Sulzer 95+ Heater Technology

Decarbonization by
Improving Fired Heater Efficiency to ≥ 95%

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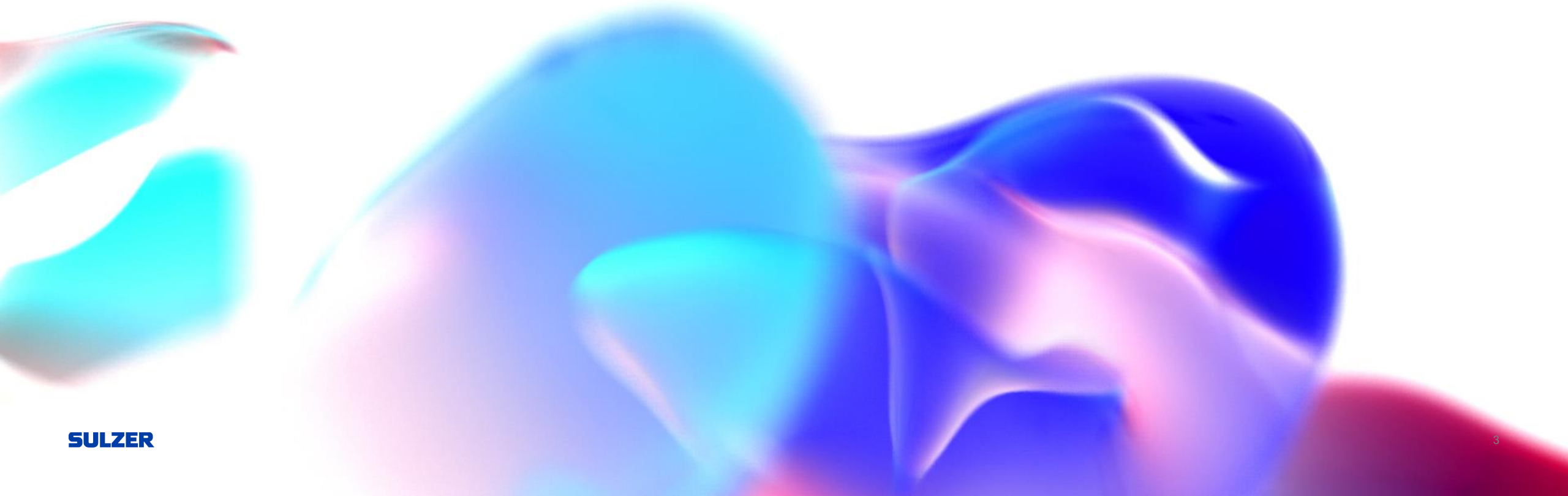
Agenda

- Introduction to Sulzer
- Why 95+ Heater Technology
- What is special about 95+ Heater Technology
- How to implement 95+ Heater Technology
- Where 95+ Heater Technology is applied
- Case Study
- Next Steps
- Technology Recap

Introduction to Sulzer



Global and Agile

We combine reach with responsiveness

13000

Employees

180

Production and service locations

100

Countries with Sulzer presence

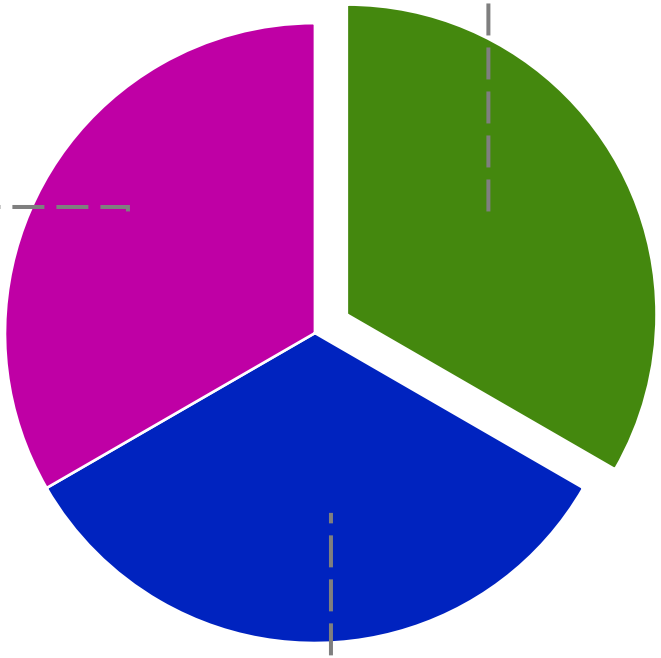
3bn

Sales (CHF) 2021E

About Sulzer

At your service since 1834

Two centuries of leadership in the development of innovative products and services that drive sustainable progress and help our customers build a better world.



Chemtech

- Chemical processing
- Separation technologies
- **Licensing**

Flow Equipment

Pumping solutions specifically engineered for the processes of our customers

Services

Parts as well as maintenance and repair solutions for rotating equipment

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Sulzer Chemtech (GTC Technology)

A global licensor for your process technologies and mass transfer solutions

- ✓ Sole owner of GTC Technology intellectual property
- ✓ Our advanced technologies:
  - Optimize production capacity and efficiency
  - Reduce operating cost
  - Minimize environmental impact

With over **30 years of process experience**

Sulzer Chemtech (GTC Technologies) team is committed to help our customer achieve their **production** and **profitability** goals

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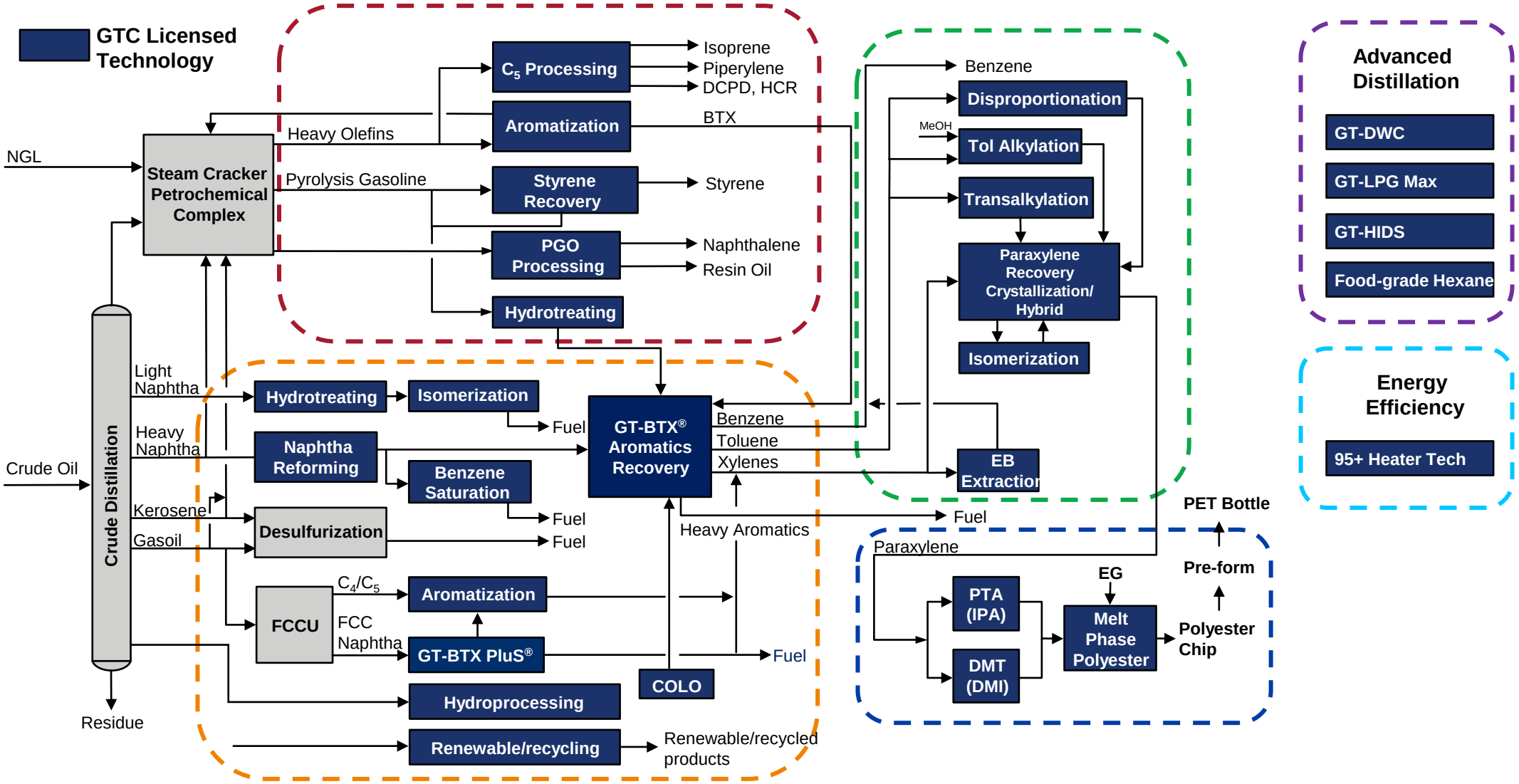
Partial Technology Map



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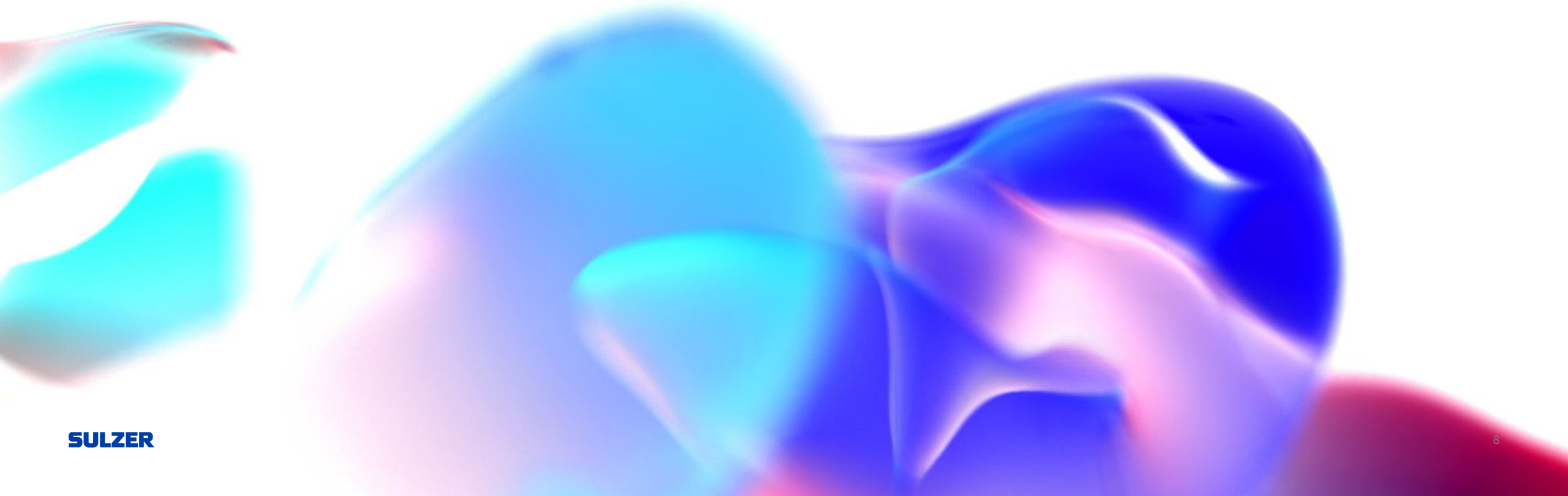
Why 95+ Heater Technology?



Scope 1 Emission Reduction and Refinery EII Improvement

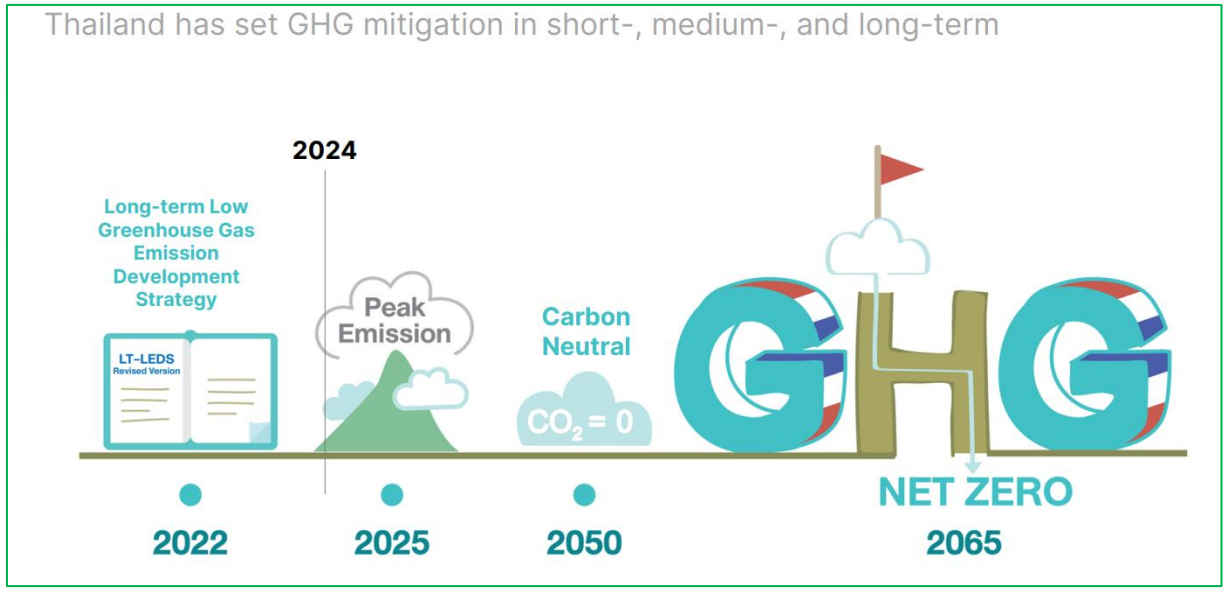
Contributing towards Net Zero Target

3 Pillars

To transition to Net Zero Company

Efficiency-Driven

Maximizing efficiency across all assets and implementing new breakthrough technologies



Source: PTTGC and ADB

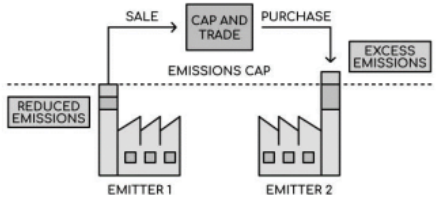
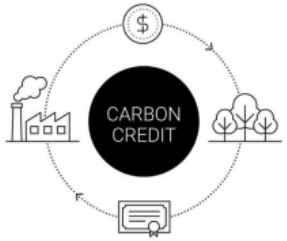
Increasing implementation of carbon pricing

Country	Initiative	Type	Status	Start Date	2023 Price (US$/t CO2e)
Japan	National	Carbon tax	Implemented	2012	Estimated up to 1500 yen (9.5 US$/ton) in 2028
Korea	National	ETS	Implemented	2015	11.24
Singapore	National	Carbon tax	Implemented	2019	- 25 SGD (18.8 US$) in 2024 and 2025 - 45 SGD (33.8 US$) in 2026 and 2027 - 50 to 80 SGD (38-60 US$) by 2030
Thailand	National	T-VER	Implemented	2016	156.36 THB (4.3 US$)
Indonesia	National	ETS	Implemented	2023	IDR 30 (2 US$)
EU	EU ETS	ETS	Implemented	2005	96.3
France	National	Carbon tax	Implemented	2014	48.5

Source: World Bank Carbon Pricing Data and various sources

Carbon Pricing Mechanism

Thailand has been implementing voluntary carbon pricing mechanisms via T-VER carbon Credits and ICP in businesses

	Market-based pricing	Determined pricing
Mandatory	Emissions Trading Scheme (ETS) 	Carbon Tax 
Voluntary	Carbon Crediting Mechanism 	Internal Carbon Pricing (ICP) 

Source: Creagy

CREAGY

Asia Pacific > Thailand to impose carbon tax by 2025, official says

Thailand to impose carbon tax by 2025, official says

Published 14:46 on June 5, 2024 / Last updated at 14:46 on June 5, 2024 / Nikita Pandey / Asia Pacific, Carbon Taxes, CBAM, Other APAC

The government of Thailand is planning to impose a carbon tax on the nation by 2025, the country's Excise Department has told local media.

Internal Carbon Pricing

Since 2021, IRPC starts implement Internal carbon price at USD 20 per ton of CO2 equivalent as **shadow pricing** to evaluate new green investments and infrastructure projects. We have applied the ICP in Renewable projects and Energy Efficiency Improvements. More than 12 projects using shadow pricing, for example Meltblown expansion project for Polypropylene, and Global Hygiene: Spun bond Expansion project for Polypropylene.

Target on the Greatest Impact

- Fuel consumption for the fired heaters are often the main contributor to the CO_2 emission in the refineries and petrochemical plants

- Increasing the fired heater efficiency to reduce fuel gas consumption can quickly provide significant impact to:

  – Operating cost reduction in the refinery (EII improvement) or petrochemical plant

  – Reduction in CO_2 emission (Scope 1 emission and carbon tax avoidance)

  – Meet environmental regulation on SOx, NOx emission

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What is special about 95+ Heater Technology?

Sulzer 95+ Heater Technology

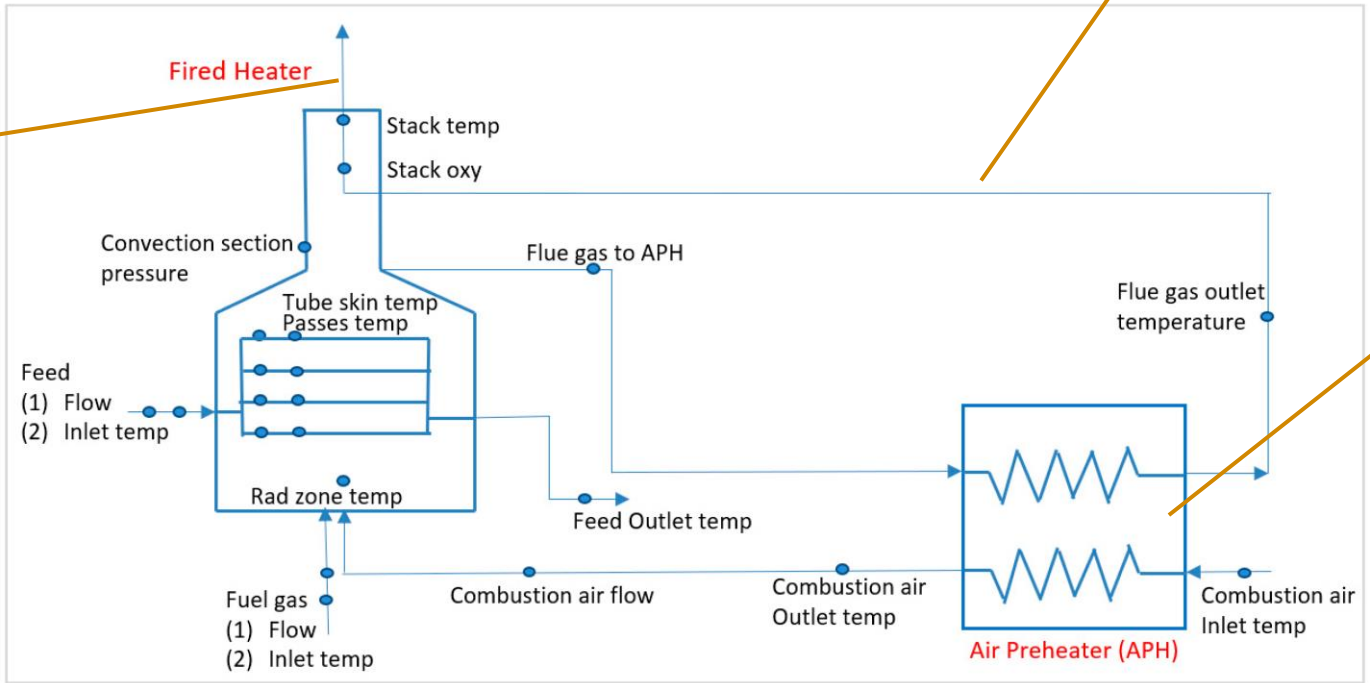
- A “total process solution”; not just an equipment solution like Air Preheater/APH.
- Final flue gas temperature can be reduced to 80-85℃ or lower.
- Reduction of SO2 and NOx.
- Worry-free operation – no corrosion, no fouling for the whole fired heater system.
- Almost no maintenance required.
- Significantly reduce the fuel gas consumption. Project return typically is <2 years with fuel gas saving.
- Significantly reduce the carbon emission. Project return typically is <1 year with fuel gas saving & carbon tax saving.
- Many commercial reference units.

Traditional Fired Heaters Limitation

Cannot go below dew point due to sulfuric acid corrosion and fouling

Still high flue gas temperature

Traditional fire heater with APH



Limitation on how much heat can be recovered

Heating efficiency is capped at max. 89%-92% even with APH

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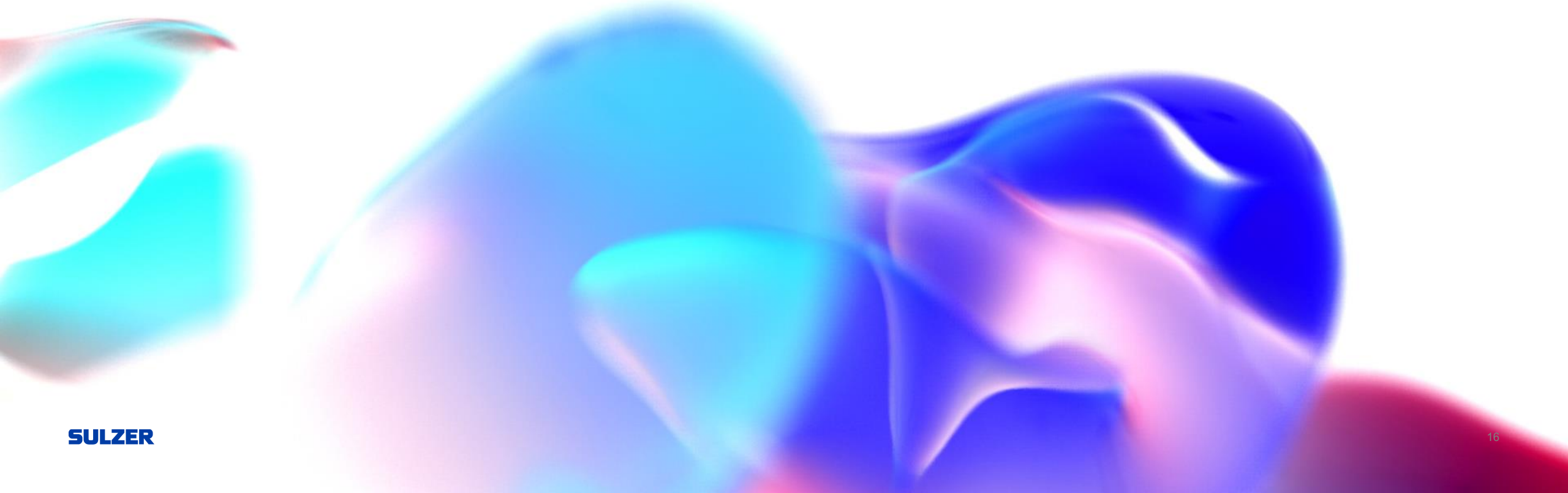
How to Implement 95+ Heater Technology?

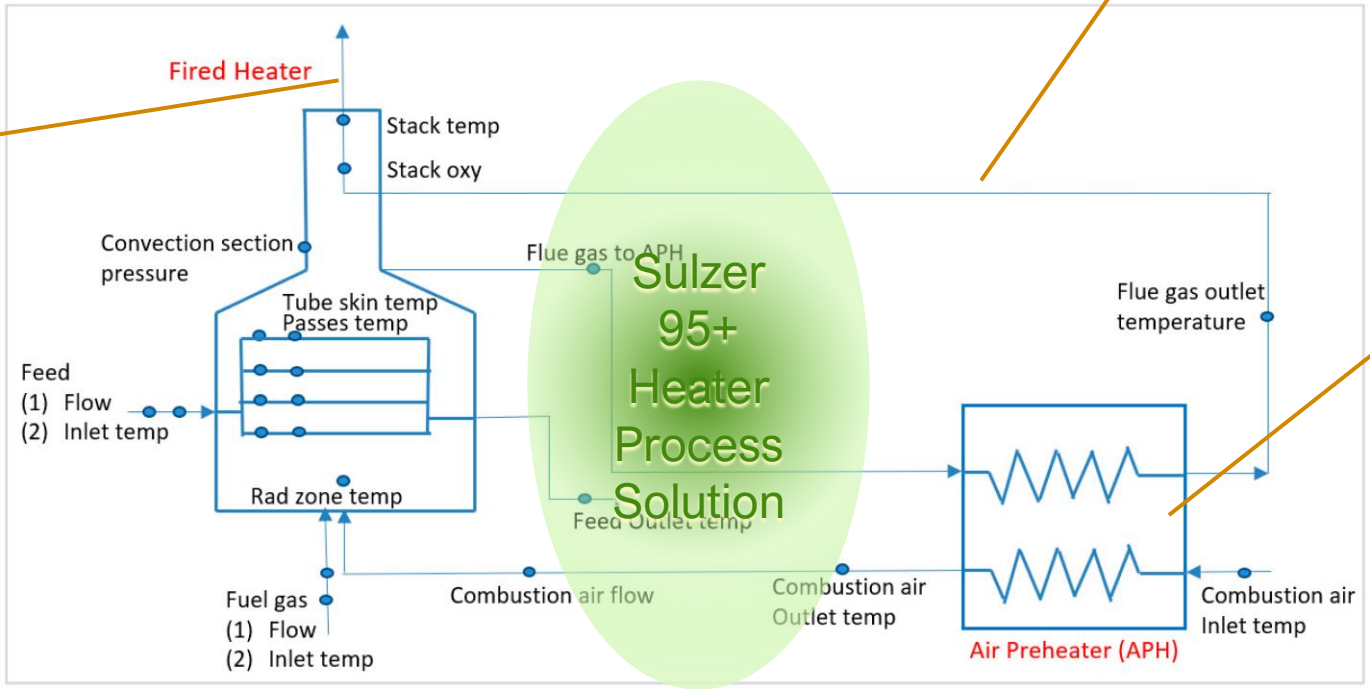


After Adding 95+ Heater Technology

Elimination of the sulfur dew point corrosion

Very low flue gas temperature

Traditional fire heater with APH



Recovering the heat as much as we want

Heating efficiency is [redacted]

increased to ≥95% with maximum heat recovery

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95+ Heater Technology Improvement over Traditional Heater

Item	Traditional Heater	95+ Heater	Note
Heat efficiency	89%-92%	≥ 95%	
Flue gas temperature	≥ 120℃	≤ 85℃	
Flue gas emission	NO_X: 40~80 mg/m^3 SO_2: 10~50 mg/m^3	NO_X: 30~50 mg/m^3 SO_2: Near zero emission	
Corrosion and Fouling Long Term Running	Unable to avoid sulfuric acid dew point corrosion and fouling, causing inability to run for a long period of time.	No sulfuric acid dew point corrosion, no fouling, Can run for a long period of time with deep energy recovery and 85℃ of flue gas	With Waste Heat Recovery System
Maintenances	Need a lot maintenances for air preheaters, draft fan and duct (replacement) due to corrosion and fouling.	Almost no maintenance because the whole system is operated under no corrosion and fouling.	

Where 95+ Heater Technology can be applied?

95+ Heater Technology Applications

Applicable to all types of fuel gas fired heaters to improve heating efficiency to ≥95%.

- Reforming heater
- CDU/VDU heater
- Xylene column heater
- Coker heater
- Hydrotreating heater
- Some chemical heaters

More than 20 successful operating references

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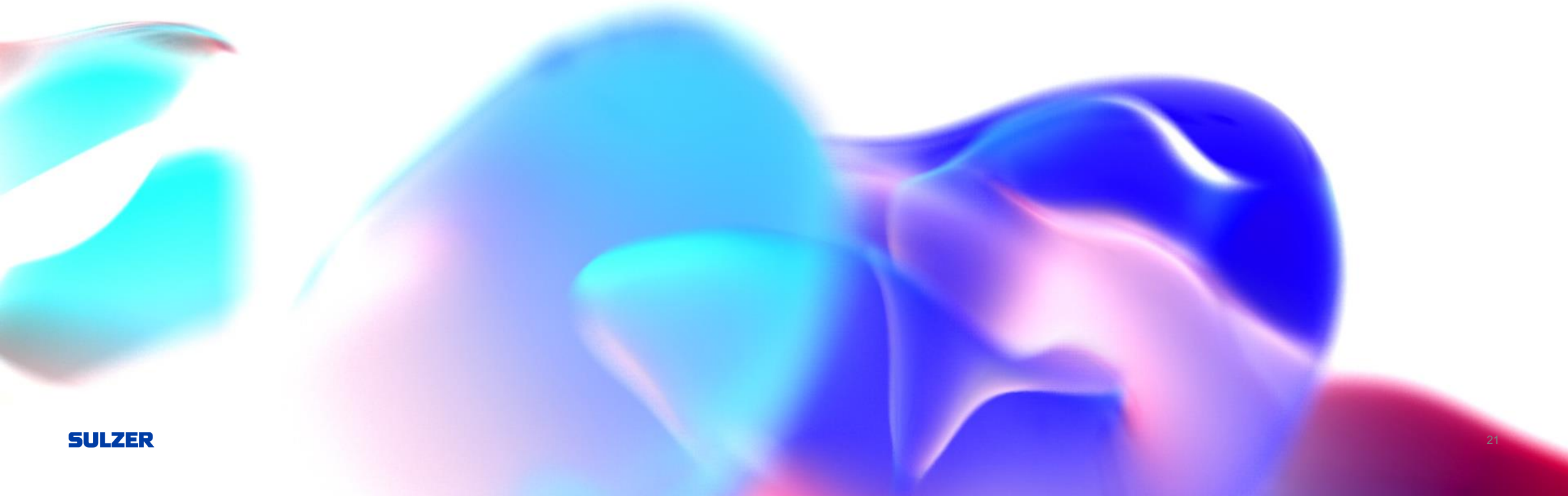
Case Study



95+ Heater Technology Selected Reference – 1 (revamp)

Refinery N

Heater	Reforming heater (3 MTA CCR)
Heater load	220 MW
Heater type	Box-type heater, side firing
Heat efficiency	Increased from 91.5% to 95%
Start up	Apr. 2021
Fuel gas saved	267,872 GJ per year
Payback period	< 1.5 years (by saving of fuel cost)
Carbon reduction	30,000 ton/year

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Example on Impact of 95+ Heater Technology

Energy Conservation Projects
โครงการอนุรักษ์พลังงาน

In 2022, GC has executed a total of 94 energy conservation projects in accordance with the ISO 50001:2018 energy management standard, placing emphasis on improving energy efficiency in production processes and creating awareness on energy conservation among employees.

ในปี 2565 บริษัทฯ ได้ดำเนินโครงการอนุรักษ์พลังงานทั้งสิ้น 94 โครงการ ตามมาตรฐานการจัดการพลังงาน ISO 50001:2018 โดยมุ่งเน้นที่การปรับปรุงประสิทธิภาพการใช้พลังงานในกระบวนการผลิต และสร้างจิตสำนึกให้กับพนักงานเพื่อร่วมอนุรักษ์การใช้พลังงาน

Overall Performance of Energy Conservation Projects in 2022
ภาพรวมผลการดำเนินโครงการอนุรักษ์พลังงานในปี 2565

261	1,440,848	100,595	471.6
million baht	GJ per year	tons CO_2 equivalent per year	million baht per year
Investment เงินลงทุน	Reduction of Energy Consumption ลดการใช้พลังงาน	Reduction of GHG Emissions ลดการปล่อยก๊าซเรือนกระจก	Reduction of Costs ลดค่าใช้จ่าย

267, 872 GJ/year of energy savings is approx. 19% of the energy reduction

30,000 ton/year of CO2 reduction is approx. 30% of the CO2 reduction

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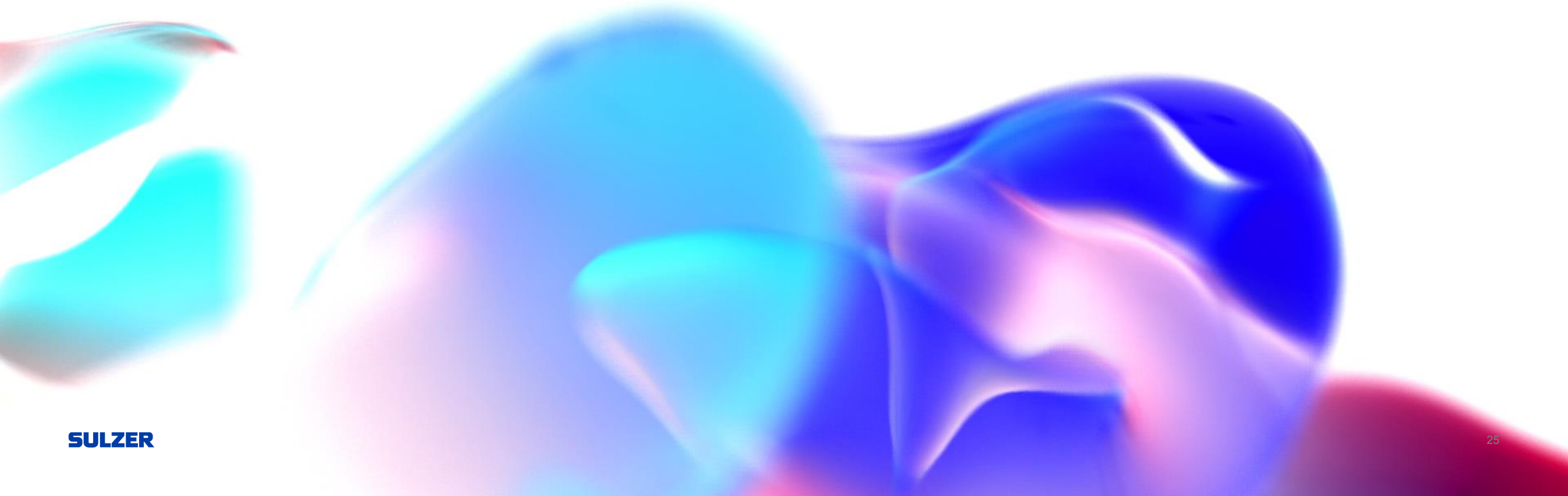
95+ Heater Technology Selected Reference – 2 (revamp)

Refinery P

Heater	CDU heater (3.7 MTA CDU)
Heater load	33 MW
Heater type	Box-type heater, bottom firing
Heat efficiency	Increased from 92% to 95%
Start up	Aug. 2022
Fuel gas saved	1,168 ton/year
Carbon reduction	2,172 ton/year

Next Steps



Project Proceeding

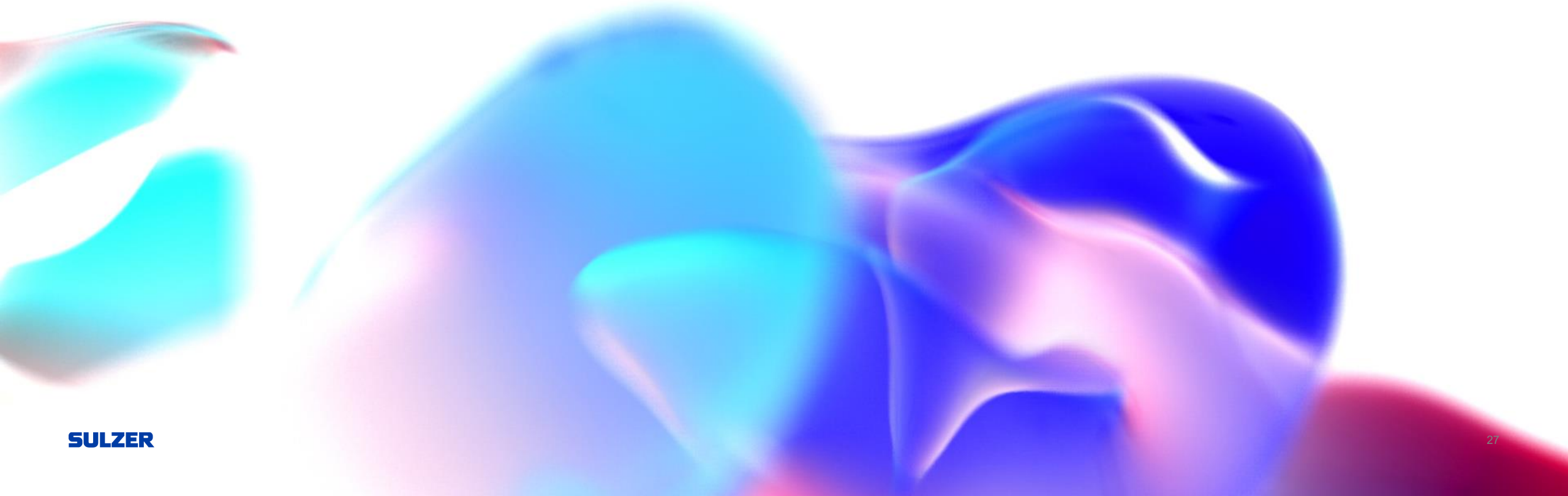
Study and research the entire heater system

- Check the operating state for the whole heater system including burner and heat recovery systems (not only the problem/bottleneck equipment)
- Jobsite investigation
- Review original design documents
- Discuss existing operating issues with customer

Preliminary revamp proposal

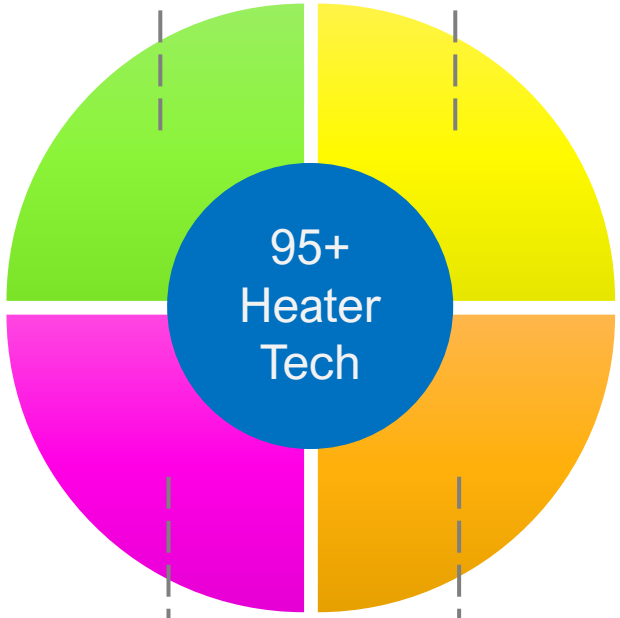
Finalizing revamp proposal, option, scope, and way forward with customer

Technology Recap



95+ Heater Technology

Advanced Heater Technology offered by Sulzer Chemtech to improve your heater efficiency to ≥ 95%



High Project Return

Fast return on investment simply by saving of the fuel cost

Decarbonization

Fast & easy way to achieve decarbonization target

Reliable Operation

No corrosion, no fouling, low maintenance

High Quality

Reputable Sulzer products & services with numbers of successful references

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Thank You!

Q&A

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