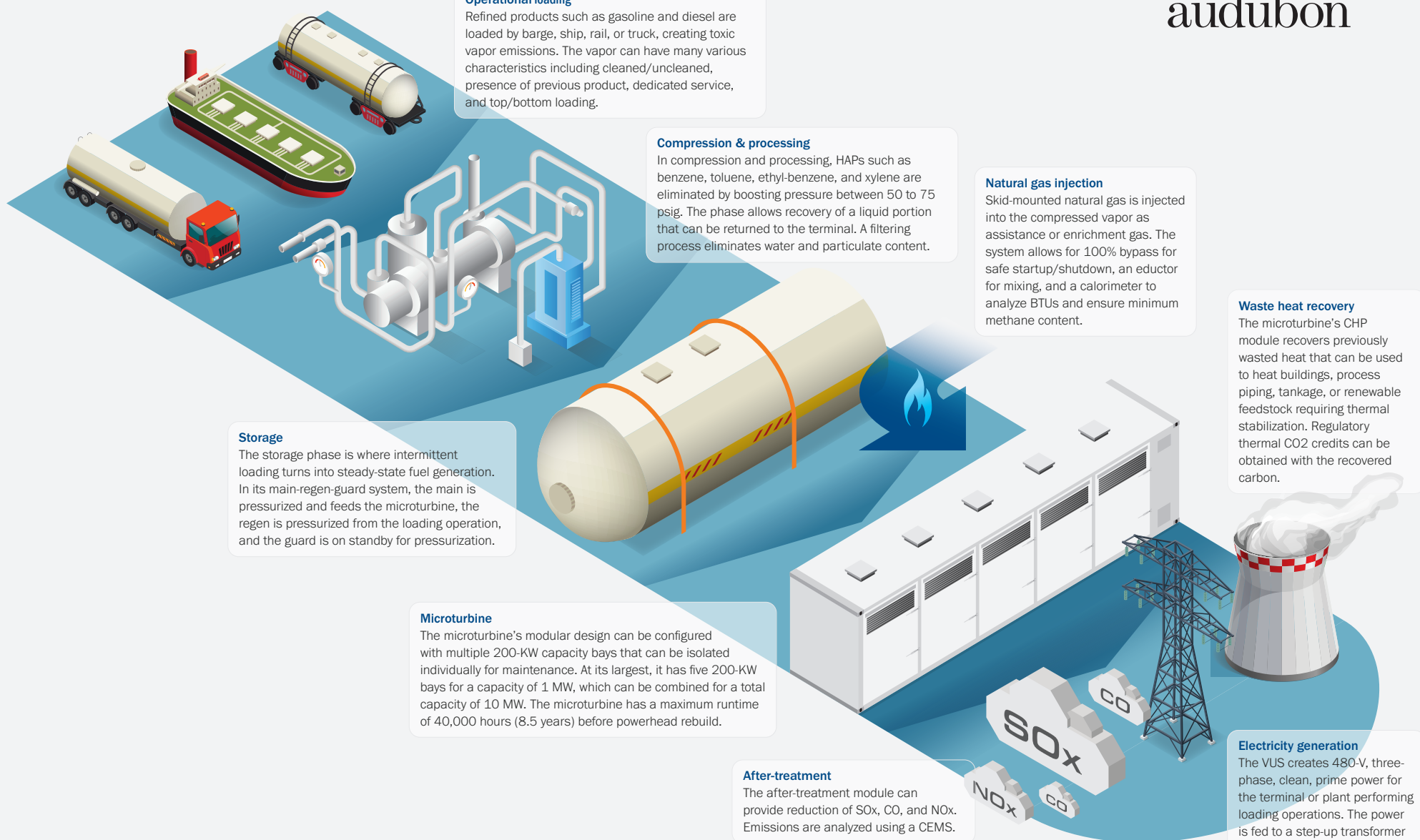
The microturbine's modular design can be configured with multiple 200-KW capacity bays that can be isolated individually for maintenance. At its largest, it has five 200-KW bays for a capacity of 1 MW, which can be combined for a total capacity of 10 MW. The microturbine has a maximum runtime of 40,000 hours (8.5 years) before powerhead rebuild.

After-treatment

The after-treatment module can provide reduction of SO_x, CO, and NO_x. Emissions are analyzed using a CEMS.

Electricity generation

The VUS creates 480-V, three-phase, clean, prime power for the terminal or plant performing loading operations. The power is fed to a step-up transformer and automatic transfer system. The VUS becomes the main power source for the loading terminal, and grid power becomes backup.





PEOPLE | FLEXIBILITY | RELATIONSHIPS | EXPERIENCE

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