Meeting the World Energy Challenge.

CoaLogix®

CoaLogix Inc. is a company formed to find, acquire, integrate and optimize technologies to improve the environmental footprint of coal fired power plants.

SCR TECH
A CoaLogix® Company

SCR-Tech LLC provides SCR management through a number of services including a proprietary regeneration technology proven in Germany & the US. This technology restores full performance to SCR catalyst for 40% less than purchasing new catalyst.

SCR Prime Reactions

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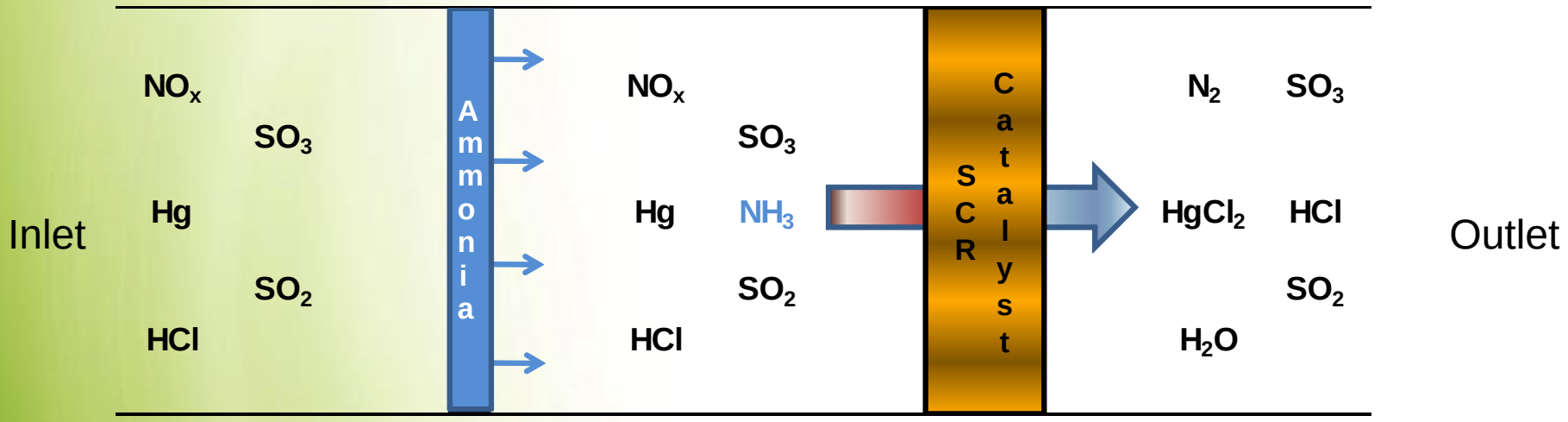

Positive Reactions:

No_x Reduction $\quad NO + NH_3 + 1/4\ O_2 \rightarrow N_2 + 3/2\ H_2O$

Hg Oxidation $\quad Hg + 2\ HCl + 1/2\ O_2 \rightarrow HgCl_2 + H_2O$

Negative Reactions:

SO_2 Oxidation $\quad SO_2 + 1/2O_2 \rightarrow SO_3$

SCR Reactor Terminology

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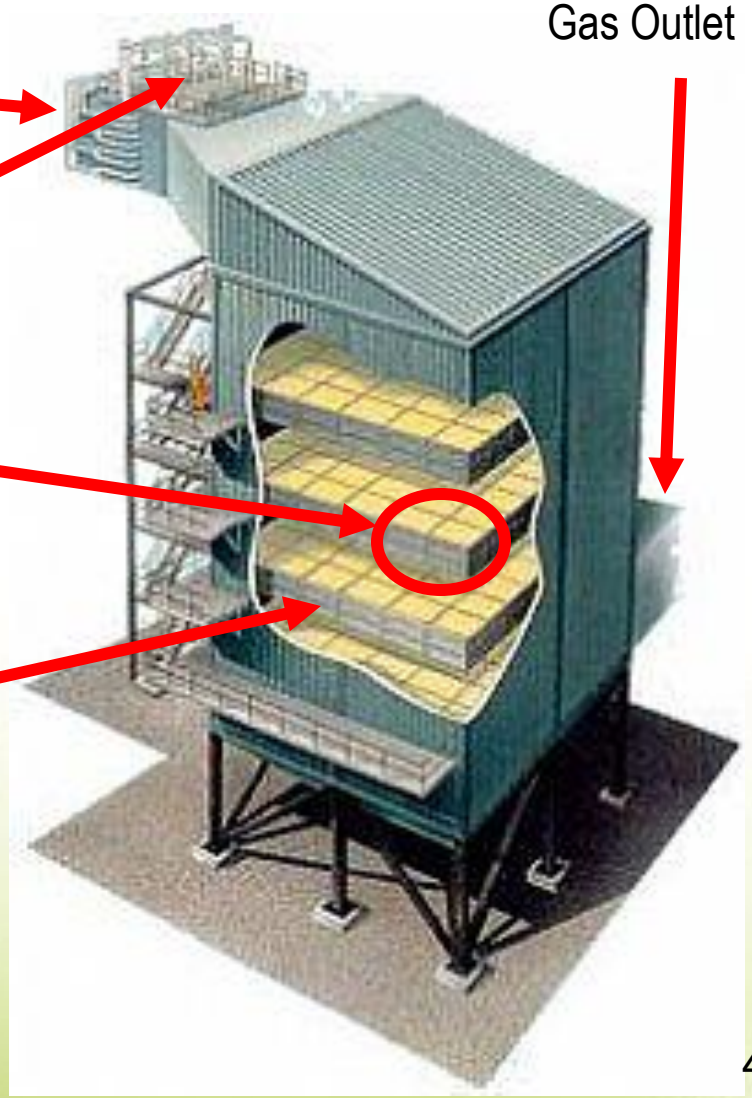

SCR System Performance

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SCR System Performance	Primarily Affected By		
	Catalyst Performance	Catalyst Decay Rate	Flue Gas Impurities
			Operating Conditions
		Temperature	
		Flue Gas Velocity	
		SO_3 Concentration - 0 to 10ppm	
		NH_3 Concentration < 1.0 Mole Ratio	
	% Catalyst Pluggage		
	% Flue Gas By-pass		
	Ammonia to NOx Distribution		
	Flow and Temperature Distribution		

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SCR Pluggage

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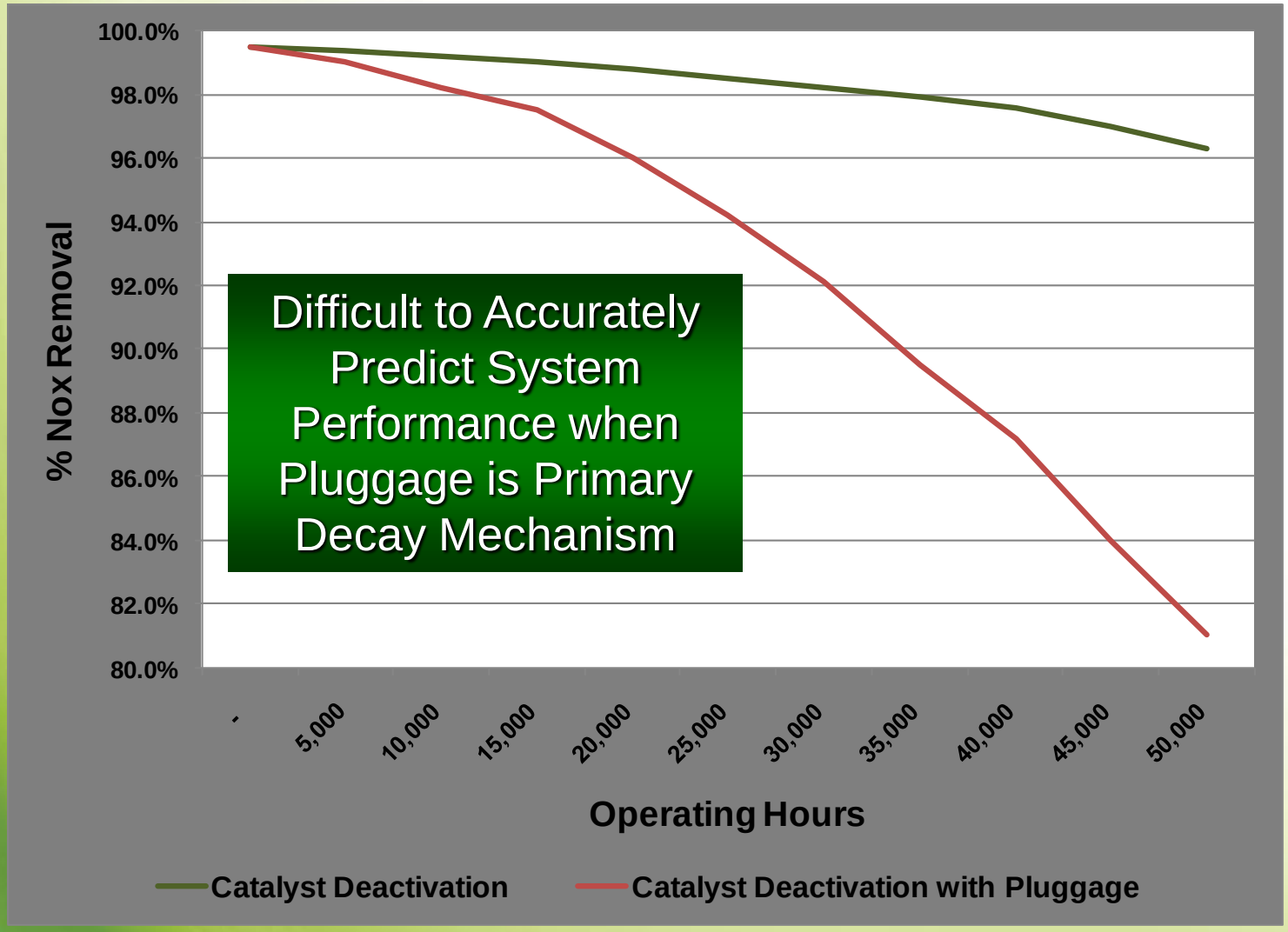

System performance is reduced significantly with pluggage, not actual catalyst deactivation.

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Factors to Consider

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- Environmental requirements now and future
- Plant limitations now and future
- Pluggage, flow and temperature imbalances
- Outage schedule
- Total costs and budgets
- Risks

Balanced Approach

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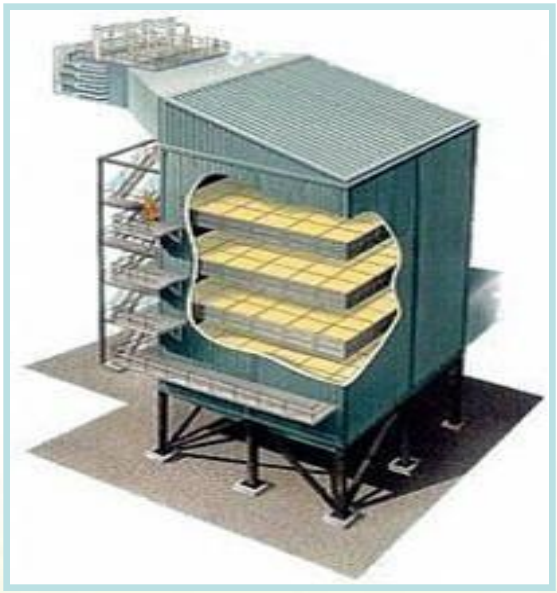
- Must meet environmental requirements
- Must not exceed plant limitations
- Purchase new
  - Sell existing
  - Store for future use
  - Dispose
- Regenerate
  - “Hot” regeneration
  - Store for future use in same or different plant
  - Purchase from inventory



How to Select the Right Catalyst

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- Determine minimum "Reactor Potential" based on
  - DeNOx requirements - 80%, 90%, etc.
  - NH3 slip limits - < 2 to 4ppm
  - Life required to meet your outage schedule
  - Estimate deactivation rate
  - Risks consequences

- Select smallest pitch that will not plug in the reactor

- Select catalyst volume and number of layers to balance:
  - Pressure drop
  - Required DeNOx life "Outage Schedule"
  - SO_2 conversion

Dust Loading vs. Pitch Selection

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Ash Dust Loading gr/dscf	Honeycomb Pitch	Open Area, %	Plate-type Pitch	Open Area, %
< 2.5	6.9 mm (22 Cell)	80	4.9 mm	84.9
3 – 6	7.4 mm (20 Cell)	77	5.6 mm	86.5
7 – 10	8.2 mm (18 Cell)	78.3	6.0 mm	87.4
10 – 11	9.2 mm (16 Cell)	79.8	6.5 mm	88.3
>12	Largest pitch is 9.2mm	79.8	7.0 mm	89

(grains per dry standard cubic foot)

Rule of Thumb Only

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How to improve SCR performance?

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- Ammonia Injection Grid (AIG) tuning twice a year
- Select catalyst pitch to minimize pluggage. May require:
  - Larger pitch near boiler wall
  - Smaller pitch in remainder of SCR
  - Different catalyst types in different layers
- Vacuum catalyst at every opportunity
- Maintain soot blower and sonic horn systems
- Regular catalyst testing to determine Reactor Potential

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Customized Regenerations

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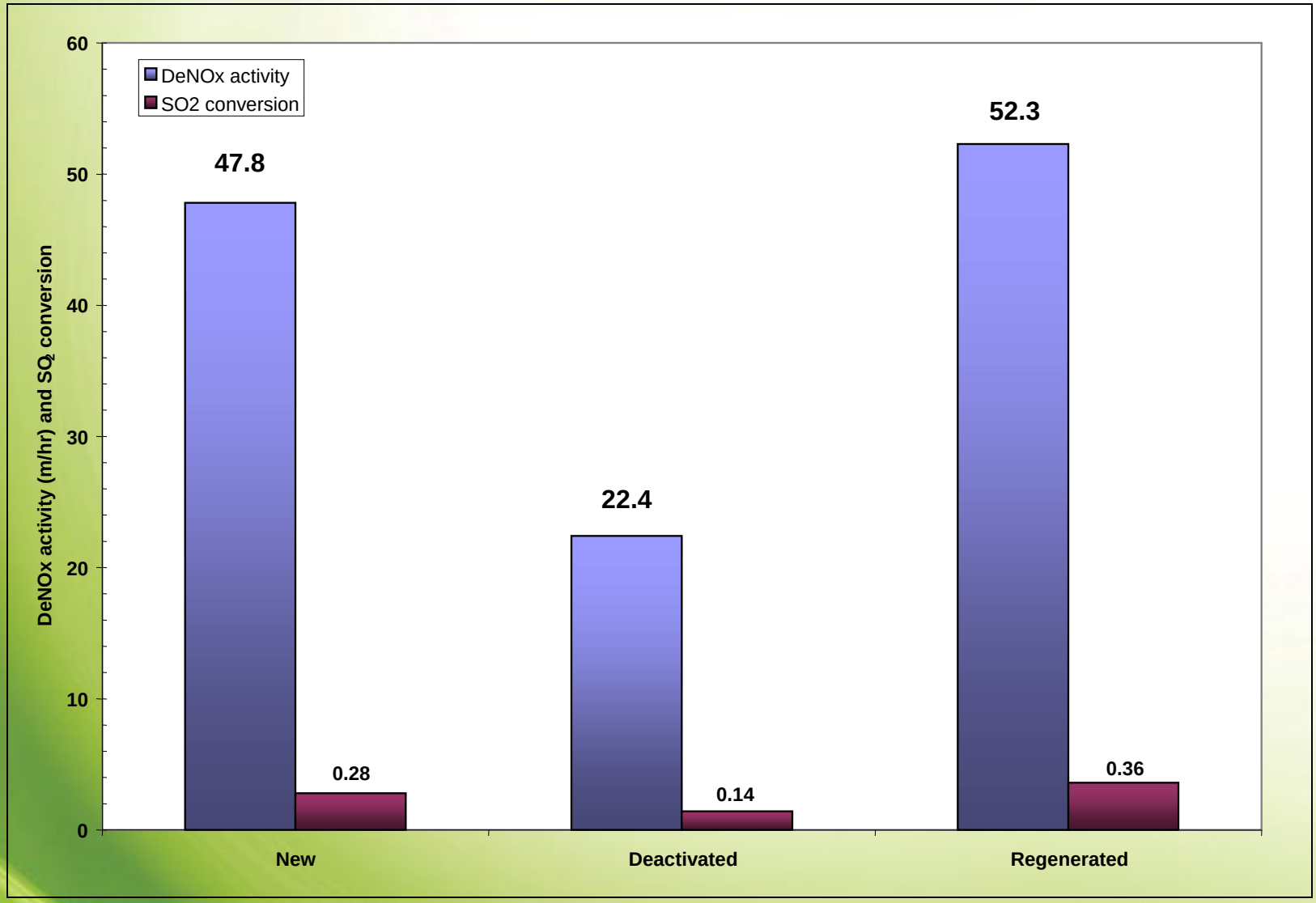

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What to Expect from Regeneration?

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- **Performance similar to the original catalyst**
  - **$DeNO_x$ Potential**
  - **SO_2 conversion**
  - **Hg oxidation – Need more data!**
  - **Pressure drop - % pluggage < 5% per layer**

- **Customized Performance**
  - **Adjust active ingredient(s) for proposed operating conditions**
  - **Can normally improve performance by placing active ingredient(s) in the preferred reaction zone**

Re-impregnate catalyst based on where it is going

Regenerated Catalyst Works: Technical Aspects

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SCR-Tech Regeneration

- ✓ **Removes poisons**
- ✓ **Pre-conditions TiO_2 support for optimal V_2O_5 up-take**
- ✓ **V_2O_5 impregnation Is on the *catalytic surface* ~60,000,000 m^2 / module not the *visible surface* ~900 m^2 / module**

Re-impregnated V_2O_5 does not abrade off in use

Performance ≥ Original Catalyst

- ✓ **NOx reduction occurs preferentially on pore-mouth and in larger macro-pores**
- ✓ **SO_2 oxidation occurs preferentially inside micro-pores**

SCR-Tech maximizes V_2O_5 deposition in macro-pore and pore mouth which improves NO_x activity while maintaining $S0_2$ conversion

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Summary

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- SCR catalyst is a durable highly engineered asset
- Lower life-cycle costs requires:
  - Proper catalyst selection upfront
  - Proactive SCR management program
  - Regeneration, brokering and new catalyst
- SCR Management is good for your bottom line
- SCR Management is good for the environment

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Thank You.
Questions