



Energy Efficiency
PROGRAM



Thanks to
Megawatt Sponsor



**ENVIRONMENTAL
CONTROL SOLUTIONS INC.**

A PremiStar Company



2025 Ameren Illinois Business Symposium

Jace Patacsil, Technical Sales Manager | jace.patacsil@skyven.co

(309) 361-5664 | www.skyven.co



FACT

**20% of global carbon
emissions are caused
by industrial heat**

half of that is steam



EMISSIONS FROM INDUSTRIAL HEAT IS “HARD TO ABATE”

- ◇ **Lack of Technology**
- ◇ **Financially Unattractive**
- ◇ **Impact to Operations**

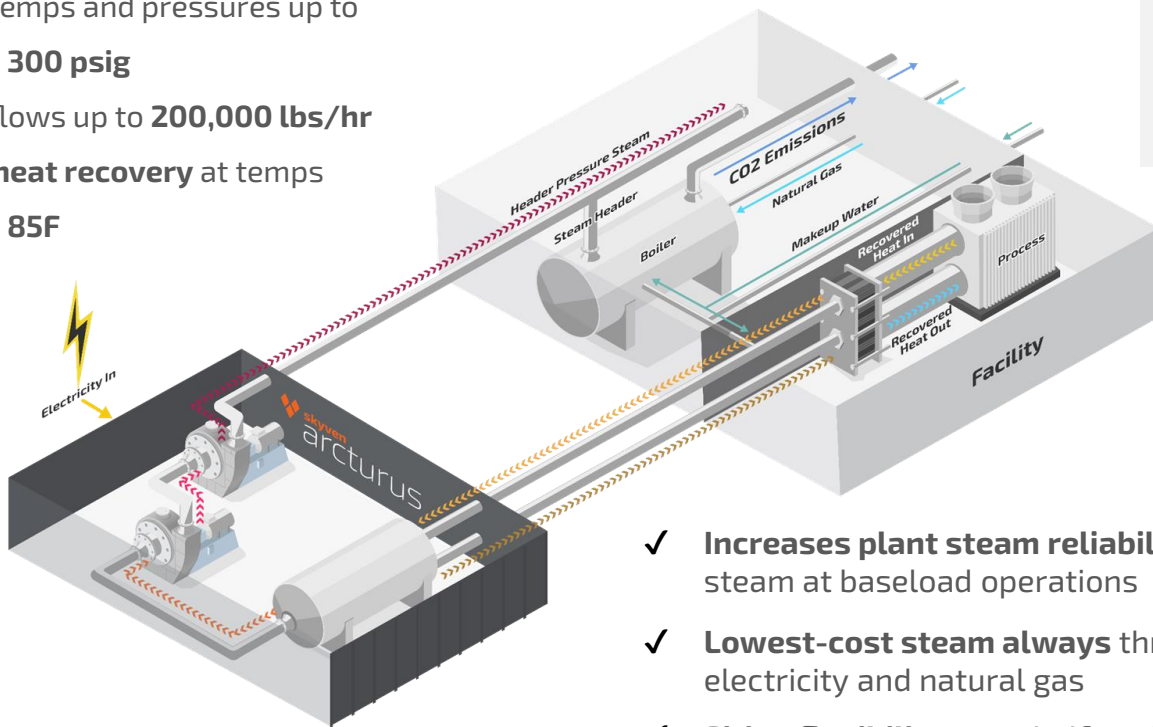




The Skyven Arcturus Steam-Generating Heat Pump

Steam at the lowest cost and lowest emissions, always

- ✓ Steam temps and pressures up to **420F** and **300 psig**
- ✓ Steam flows up to **200,000 lbs/hr**
- ✓ **Waste heat recovery** at temps as low as **85F**

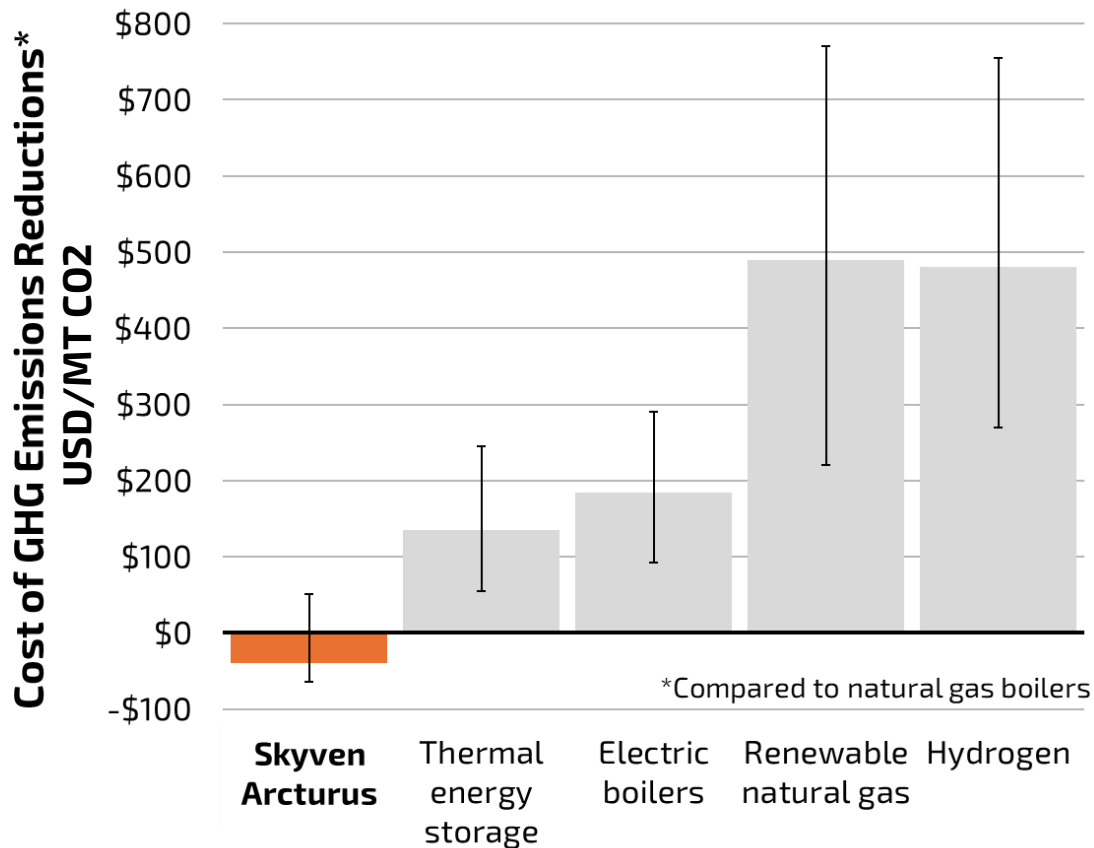


Installed in parallel with existing steam systems

- ✓ **Increases plant steam reliability** by supplying additional steam at baseload operations
- ✓ **Lowest-cost steam always** through fuel-switching between electricity and natural gas
- ✓ **Siting flexibility** up to half a mile away from the plant



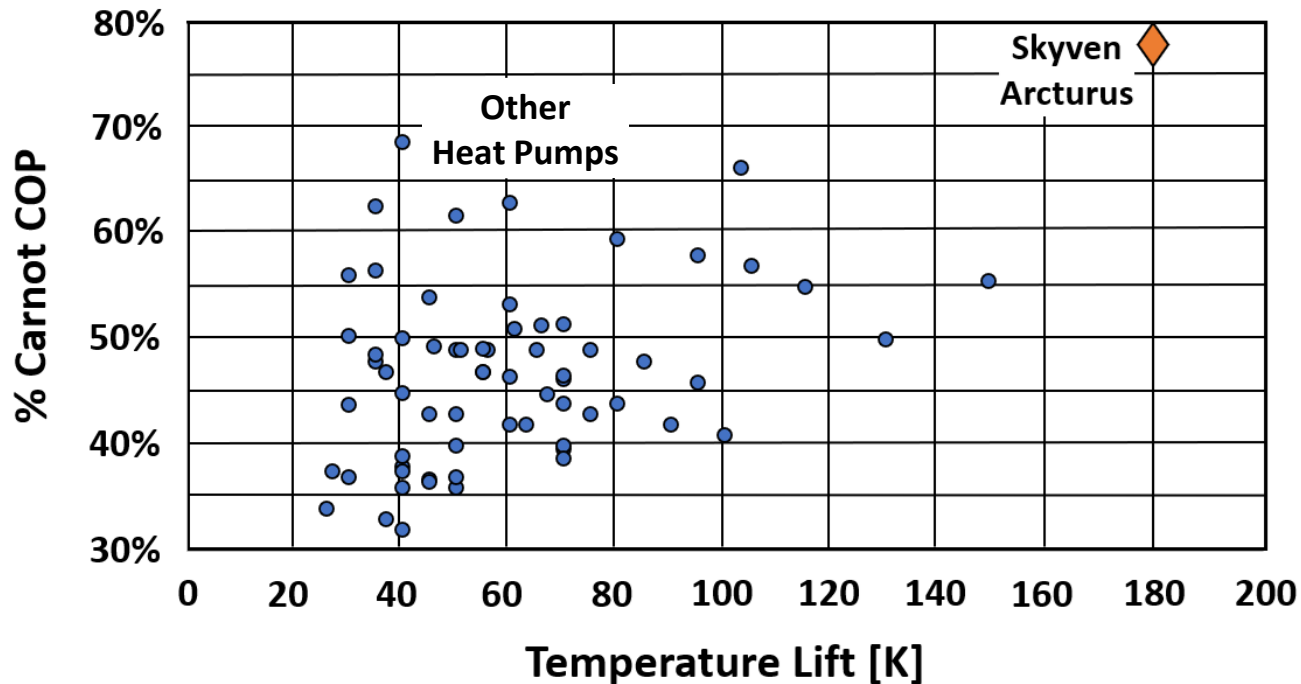
Best economics of any steam generation technology





Highest COP possible

Best coefficient of performance (COP) means the lowest energy consumption of any steam-generating tech



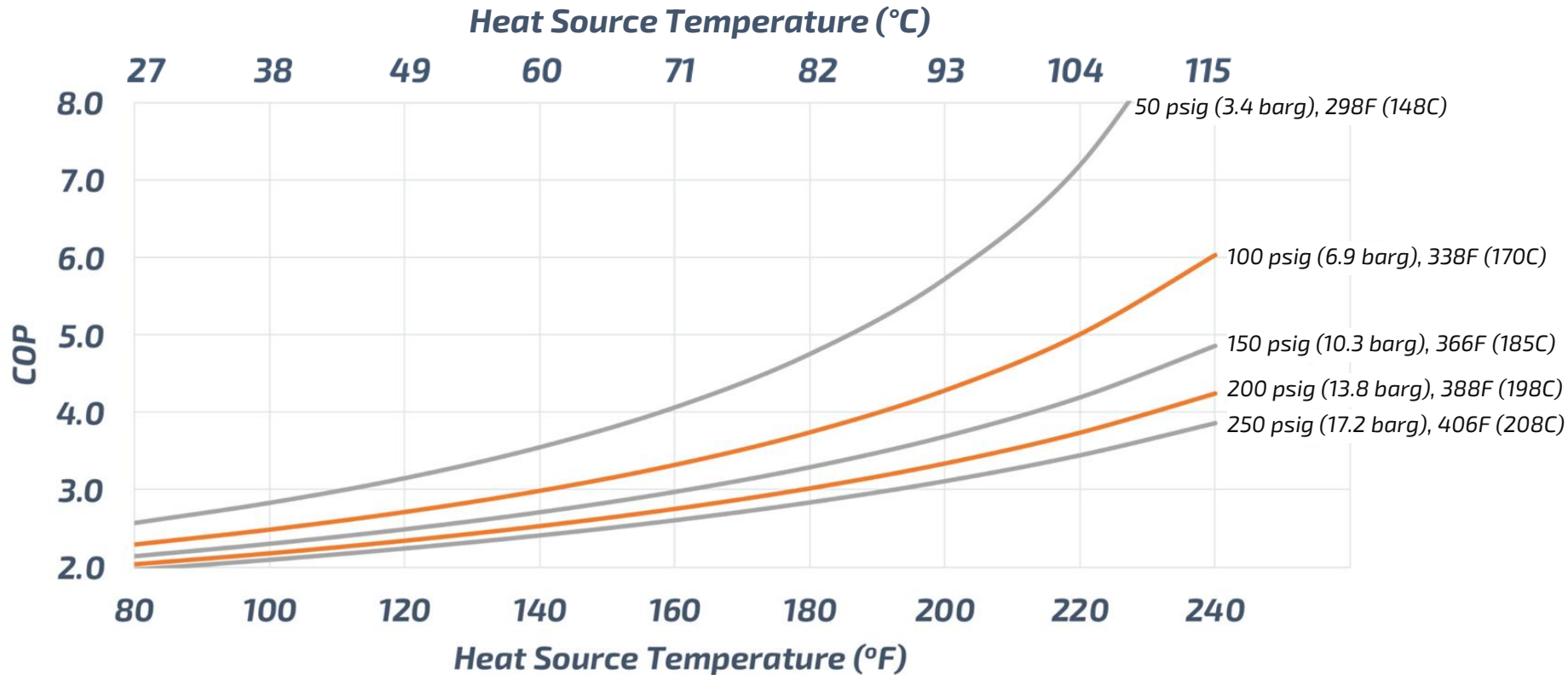
"% Carnot COP" is % of max allowed by the laws of physics.

We achieve 78% thanks to our multistage open-cycle MVR architecture with low impeller speeds and in-situ desuperheating.



High COPs across operating conditions

COP depends on heat source temperature and steam pressure/temperature.





ALIGN

our financial goals with your
emissions reduction.

+

FUND

the project with no capital
expenditure.



Three Implementation Models

Skyven Ownership (Energy-as-a-Service)

1. Shared Savings Model

- ◆ Skyven funds, installs, and operates Arcturus.
- ◆ Skyven procures electricity.
- ◆ Skyven and Customer share net economic benefits.

2. Tolling Model – Fee for Steam

- ◆ Skyven funds, installs, and operates Arcturus.
- ◆ Skyven or Customer procures electricity.
- ◆ Customer purchases emissions-free steam from Skyven.

Customer Ownership

3. CAPEX Approach

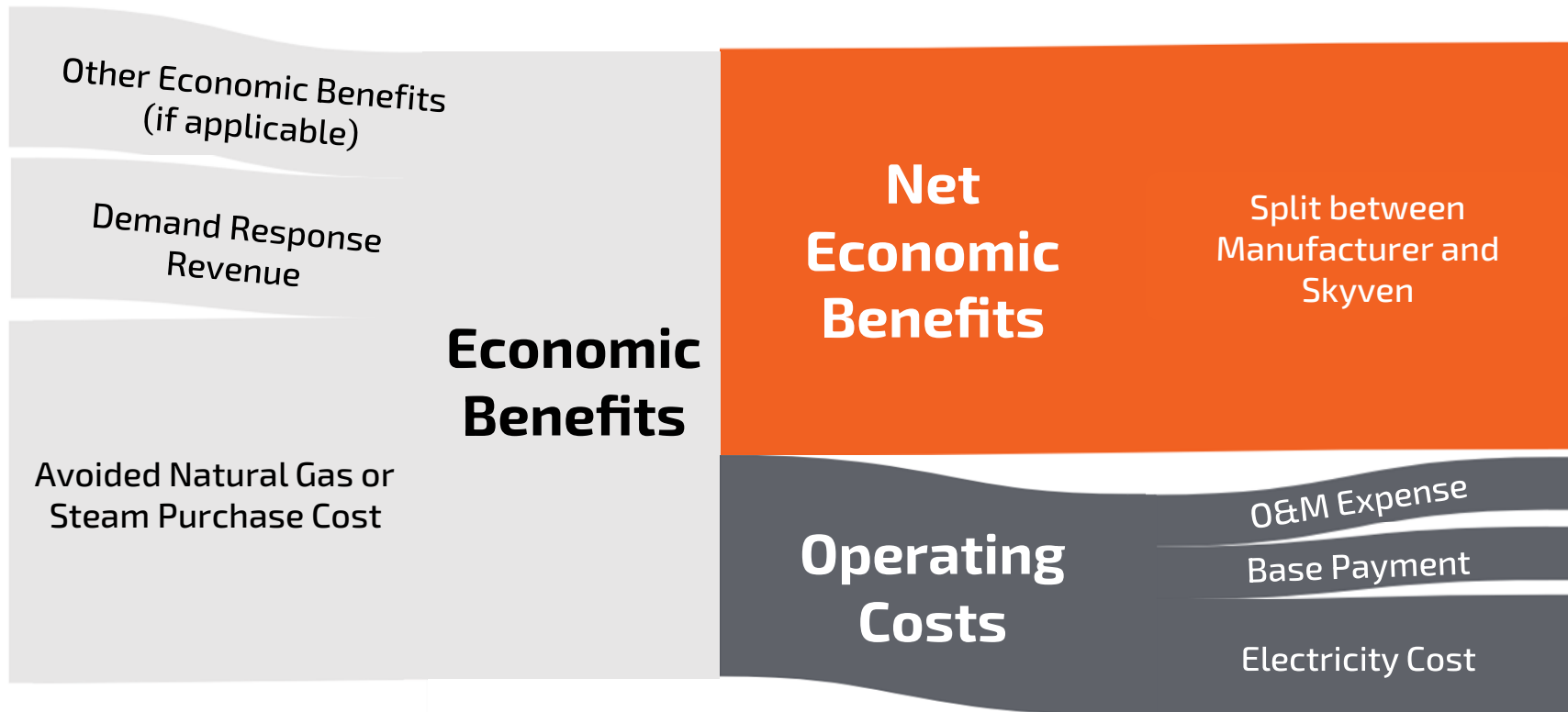
- ◆ Customer funds the Arcturus project.
- ◆ Skyven installs and commissions Arcturus.
- ◆ Skyven available for O&M.





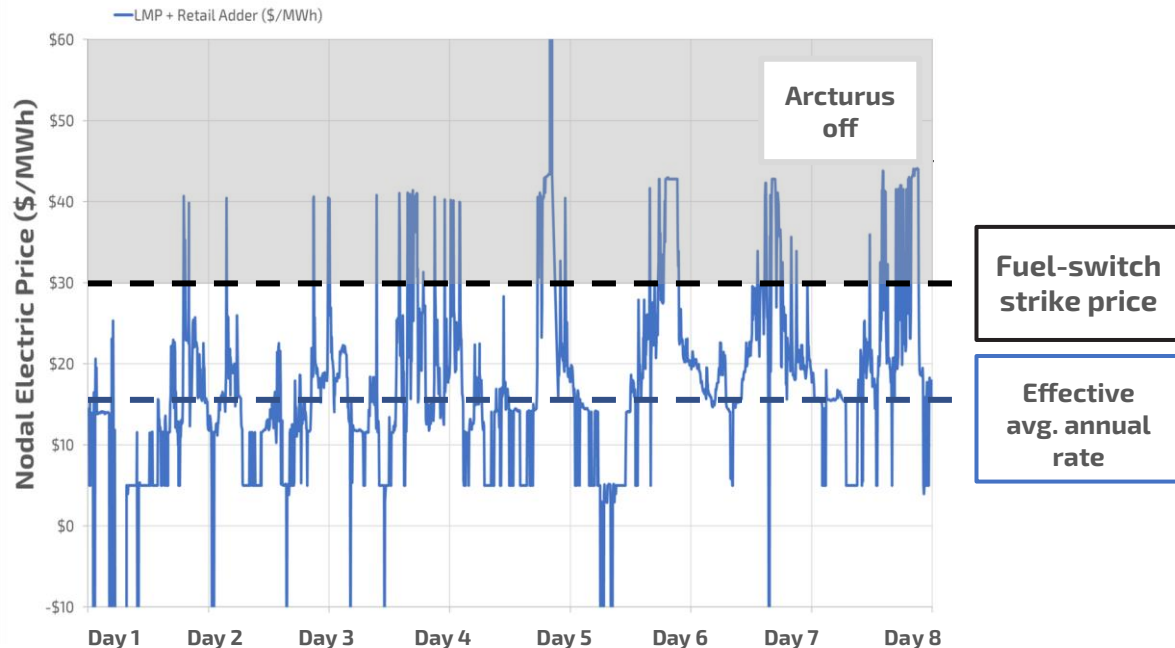
Skyven's Shared Savings Model

Skyven covers all CapEx; Skyven and Customer share economic benefits





Hybrid Operations for Cost Savings



Arcturus is installed in a hybrid configuration with existing steam systems, enabling users & providers to benefit from system redundancy.

Benefits

- Increased steam reliability.
- Lowest cost steam possible.
- Potential revenue from grid services.
- Electricity providers benefit from flexible loads available during peak demand.



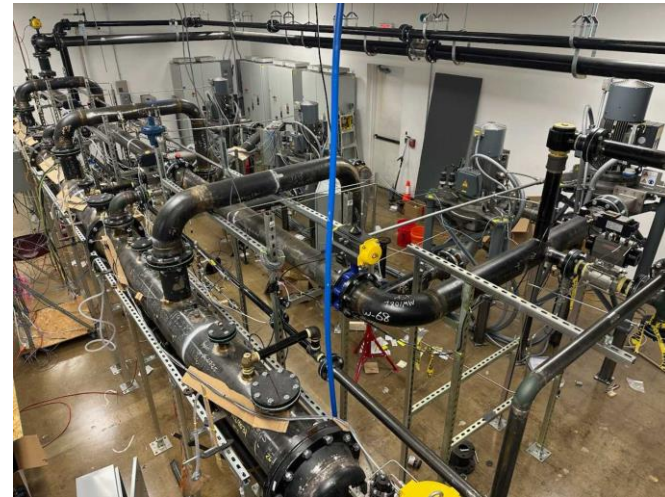
1 MW Thermal Demo Center In Operation

Demo Center Specifications

- **Steam Generation:** 3,500 lb/hr steam
- **COP:** 7.6 (78% of Carnot efficiency @ 70°F lift)
- **Heat Source:** Simulated process hot water @ 95 °F

Features Demonstrated

- **Grid interactivity** for energy price arbitrage
- **MSF:** Multi-stage flash vessel for highly-efficient heat capture
- **Control systems:** Industry standard



*"Under the hood" at the Skyven Arcturus demo center
Located in Dallas, TX.*



Arcturus Case Study | ICM Ethanol Facility

ICM Ethanol Facility in NY. Projected to Achieve **22%** Emission Reductions & **\$467,917** in Annual OPEX Reduction on Average. Utilizing Skyven's **Zero Capex** Shared Savings Energy-as-a-Service Model. Currently in Basic Engineering, with Construction slated to begin in late **2026**.

\$7,017,756

Savings Over 15-yr Project Term

369,925 MMbtu

Annual Natural Gas Reduction

19,154 MT

Annual CO2 Emission Avoidance

Heat Source **Mixed Dryer Exhaust**

Heat Sink **Evaporator Steam Header**

Steam Pressure **4.4 PSIG**

Steam Flow **35,000 lbs/hr**

Power Input **1.4 MW**

COP **7.61**





Additional Use Cases



CHEMICALS

With Skyven Arcturus:

Annual Fuel Usage Reduction:

750,203 MMBtu

Annual Scope 1 & 2 CO2e Emissions Reduction:

39,658 MT

Total CapEx Required:

\$0

Average Annual Facility Savings

\$807,000



PULP & PAPER

With Skyven Arcturus:

Annual Fuel Usage Reduction:

1,829,988 MMBtu

Annual Scope 1 & 2 CO2e Emissions Reduction:

96,653 MT

Total CapEx Required:

\$0

Average Annual Facility Savings

\$830,000



FOOD & BEVERAGE

With Skyven Arcturus:

Annual Fuel Usage Reduction:

648,041 MMBtu

Annual Scope 1 & 2 CO2e Emissions Reduction:

34,203 MT

Total CapEx Required:

\$0

Average Annual Facility Savings

\$174,000



QUESTIONS?

Let's dig in!