



SNOX™ technology for cleaning of flue gas from combustion of high sulfur fuels

RESEARCH | TECHNOLOGY | CATALYSTS

“Beneficial By-products of Coal Combustion and Gasification”, Hot Topic Hour

April 28th, 2011 – Erik Eriksson

Presentation outline

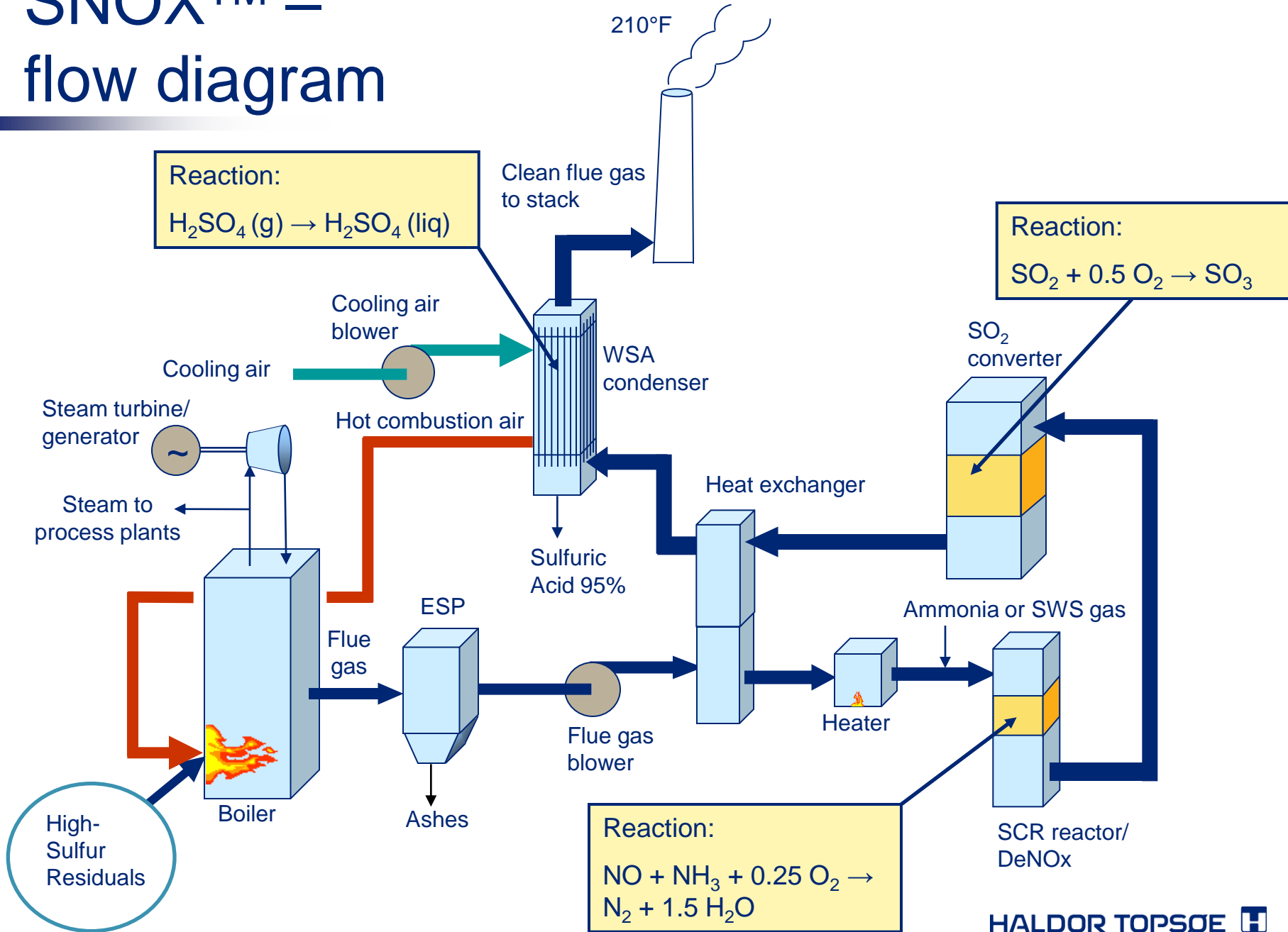
- Introduction
- Process layout
- Economy compared with limestone scrubbing
- References
- Summary

What is SNOX™?

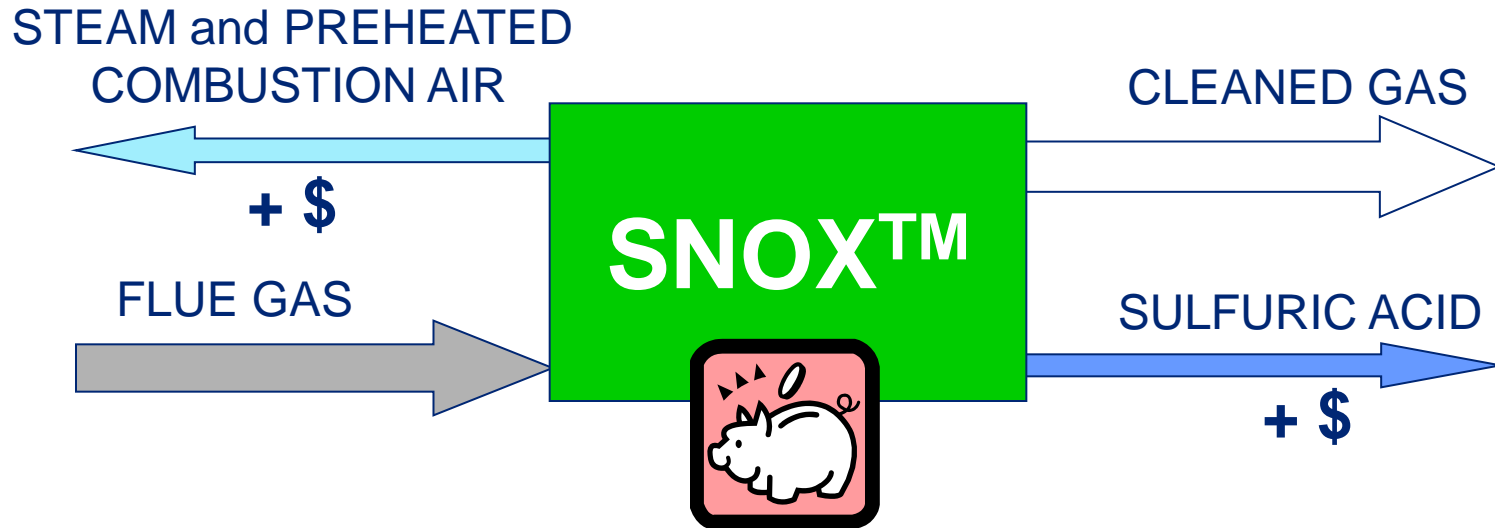
SNOX™ – a process for purification of flue gas from combustion of **high-sulfur fuels**

Removes **SO_x, NO_x and particulates** from flue gases.

SNOX™ – flow diagram



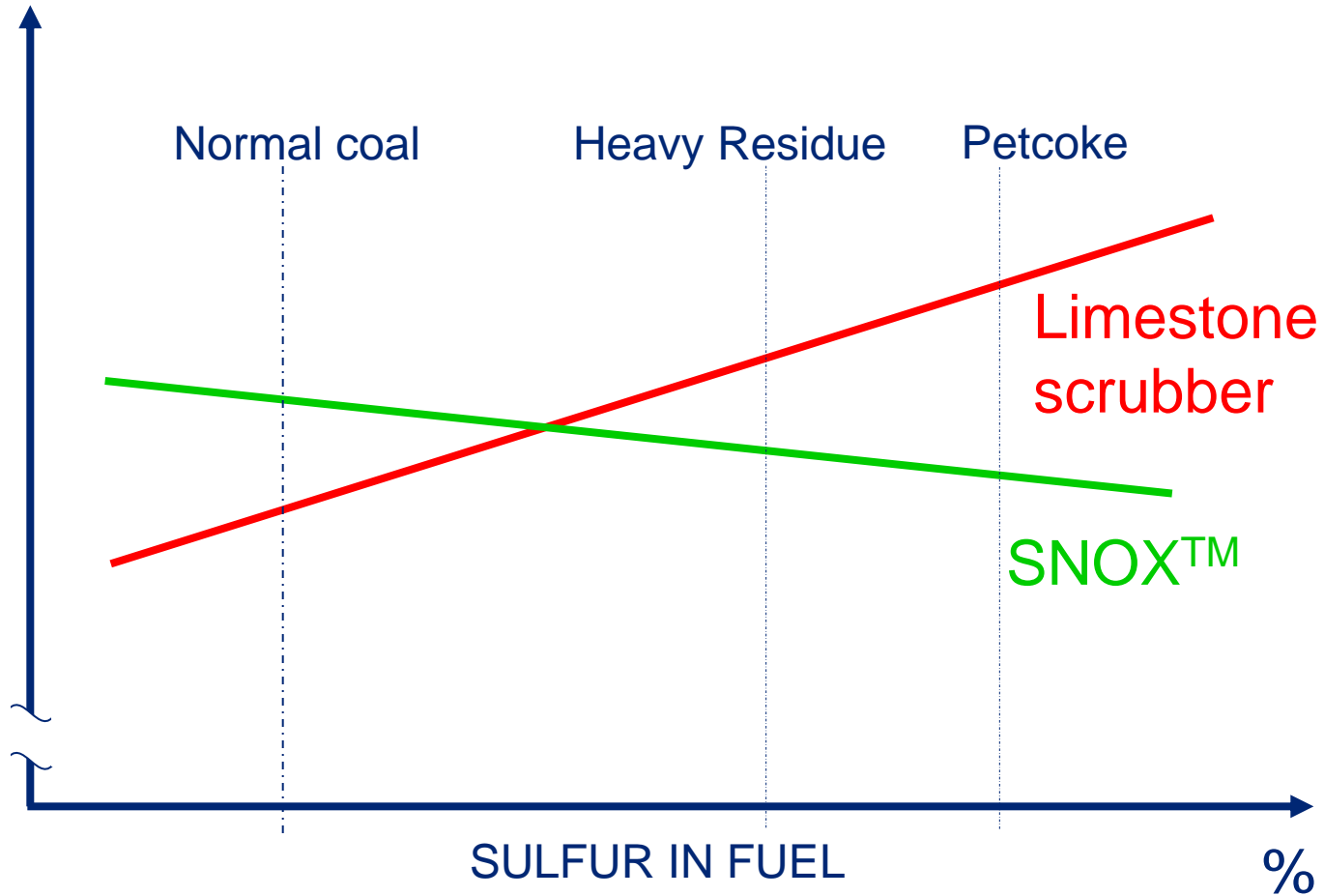
SNOX™ vs. limestone



Cost of flue gas desulfurization

\$/kWh

TOTAL COST (CAPEX + OPEX) OF
FLUE GAS DESULFURIZATION



Comparison of operating costs

Basis: Petcoke

300 MW electric power

Unit: USD per year

**Downshot
PC boiler
with SNOX™**

**CFB boiler
with SCR DeNOx
and limestone FGD**

Income:

Sales of sulfuric acid at \$30/t

3,600,000

0

Costs:

Limestone at \$20/t

0

7,500,000

Ammonia at \$300/t

600,000

240,000

Waste disposal at \$20/t

0

12,000,000

Additional petcoke consumption at \$40/t

0

400,000

Total costs

600,000

20,000,000

Net operating income

+ 3,000,000

- 20,000,000

SNOX™ references

Plant	Capacity (flue gas)	Start-up	Fuel
Nordjyllandsværket, Denmark	1,000,000 Nm ³ /h 900 MM SCFD	1991	Coal
Raffineria di Gela, Italy	1,200,000 Nm ³ /h 1,075 MM SCFD	1999	Petcoke + RFO
OMV Refinery, Austria	820,000 Nm ³ /h 735 MM SCFD	2007	RFO + sour gas
Petrobras RNEST, Brazil	2 x 650,000 Nm ³ /h 2 x 582 MM SCFD	Expected 2012	Petcoke + sour gas
Ohio Edison, USA (demonstration plant)	135,000 Nm ³ /h 121 MM SCFD	1991-96	Coal

SNOX™ – Raffineria di Gela, Italy

Raffineria di Gela, Sicily, Italy

Boilers: approx. 250 MW_e
+ steam and heat

Fuel: **90% Petroleum coke**

Additional fuel: Oil and gas

Total flue gas flow: 1,200,000 Nm³/hr
1,075 MM SCFD

H₂SO₄ (95%): 225 t/d

SO₂ removal: 96.5%

Commissioned: 1999

Left stack
emits
1,000,000
Nm³/h
SNOX™
treated
(invisible)
flue gas

Right stack
emits (hazy)
flue gas from
the 4th boiler
before it was
connected to
the SNOX™
plant



Seven good reasons for choosing Topsoe SNOX™

- **Clean, proven and reliable technology**
- **No consumption of absorbents**
- **No process water consumption**
- **No production of waste solids and liquids**
- **Valuable sulfuric acid product**
- **Excellent heat recovery**
- **Low operating & maintenance costs.**

Thank you for your attention!

