AtmosZero

Industrial scale decarbonization

Chris Fraughton
Sr. Director of Sales
GEMS Conference 2025

Delivering low-cost decarbonized steam for industry

AtmosZero replaces fossil-fueled industrial boilers with a drop-in electrified steam boiler with zero carbon emissions.

Eliminating Scope 1 boiler emissions on Day 1.

The Geo Argument

Today, **Steam** accounts for:

50% of process heat used in industry

8% of global primary energy use

2.25 GT GHG emissions per year

1. **Energy efficiency is in focus at unprecedented levels**
2. **Producing heat from the ground lowers lift for heat pumps**
3. **AtmosZero converts geothermal into world's most efficient steam system**

Shallow geothermal energy as a heat source for SGHPs could be a low-cost alternative to drilling deep for direct thermal use.

Introducing:

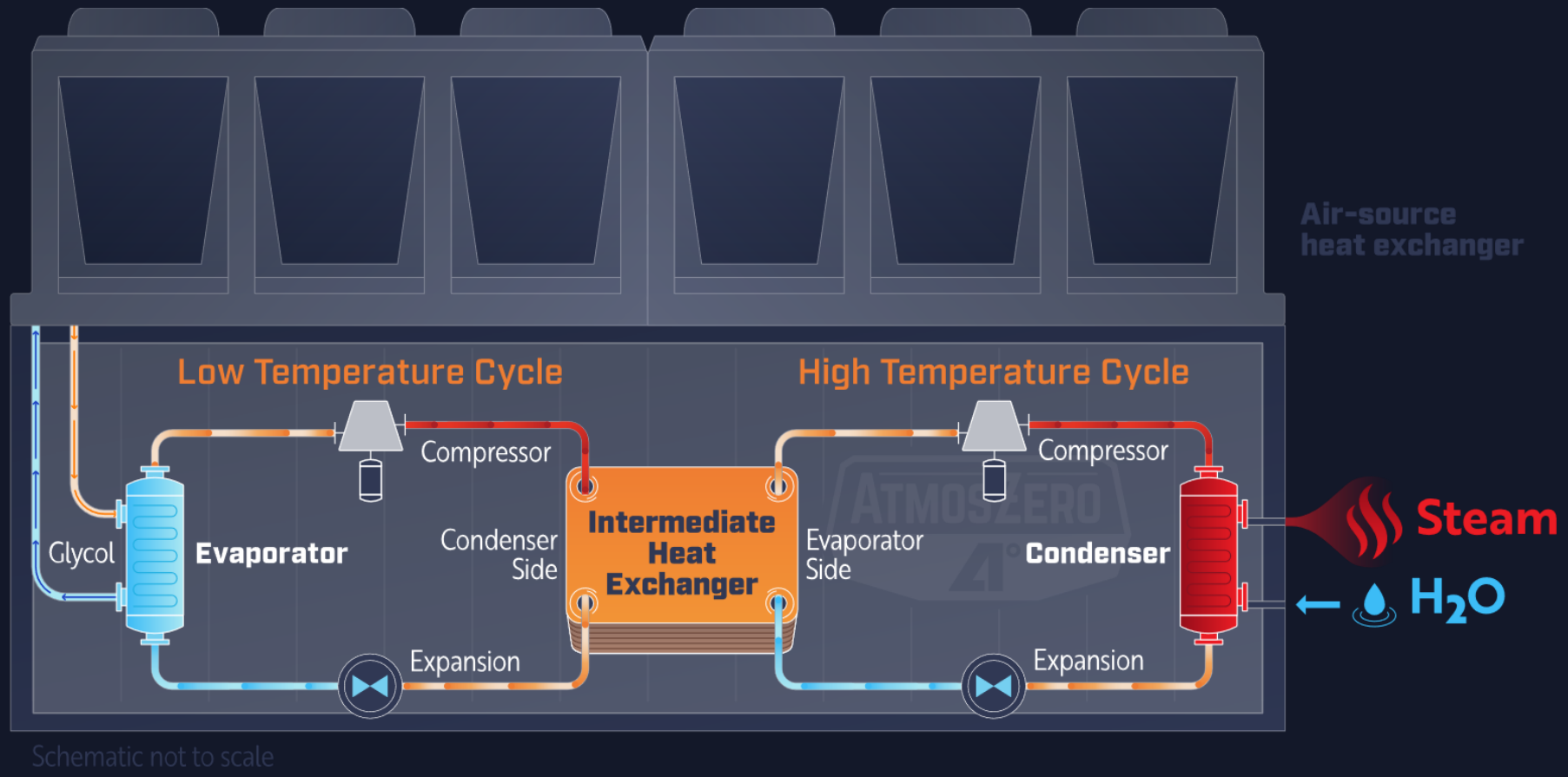
Boiler 2.0

- Modular Multi-Sourced Steam Heat Pump
- No Waste Heat Required

Solves decarbonization barriers to adoption

- Operationally efficient
- Capital light
- Easy Installation

Boiler 2.0 Specifications



Nominal duty
Up to 1 MW thermal

Voltage; current
480 V 3-phase FLA: 1500A

Output flow
Up to 3,400 lb/hr saturated steam

Output temperature/pressure
120-153°C / 248–307 °F
1.03 – 4.13 Bar(g) / 15-60 PSIG
60-150PSIG for 2027 deliveries

Heat source
Air or water

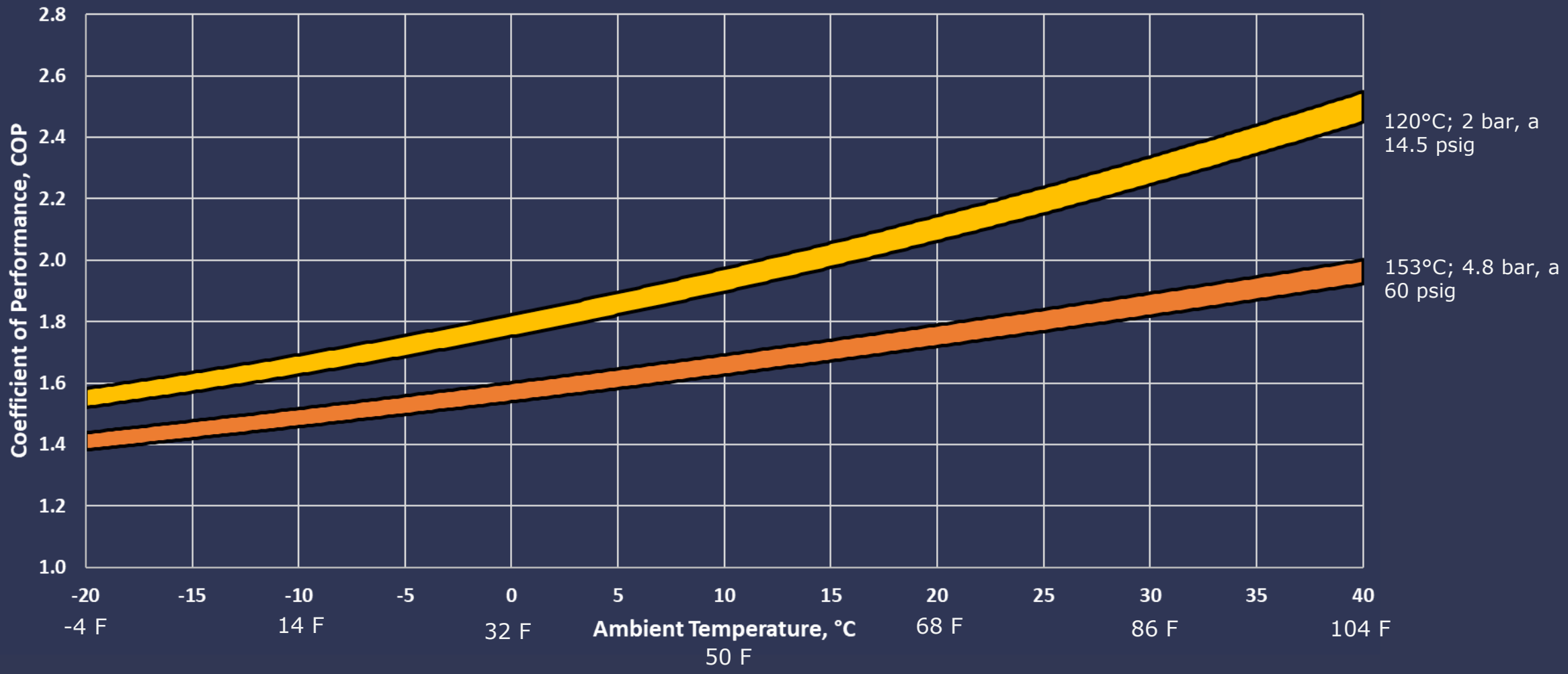
Inlet air temperature
-20°C (- 4°F) to 40°C (104°F)

HP Dimensions
Footprint: 8’ x 27’
Height: 10’ core

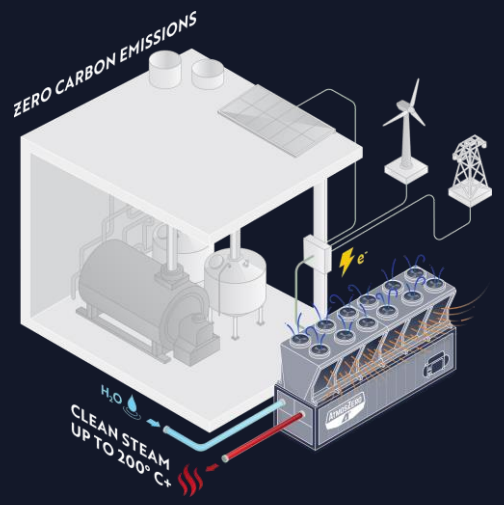
Refrigerant
Ultra-Low GWP;
ASHRAE A1, or A2L options

Noise
Sound pressure level 54 dB(A) at 10m

AtmosZero Air-Source to Steam Performance

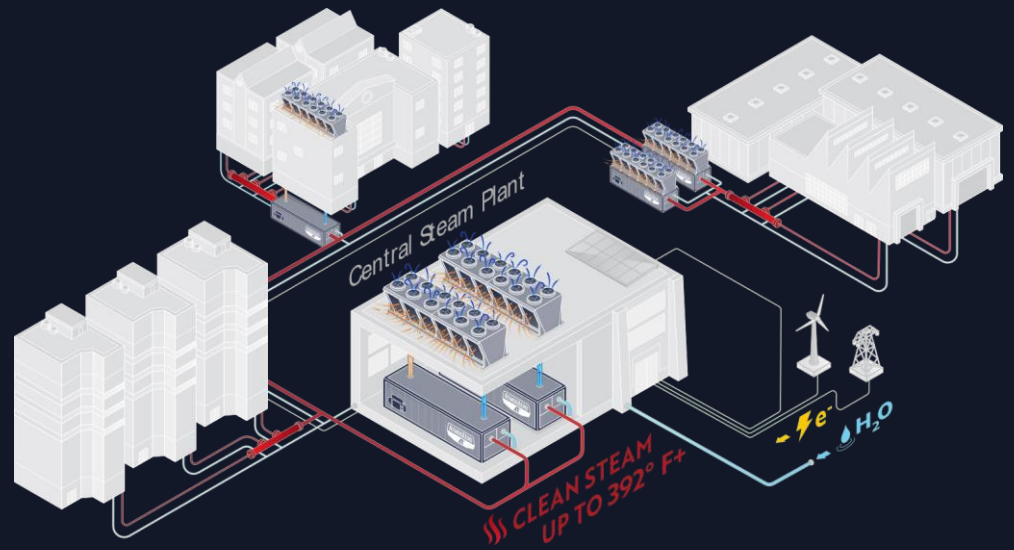


Boiler 2.0 Installation Options



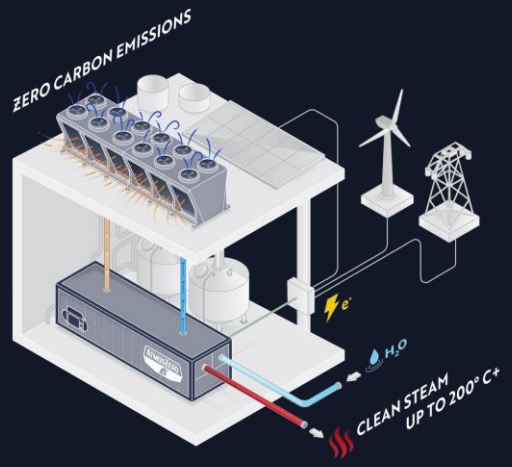
Outdoor Installation

Entire heat pump can be placed outdoors, with water & steam routed to/from the boiler room and steam headers.



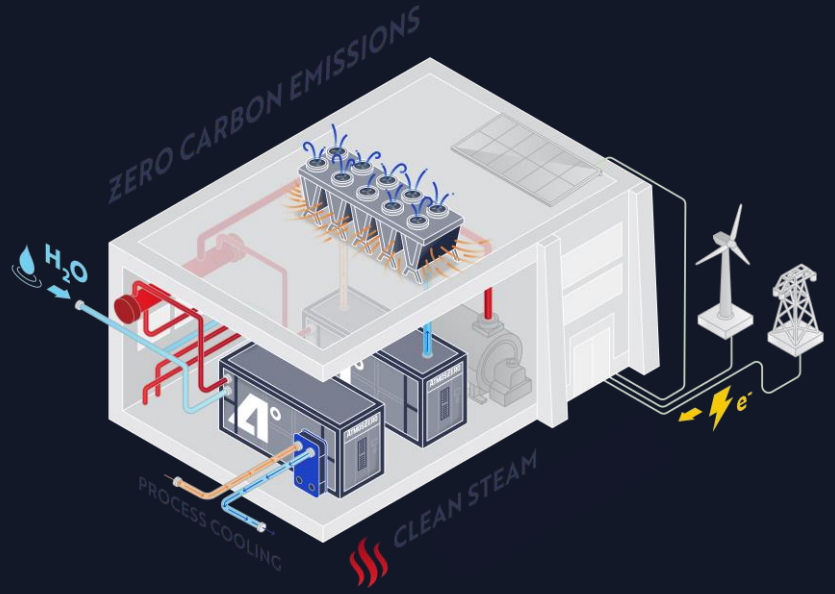
Distributed Steam Generation

The modular air-sourced heat pump can be deployed at various locations on-site, including at several different buildings on a campus.



Split Installation

Core heat pump can be placed indoors (e.g. in a boiler room or close to an end user) with air coils on a roof or other outdoor space. Glycol loop is used to couple the core heat pump and the air coils.



Central Steam Plant

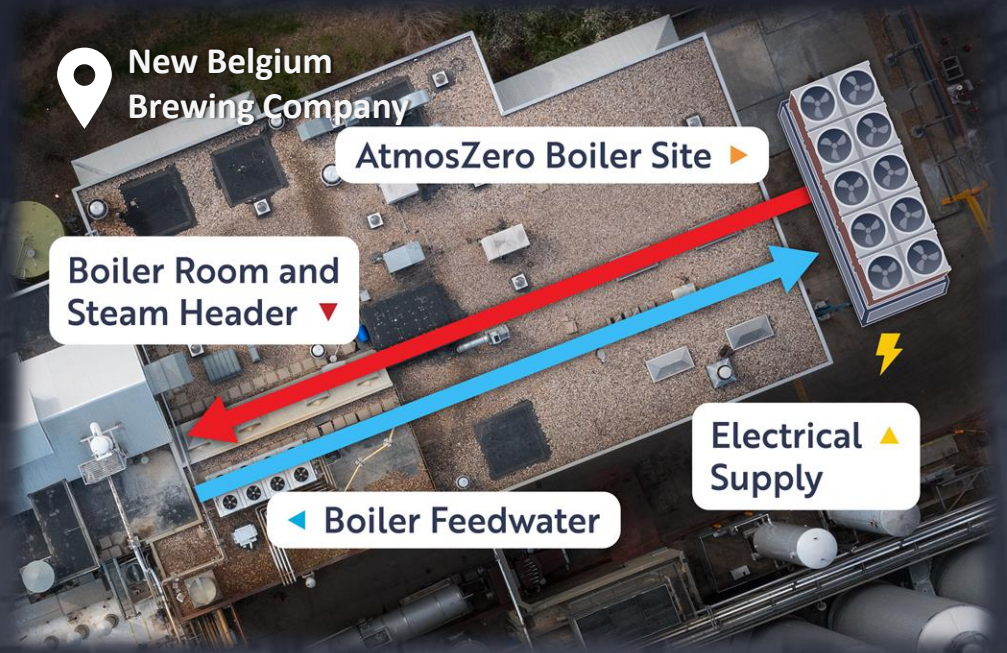
The heat pump can be installed in a central steam plant, similar to how existing natural gas boilers operate today.

First Commercial Installation

PHASE 1 – The Pilot

Meet 1/3 of steam demand

- Replace one natural gas boiler in the Fort Collins facility
- 90psi/165°C, 2,200 lb/hour saturated steam
- In-field, in-revenue service. Q2’25.



- New Belgium was present for a successful factory acceptance test (FAT) at AtmosZero’s manufacturing facility on 5/2/25
- The heat pump was shipped and installed on 5/16/25
- Commissioning began on 6/2/25 (first push button start and steam delivery)
- 24/7 operation began on Sunday, 6/22/25

Geo-Steam Delivery

A Thought Experiment

Illustrative values; site-specific

Scenario	Drilling Depth	Drilling CAPEX	Surface Equipment	Total Approx. CAPEX
Deep Geothermal Well	~18,000 ft	**$7–11M**	HX, Pumps, etc.	**$11–16M**
Shallow + SGHP	1,500 ft total	**$40–55k**	SGHP + HX, Etc.	**$2–6M**

Why It Might Win

- Order-of-magnitude lower drilling CAPEX
- Much lower subsurface risk and project uncertainty
- Flexibility: scalable well fields, modular SGHP
- Deployed in under a year!
- Easy to finance -> Also opens EaaS options.

"How many direct-use deep geothermal projects could become viable sooner by trading some electric OPEX for a much smaller, shallow drilling program plus a high-temperature steam heat pump?"

Driving the next industrial revolution

www.AtmosZero.energy | chris.fraughton@atmoszero.energy

Simple, emissions-free steam

Modular
Electrified boiler solution scales with you

Drop-in
Installs in days, delivers instant results

Flexible Heat Source
Reduces complexity, increases repeatability.

24-7
Consistent output for energy security and resilience

Boiler 2.0 is a product, not a project. Scalable for a global solution.

New Belgium Brewery

FAT & Happy Customers

Factory Acceptance Test (FAT)

- **Cold Start**
- **Steady state steam at 90 psig**
- **Lead/Lag to NBB Set points**
- **Command Stop & E-stop**
- **Warm Restart**

"On May 2, 2025, we witnessed AtmosZero's Factory Acceptance Test (FAT) at [the] Loveland manufacturing facility, and **we were pleased with the system performance and safety**... Within a month of the FAT, the system has since been delivered, installed, and is about to begin full operation at our Fort Collins brewery… It's been a pleasure to work with AtmosZero over the last months and years, and we are supportive of AtmosZero's new, innovative, and impactful commercial produce."

– Andy Collins, Utilities and Carbon Neutral Engineer

NEW BELGIUM BREWING

AtmosZero Inc.
Attn: Dr. Adrienne Tsier
815 14TH ST SW # B140
LOVELAND, CO, US 80537

June 2, 2025

Dear Dr. Tsier,

At New Belgium, we are dedicated to minimizing the environmental impact of producing our diverse range of high-quality beers, including the iconic Fat Tire Amber Ale. By 2030, we are committed to reducing our indirect and onsite emissions by 55% (Scope 1 and 2) from our 2019 baseline. Our breweries in Fort Collins, Asheville, Comstock, and Daleville use pressurized steam and hot water in our brewing process, which comes from the burning of natural gas. The consumption of natural gas is half of our Scope 1 emissions and eliminating these would be >20% of our total 2030 targets for Scope 1 and 2.

Because we reduce a portion of our net electrical load with renewable electricity produced on site, we're particularly excited to be AtmosZero's first commercial pilot partner for your electrified Boiler 2.0 product.

On May 2, 2025, we witnessed AtmosZero's Factory Acceptance Test (FAT) at your Loveland manufacturing facility, and we were pleased with the system performance and safety. The FAT included initiating cold start, generating steady steam at 90 psig (steam pressure required in the brewery), demonstration of lead/lag controls of steam pressure to New Belgium set points, demonstration of command stop, execution of warm startup, and demonstration of a safe e-stop. Within a month of the FAT, the system has since been delivered, installed, and is about to begin full operation at our Fort Collins brewery this week.

It's been a pleasure to work with AtmosZero over the last months and years, and we are supportive of AtmosZero's R&D 100 application recognizing AtmosZero's new, innovative, and impactful commercial product.

Sincerely,

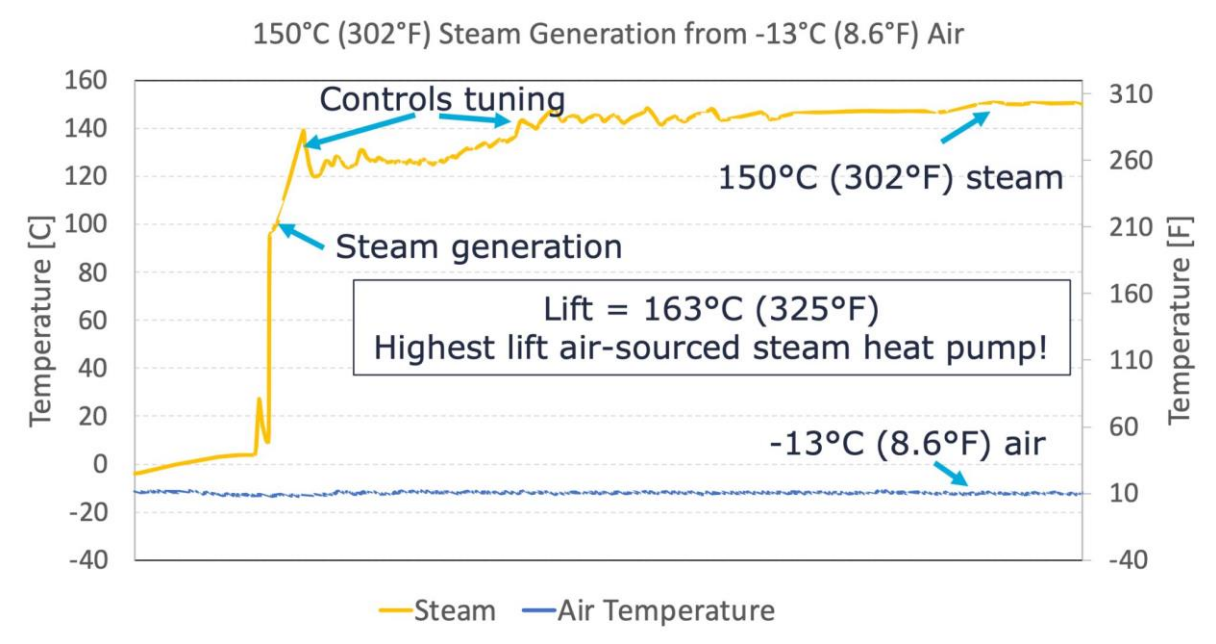
Andrew Collins
Utilities and Carbon Neutral Engineer

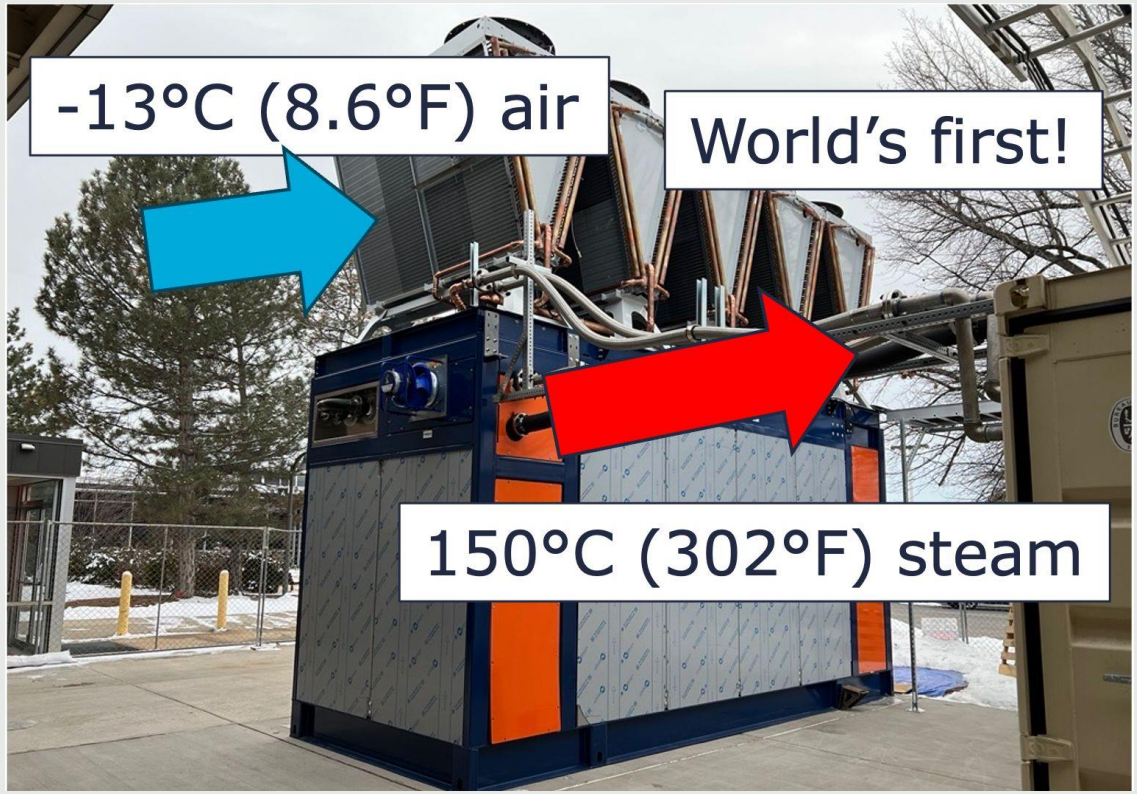
Certified B Corporation
Business as a Force for Good.

FORT COLLINS BREWERY • 500 Linden St, Fort Collins, CO 80524
ASHEVILLE BREWERY • 21 Craven St, Asheville, NC 28806

Snow to Steam

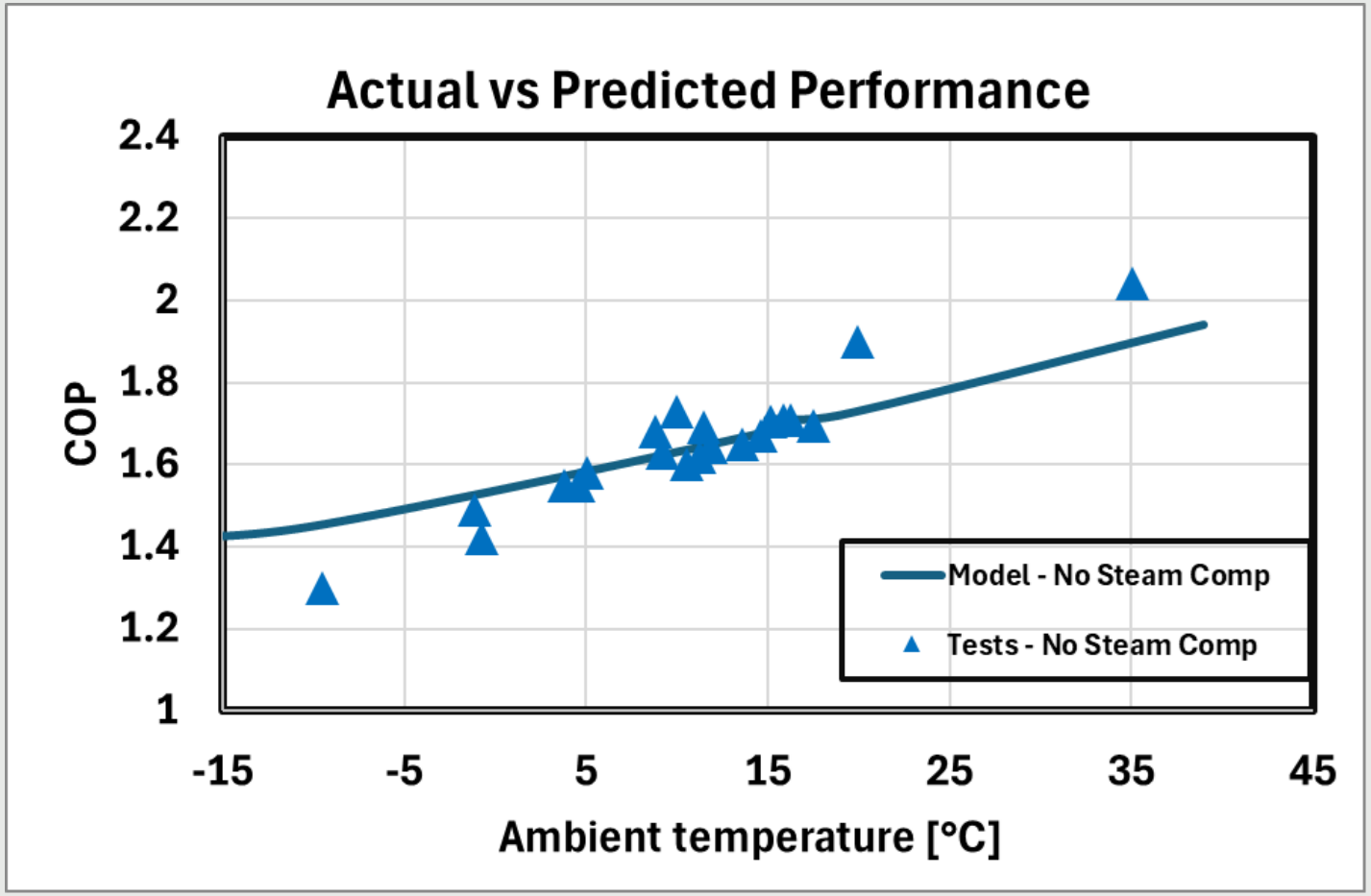
@ AtmosZero HQ





COP - Actual Data vs. Model

- Air-sourced system
- 150C, 55 psig Steam pressure (60psig at site, 5000' elevation)
- 22 steady state points at various ambient temperatures.



Boiler 2.0 Applications