2024 TECHNICAL CONFERENCE

WELCOME!

CANUSA EPC

GPA MIDSTREAM ASSOCIATION

Compressor Station Emission Reduction

Technology and Developments

The Path to Zero Emissions Gathering Sites

Identifying Our Current Emissions Sources

Where Are We Heading?

Evolving Our Designs

- Instruments
- Tanks
- Rotating Equipment
- Piping
- Engine Exhaust
- Burners/Heaters (Future)
- Waste Heat Utilization (Future)

Typical Compressor Site

Develop Our Basis

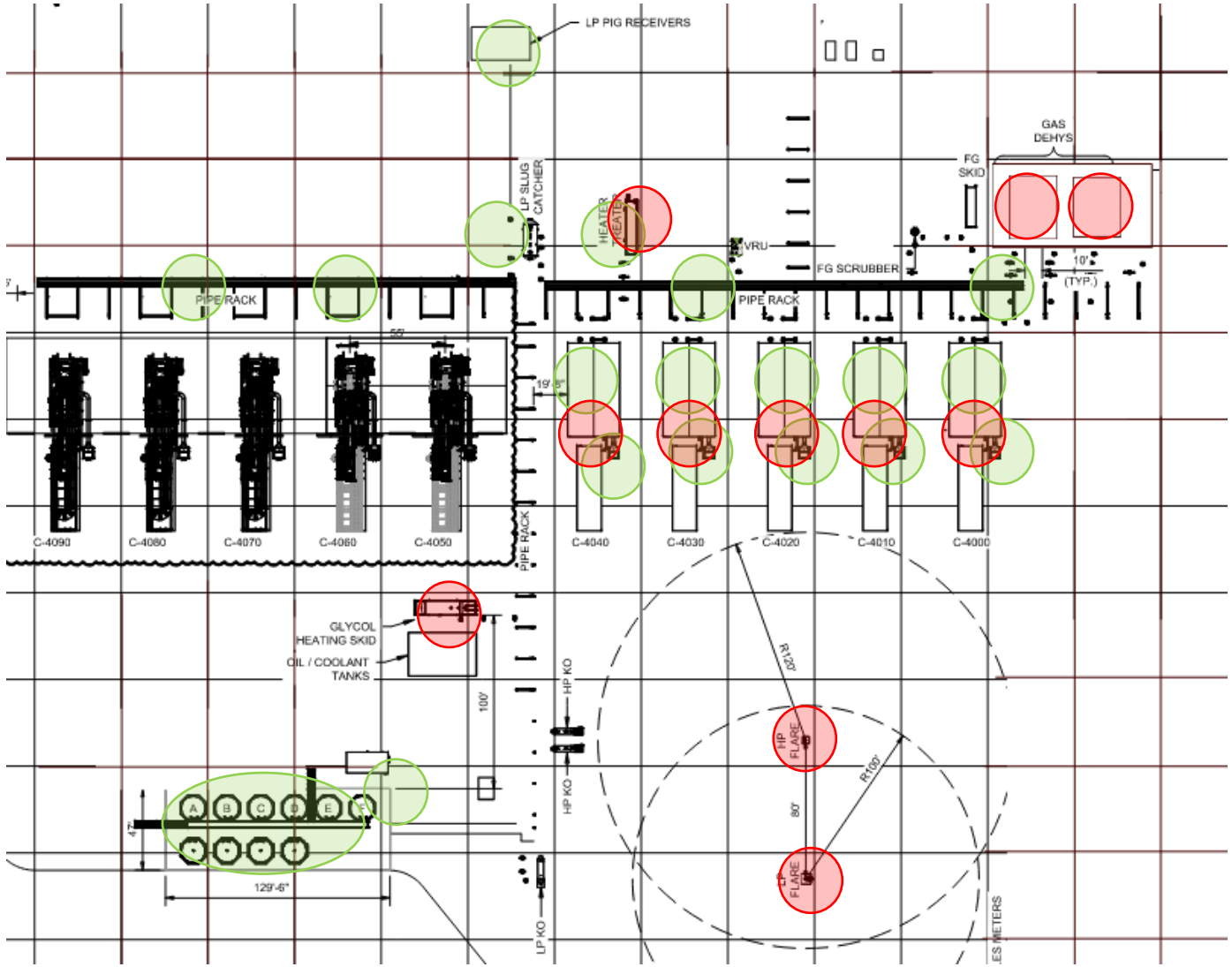
Existing Emission Sources

Methane Sources

- Pneumatic Devices
- Tank Vapors
- Compressor Seals
- Compressor Starters
- Maintenance Blowdowns

CO2 Sources

- Heaters
- Engines
- Flares/Combustors



Where Are We Heading?

Depends on Your Location

Methane & CO2 Focus

20.2.1-20.2.350 NMAC

Methane Reduction Program from IRA
Subpart W – GHGRP
40 CFR Part 98.230

BLM

40 CFR 60

Reg 7 / Reg 22

Directive 60

Evolving the Standard Design

Current Trends and Future Consideration

Pneumatic Loads

Basis: Pneumatic Devices (27 Control Device and 11 Diagram Pumps)

Drivers: OOOO(b)

SOLUTIONS



- Instrument Air Package
- Low Bleed Devices
- ECD Device

CHALLENGES

- Varies by site demand
- Additional emissions reporting
- Reliance on power, moisture, more rotating equipment

METRICS

- $34K to $240K in Capital
- 66 to 128 TPY of Methane Reduction
- Power Costs of $5,800 per year

Tanks

Basis: 50 MMscfd of Rich Gas

Drivers: Local regulations, OOOO(b)

SOLUTIONS



- Combustors
- VRU unit with injection to suction headers

CHALLENGES

- Introduction of O2 into the system
- Additional rotating equipment

OVERALL COST/POWER REDUCTION

- $400K in Capital
- 180 TPY of Methane Reduction
- Power Costs of $39,400 per year

Start Air

Basis: Five (5) 3608 Units, 30 Compressor Starts Per Month

Drivers: Local regulations

SOLUTIONS

- Install IA bottles for start demands

CHALLENGES

- Up-sizing the IA system
- Planning for startup processes and air demand

OVERALL COST/POWER REDUCTION

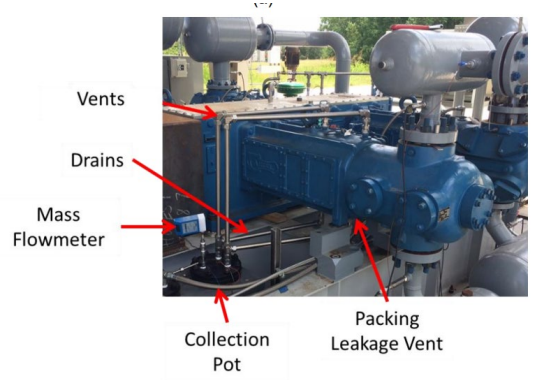
- $488K in Capital
- 19 TPY of Methane Reduction
- Power Costs of $13,800 per year

Rotating Equipment
(seals, packing)

Basis: Five (5) 3608 Units (36 SCFH per unit)

Drivers: Local regulations, OOOO(b)

SOLUTIONS



- Upgrade packing to low leak with manual monitoring
- Routing solution on packaged skid
- VRU with Accumulator

CHALLENGES

- Monitor the packing for failures manually or through an automated system
- Piping to recovery point for captured gas

OVERALL COST/POWER REDUCTION

- $725K in Capital
- 31 TPY of Methane Reduction
- Power Costs of $39,140 per year

Blowdown Capture

Basis: Capture of Five (5) Compressor and Facility Gas

Drivers: Local regulations

SOLUTIONS

- Repressurize gas to the inlet

CHALLENGES

- Managing contaminants
- Staged blowdown controls controlling to inlet or flare depending on pressures
- Disperse piping to capture sources

OVERALL COST/POWER REDUCTION

- $650K in Capital
- 22 TPY of Methane Reduction
- Power Costs of $5,800 per year

Engine Electrification

Basis: Five (5) 3608 Units

Drivers: Local regulations

SOLUTIONS

- Electric motors with onsite distribution
- Conversion of Engine to Electric Motor

CHALLENGE

- Large utility design and reliance
- Site availability concerns
- Increased OpEx
- Operations team needs to train on MV systems

OVERALL COST/POWER REDUCTION

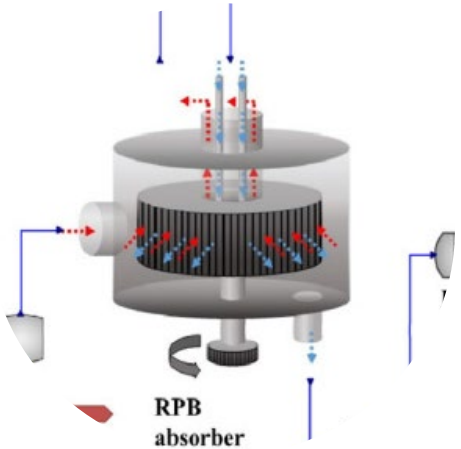
- $7.5M in Capital
- 22-220 TPY of Methane Reduction
- Power Costs of $5.3M per year
- Bonus: Maintenance Reduction

Engine Exhaust
(CO2 Capture Applications)

Basis: Five (5) 3608 Units

Drivers: Carbon Pricing

SOLUTIONS



- Amine Solvent(traditional)
- IP Based Capture Solutions
  - Metal Organic Frameworks
  - Capture as a Service
  - Oxy-fuels

CHALLENGE

- Deploy capture facilities onsite (PSM)
- Depends on disposal/pipelines
- Long-term pricing support
- Effects on engine performance

OVERALL COST/POWER REDUCTION

- $25M in Capital
- 54% of CO2e Reduction*
- Power Costs of $650,900 per year

Deeper Dive In CO_2 Capture of Exhaust

- Overview of the process
- Analysis of the cost
- Future developments
- Could this become a revenue stream?

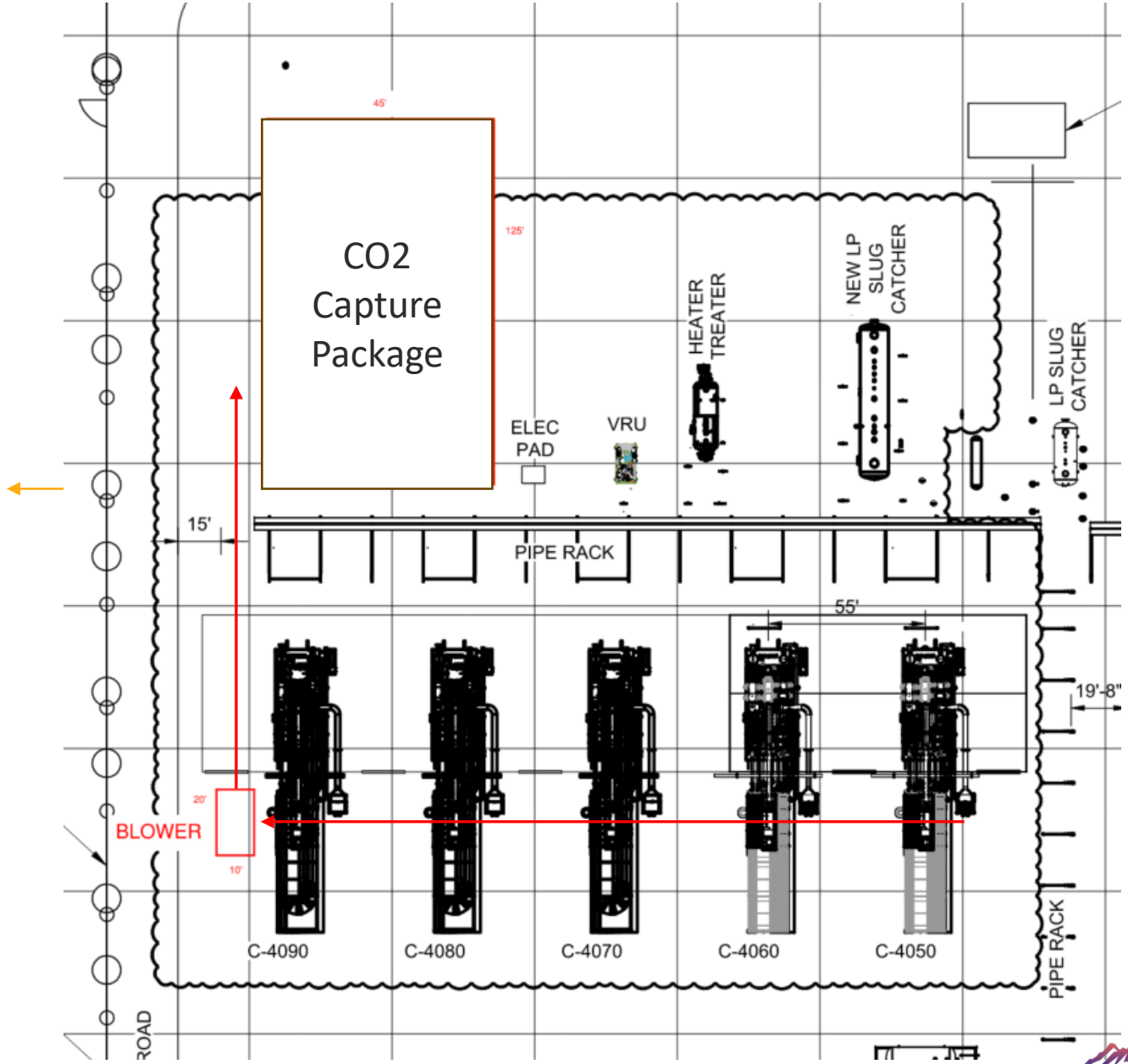
CO2 Facility

Utility Requirement

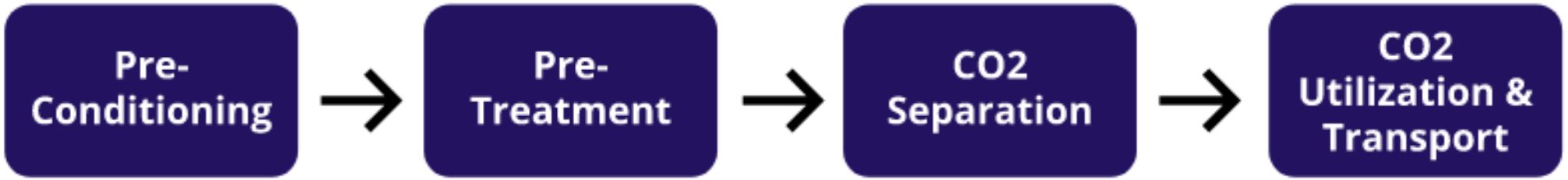
- Fuel gas
- Water
- Electricity

Processing Units

- Pre-conditioning
- Pre-treatment
- CO2 separation
- Transport



CARBON CAPTURE PROCESS



CHALLENGE

- Maintaining engine performance
- Alignment of exhausts for common header

CHALLENGE

- Engine exhaust will have contaminants
- Water management

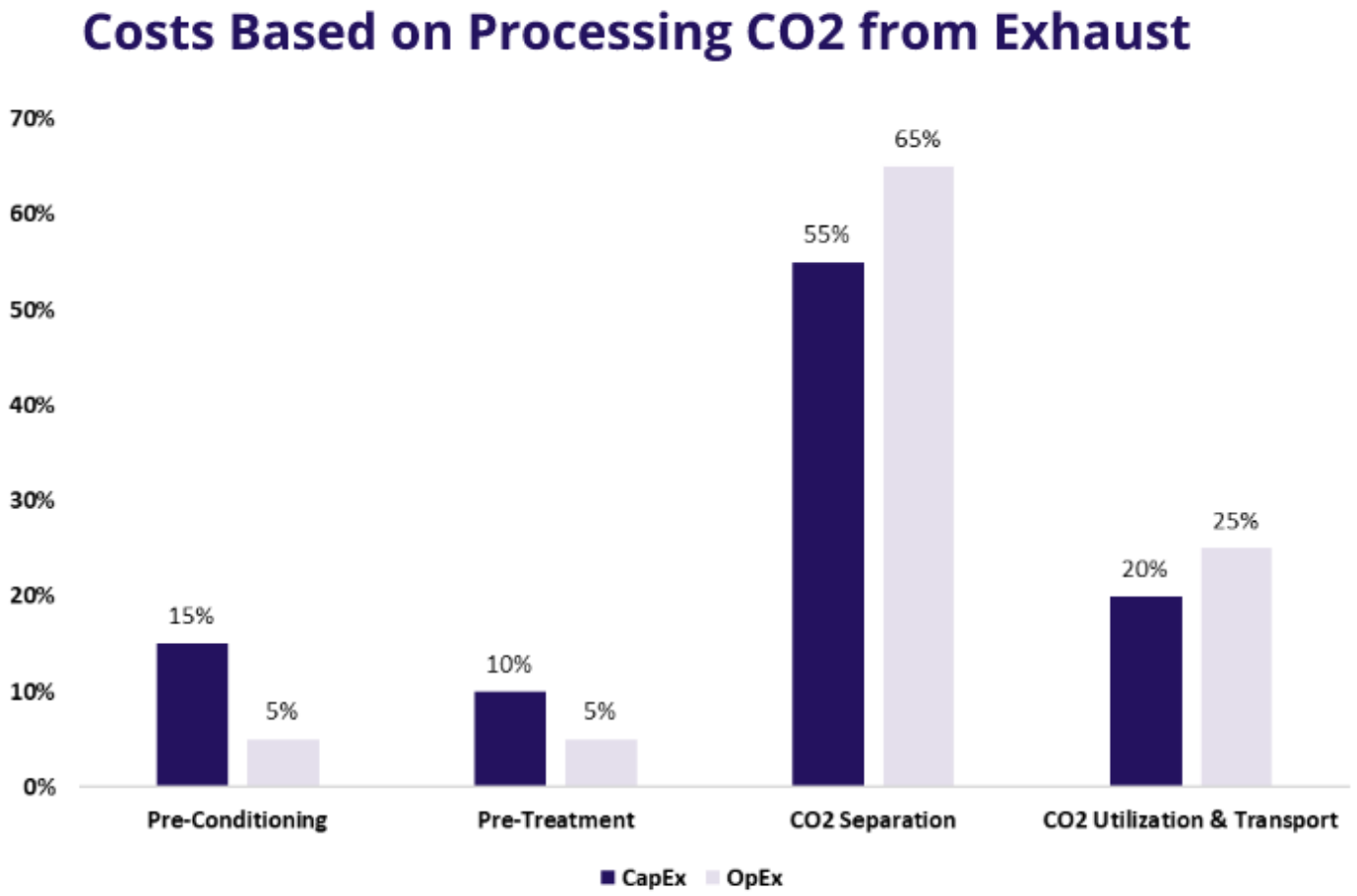
CHALLENGE

- Reboiler duty produces CO2
- Proprietary packages are hard to modify

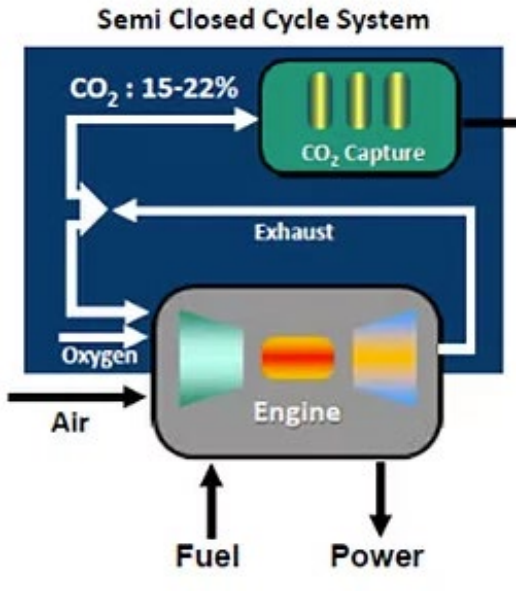
CHALLENGE

- Compression and liquefaction require relatively the same HP
- Storage capacity is not trival

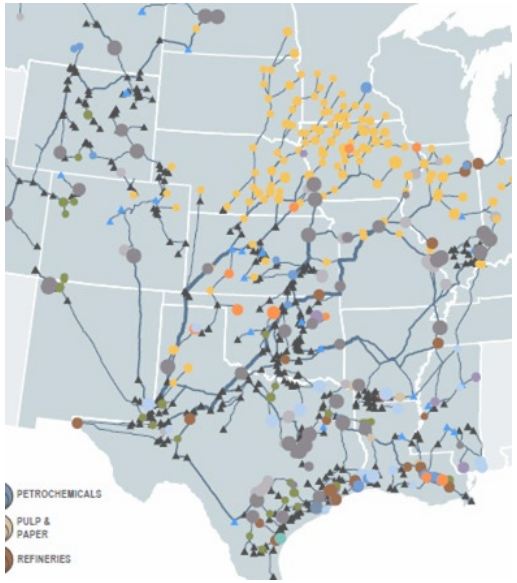
Cost Break Down for Exhaust Capture



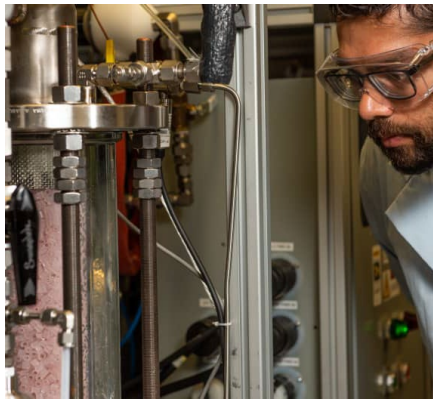
Developments to Watch



Caterpillar Solution

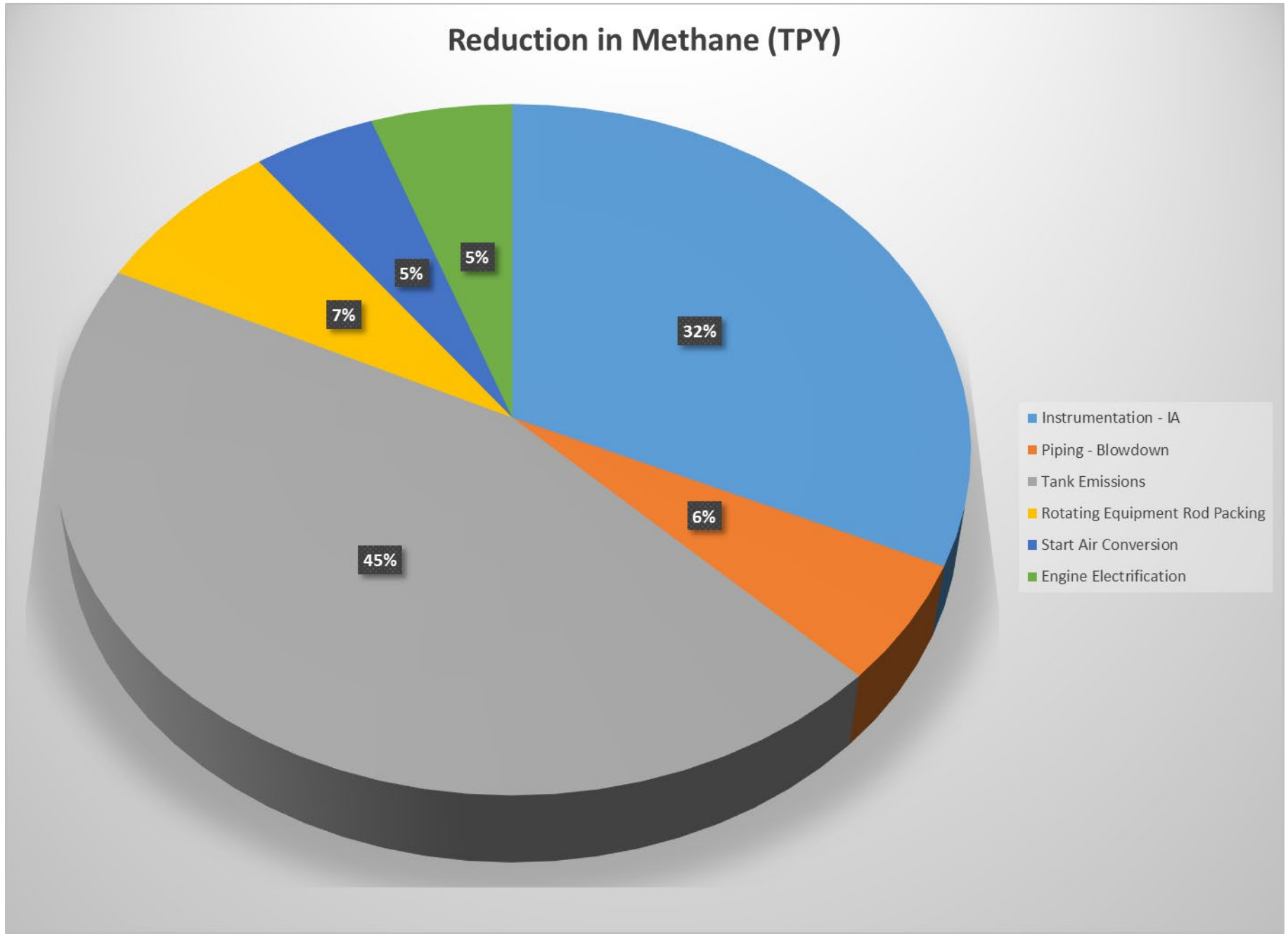


CO2 Pipelines



Chemical Developments

CO2 Demand


Reduction in Methane (TPY)
32%
6%
45%
7%
5%
5%
Instrumentation - IA
Piping - Blowdown
Tank Emissions
Rotating Equipment Rod Packing
Start Air Conversion
Engine Electrification

Get a Handle On Your Emissions

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Start With An Audit Of Your Facility

- Develop a basis for your facility
  - Site data collection
  - Design documents
  - Current reporting data
- 3rd Party Companies
  - Fee Based
  - Existing Environmental/Permitting providers
- Internal Resources
  - Operators
  - Asset Engineers

Map Out Your Regulation Profile

- Federal regulations
  - EPA – Methane Waste Fee
  - NSPS - OOOO
- State Regulations
- Company Drivers

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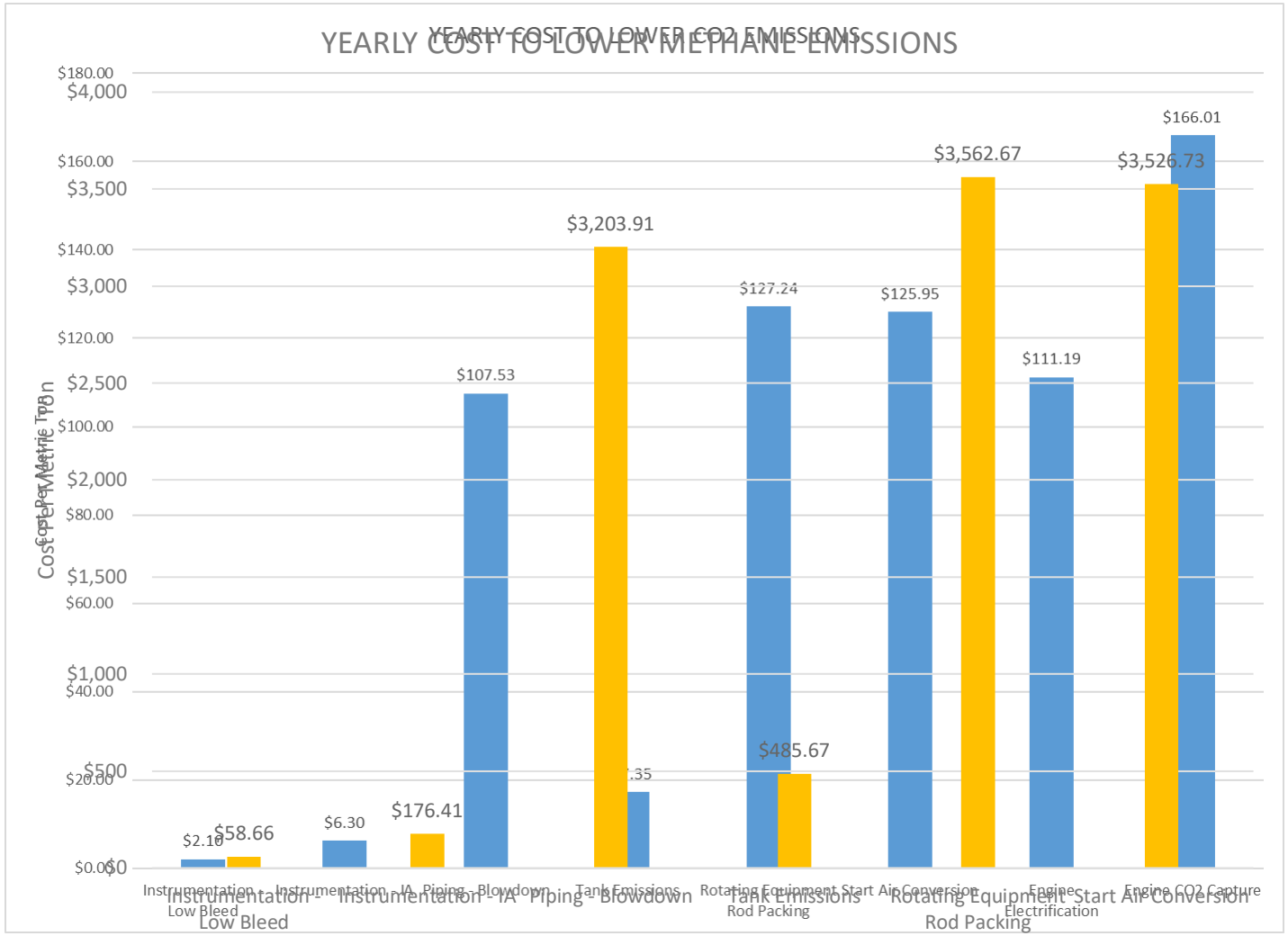
Run An Economic Analysis



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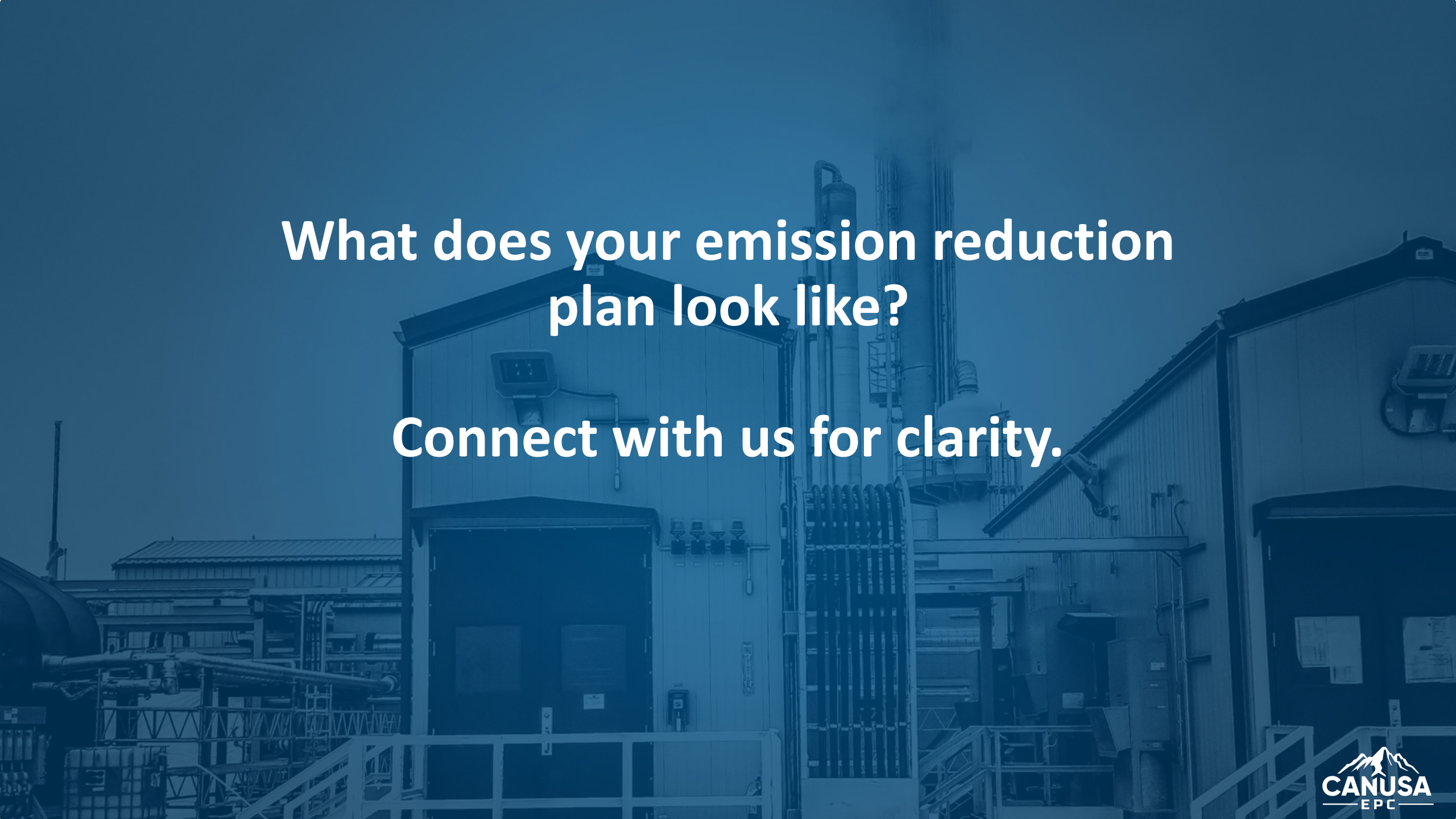
What does your emission reduction plan look like?
Connect with us for clarity.
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Thank you!

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