



Biogas Upgrading Solutions for water resource recovery and food waste

Greenlane™ **Cascade H₂O** products transform highly variable organic feedstock streams into clean, valuable renewable natural gas.



Increasing the value of residential, industrial and commercial organic waste streams

Greenlane™ Cascade H₂O product line provides additional value to diverted organic streams and water resource recovery facilities by making clean energy and reducing emissions to meet circular economy objectives.

Around the world, waste management policies are evolving to divert organic waste streams from landfills to resource-recovery facilities, including dedicated digestion facilities that minimize greenhouse gas emissions. At the same time water resource recovery facilities (WRRF) are improving biogas capture methods and are looking for ways to reduce emissions and produce clean energy instead.

Cascade H₂O important benefits

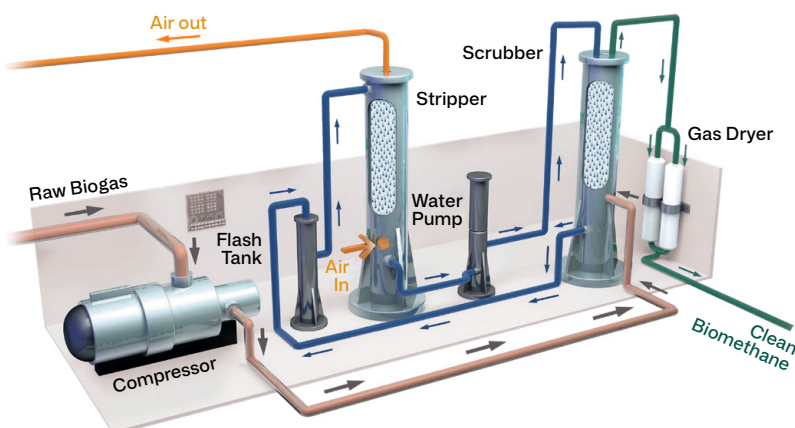
- **Increases the value of wastewater and food waste streams:**
Cost effectively upgrades biogas generated from organic waste to produce high value, high quality RNG for sale into transportation and gas distribution markets.
- **Complies with pipeline requirements for RNG:**
Tackles tough biogas compositions that, in addition to carbon dioxide, include hydrogen sulfide, volatile organic compounds and siloxanes to create RNG meeting stringent requirements.



Cascade H₂O installation

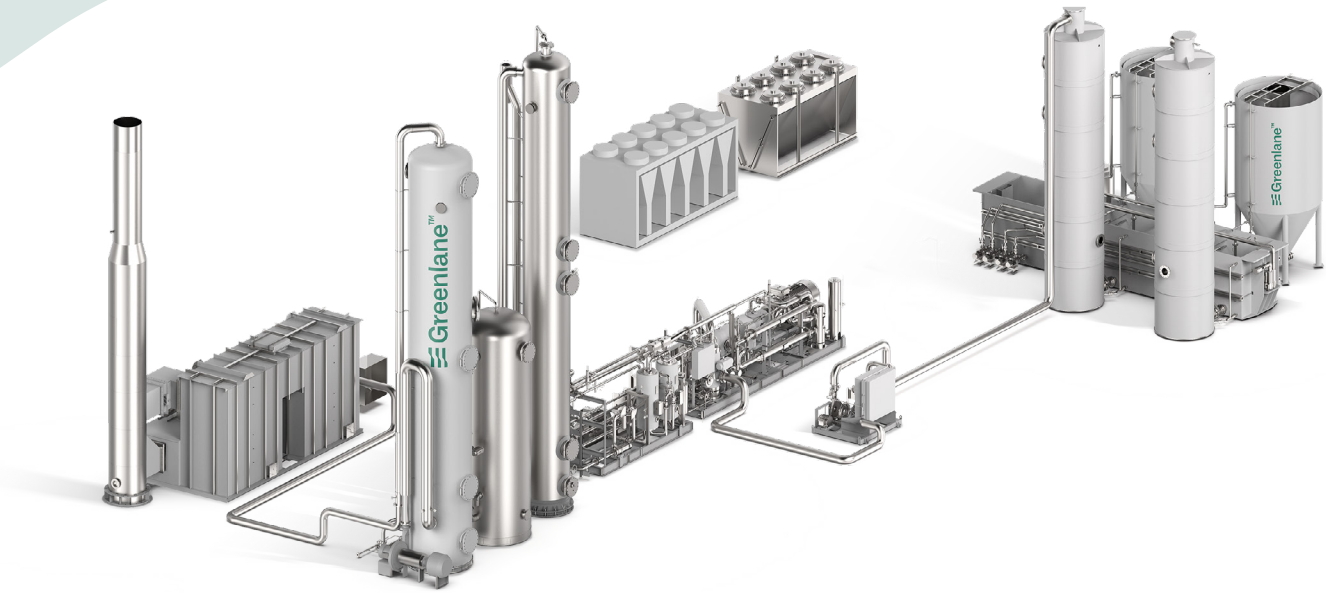
Types of Feedstock:

Food Waste, Green Waste, Wastewater, Ethanol-By-Products



→ How Cascade H₂O works

1. biogas is compressed before flowing up through a water scrubbing tower
2. carbon dioxide, hydrogen sulfide, siloxanes, and volatile organic compound molecules are absorbed by the water while the methane passes through
3. product gas is dried before end use
4. water is recycled in a closed loop which absorbs the carbon dioxide and contaminants from the biogas then desorbs in the air exhaust stream



Why water wash technology for biogas upgrading?

Water wash technology is the most deployed biogas upgrading technology in the world. Water wash systems use counter-flow water to scrub away biogas impurities, without the need for chemicals or heat.

Greenlane Cascade H₂O biogas upgrading products:

- remove high levels of hydrogen sulfide, volatile organic compounds, and siloxanes to meet pipeline specifications, without the need for pretreatment
- operate in a closed loop to limit energy consumption
- provide high methane recovery with high uptime
- have no expensive overhaul of the upgrading media – it's only water
- are robust – will not be damaged by impurities

The Cascade H₂O advantage

- + End-to-end solution, from digester outlet to grid-injection-unit inlet
- + High uptime
- + No media-based pretreatment required
- + Cold Weather Packages available
- + Cost-effective and fast implementation
- + High methane recovery (up to 99%)
- + High tolerance for biogas impurities
- + Easy to install, operate, and scale
- + Standard modular design with compact footprint
- + Highly efficient carbon dioxide removal
- + Low utility consumption
- + 24/7/365 on-call technical support

Cascade H₂O model range

Model	Flow (Nm ³ /h)*	Flow (scfm)*
Rimu	800	500
Matai	1200	750
Totara	2000	1250
Totara+	2500	1550
Kauri	5000	3100

*minimum flow is 40% of max flow

Typical gas processing capability for RNG

Parameter	Raw Gas Quality	Product Gas Quality	Cascade H ₂ O
Methane (CH ₄)	45-60 %	Meets Pipeline Quality Requirements	Up to 99% methane recovery
Carbon Dioxide (CO ₂)	35-45 %		
Nitrogen (N ₂)	0-1%		
Oxygen (O ₂)	0-0.1%		
Hydrogen Sulfide (H ₂ S)	up to 3000 ppmv*		

*contact us for higher H₂S levels.

Your trusted biogas upgrading partner



Greenlane Renewables is a leading global provider of integrated biogas upgrading systems, with more than 140 installations worldwide to date. We believe renewable natural gas is the most relevant renewable energy to support the decarbonization of commercial transportation and the natural gas grid.

Greenlane™ **Cascade suite of technologies** and products produce clean, low-carbon and carbon-negative RNG, creating value from organic waste at landfills and water recovery facilities, agricultural, food and organics. With water wash, pressure swing adsorption, membrane separation and proprietary desulfurization products available, Greenlane's commitment is to deliver exactly the right technology and level of service to meet our customers specific biogas upgrading needs and objectives.

Our services:

- 24/7 helpline
- Installation training, consulting, inspection
- Operator training and support
- Commissioning and performance testing
- Service and performance reporting
- Preventative and corrective maintenance
- Performance data analysis
- Options for service/maintenance contract
- Remote monitoring and management

For more information, visit greenlanerenewables.com

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#1

in global
supplied capacity

140+

upgrading
systems deployed

35+

years
experience

19

countries
supplied