

# ANGUIL

Environmental Solutions for  
Cleaner Air & Water

## Ventilation Air Methane and Coal Mine Methane Abatement and Utilization

### 2024 Global Methane Forum

Mobilizing Methane Action

18-21 March 2024 • Geneva, Switzerland



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# VAM & Low Concentration CMM



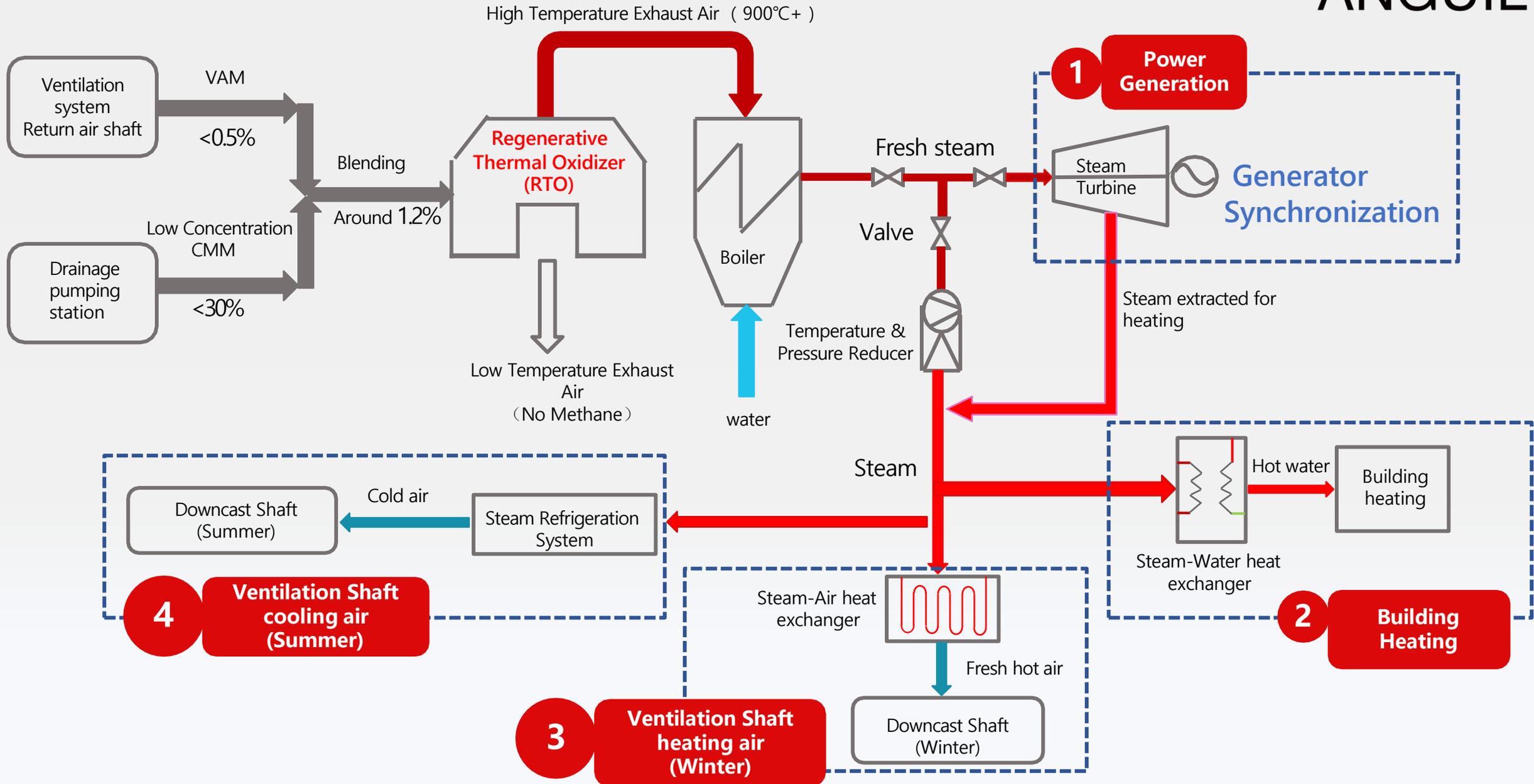
✓ **VAM**: Ventilation Air Methane ( $\text{CH}_4$  Concentration  $< 0.75\%$ , mostly  $< 0.5\%$ )

✓ **Low Concentration CMM**: Low Concentration Coal Mine Methane ( $\text{CH}_4$  Concentration  $< 30\%$ )

✓ The total amount of methane discharged into the atmosphere from China's coal mines is more than 24 billion  $\text{m}^3/\text{y}$ , and more than 75% of them are discharged by the VAM with extremely low methane concentration but extremely high air volume. The greenhouse gas effect is about 200 million t of  $\text{CO}_2$  equivalent.

✓ With the continuous efforts of the energy conservation and emission reduction in China, **VAM and low concentration CMM oxidation** has been widely used to generate heat and electricity.

# Process Flow Showing VAM & CMM Oxidation & Utilization



# RTO Features

## Ceramic Media

- True Thermal Efficiencies of **95%+**
- Low Pressure Drop
- Multiple options for handling particulate

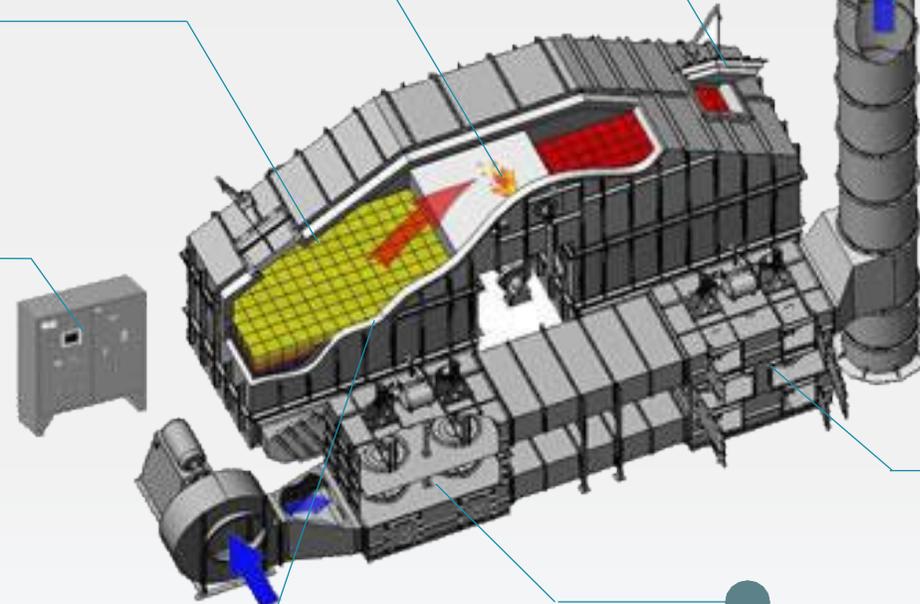
## Programmable Logic Controllers (PLC)

- Automates startup to shutdown, minimizing operator interface requirements
- Remote control module enables the system's operations to be viewed & altered via modem, reducing maintenance costs & downtime
- Control rooms and various enclosure options available

## Hinged Access Doors

- Allow for easy maintenance & inspection of the media beds

## Low NOx Burners



## Destruction Rate Efficiency (DRE)

- **≥99%**

## Hinged Access Doors

- Allow for easy maintenance & inspection of the valves

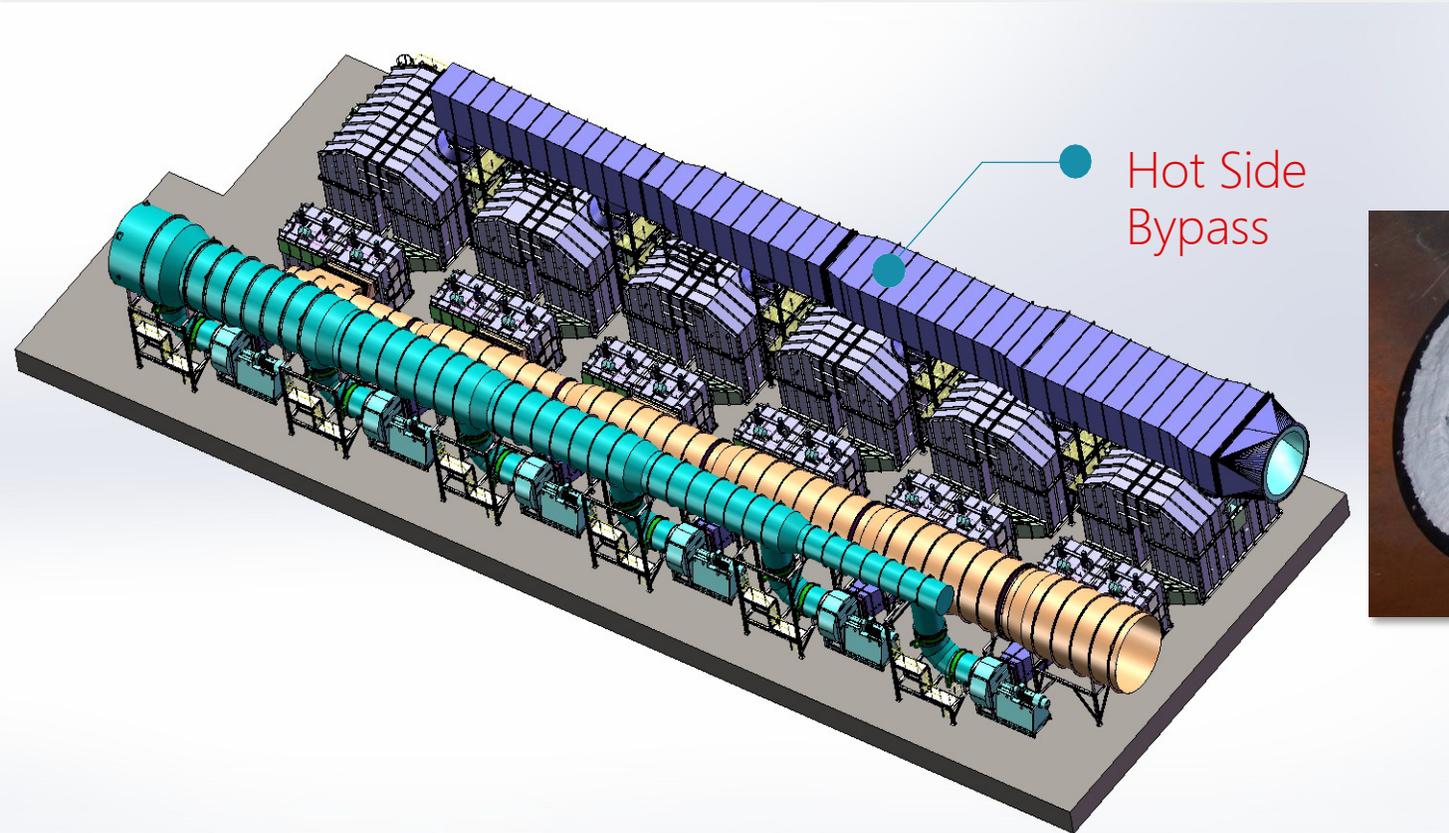
## Insulation

- Low heat capacity
- Low thermal conductivity
- Thermal shock resistance

## Poppet Valves

- Dual-disk Poppet valve with very low leakage design

# Hot Side Bypass



Duct and plenum are internally insulated



Hot Side Bypass Damper

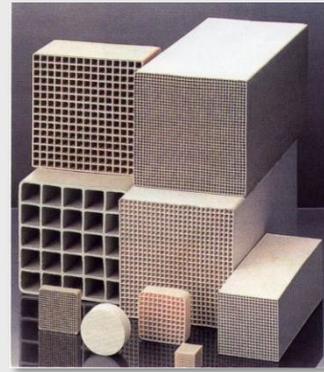
- Damper position controlled by PLC and driven by pneumatic actuator with positioner
- The hot-side gas has sufficient residence time in the hot side bypass duct to achieve the DRE.
- When the concentration of emissions increase (but does not exceed the design concentration), the hot side bypass damper opens automatically.

# Types of RTO Heat Recovery Media



## RANDOM PACKING

- Typically 1" or 1½"
- ½" – 3" Available



## EXTRUDED HONEYCOMB MONOLITH

- Variety of cell sizes and wall widths
- Typical block size: 150 x 150 x 300



## MULTI-LAYERED MEDIA

- Style and Size Options

# Anguil Asia VAM Reference



Company Name	province	Oxidizer Type	Air Flow(m <sup>3</sup> /h)	Date
Yangquan Coal Industry Group / Sangzhang Project	Shan xi	RTO M600x6	540,000	2016
LuAn Group	Shan xi	RTO M600x3	270,000	2018
Yangquan Coal Industry Group	Shan xi	RTO M600x6	540,000	2018
Hangtai Xinyan	Shan xi	RTO M600x1	90,000	2019
Hangtai Xingwu	Shan xi	RTO M600x2	180,000	2019
Total		18 RTO	1,620,000	

# Sangzhang Project



**15MW**

Installed capacity of  
power generation



**540,000m<sup>3</sup>/h**

Total oxidation capacity



**108 million kwh**

Annual power generation



**95%+**

Destruction or  
Removal Efficiency



**51,840,000m<sup>3</sup>/h**

Annual emission  
reduction CH<sub>4</sub>



**0.8 million t**

Annual emission  
reduction CO<sub>2</sub>e

# Sangzhang Project

Foundation



Equipment Transportation



Chamber Installation



RTO Installation



Assembly



Hot Side Bypass Installation



Commissioning



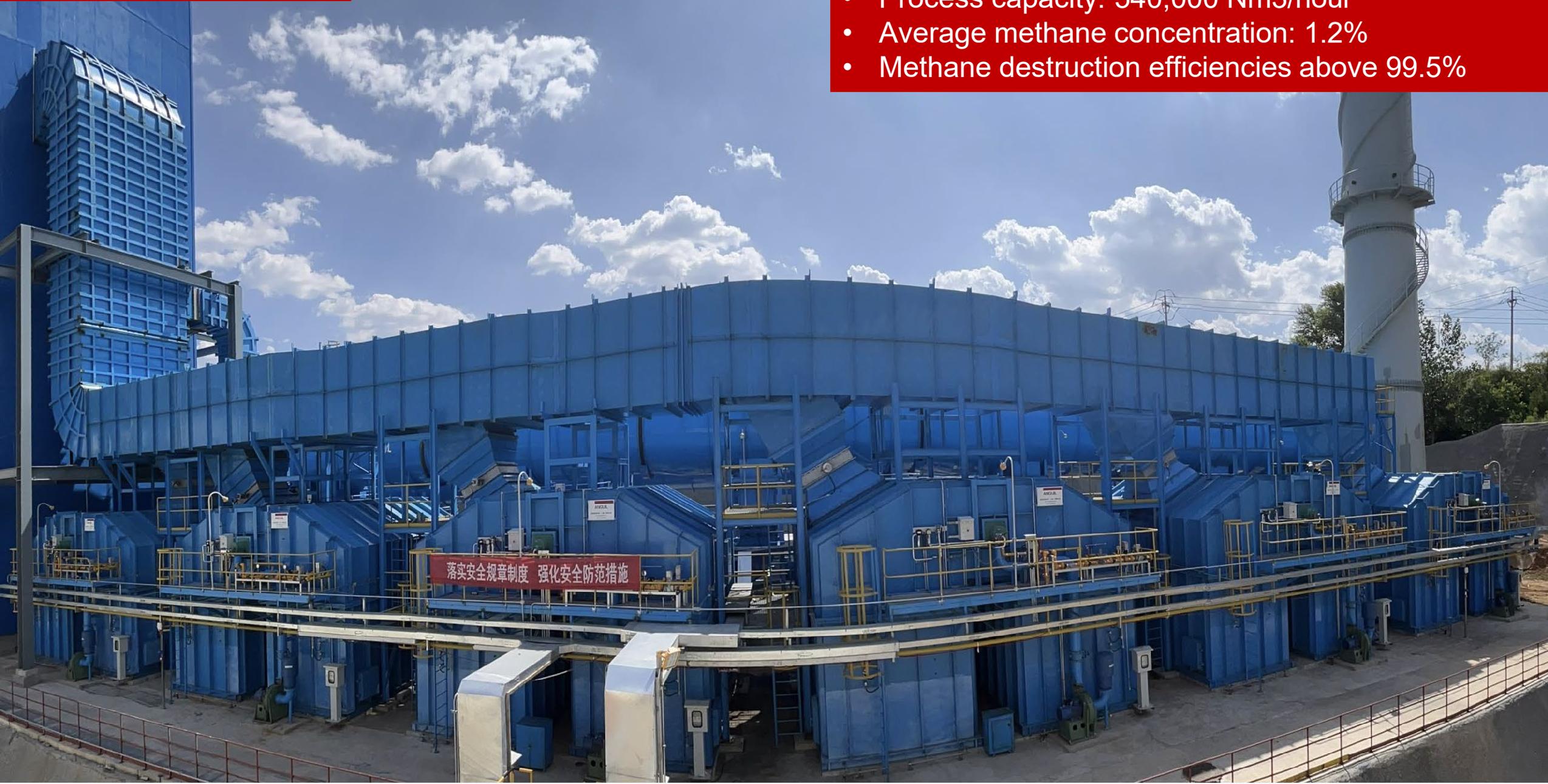
Start-Up & Testing



## Sangzhang Project

### (6) Anguil Regenerative Thermal Oxidizers (RTOs)

- Process capacity: 540,000 Nm<sup>3</sup>/hour
- Average methane concentration: 1.2%
- Methane destruction efficiencies above 99.5%



## Sangzhang Project

Excess heat from combustion is converted to electricity using boiler and steam turbines.

- Installed capacity of 15 million megawatts



# Questions?

## Anguil.com Resources

- Introduction to Pollution Control
- Overview of Emission Control Technologies
- Industry & Regulatory Links
- Oxidizer Service Series
- Register Your Oxidizer
- 24/7 Service Information

## Connect with Us

