IPRO 302 –

Analysis of Water Recovery from Power Plants for Recycling

Midterm Presentation
October 7, 2008

Presented by:

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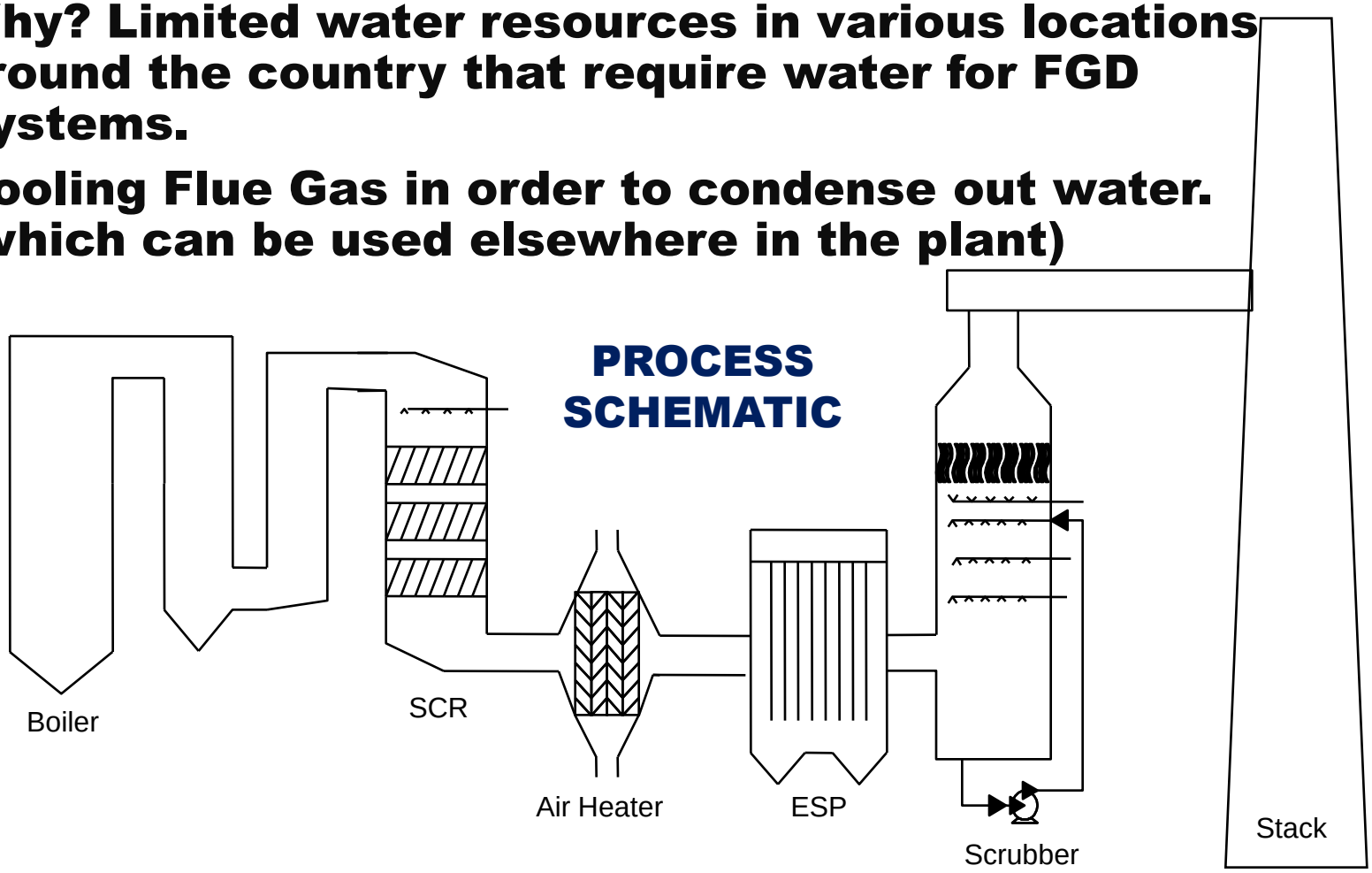
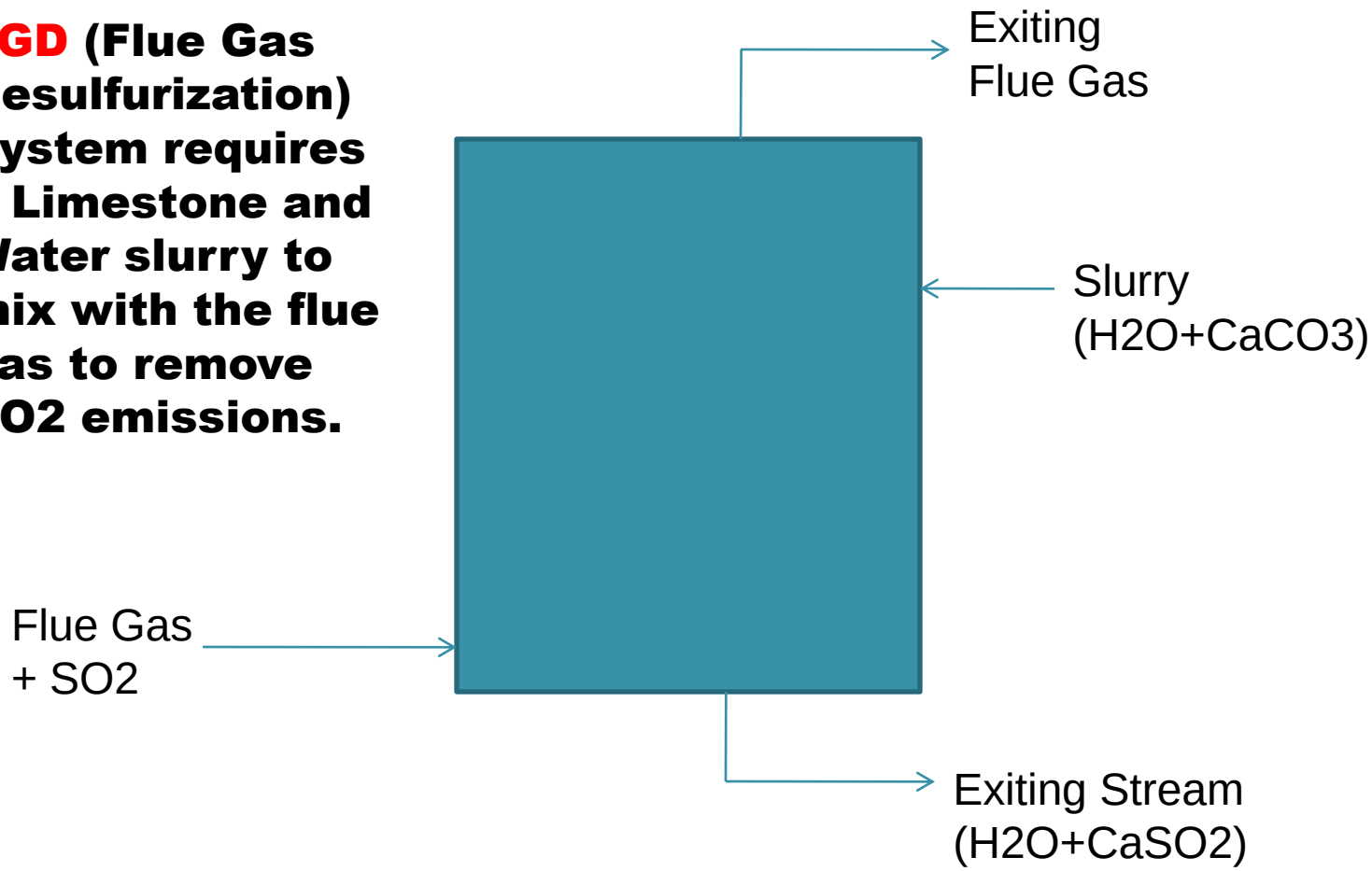
IPRO 302 - Purpose

- **Analyze different methods of removing water from flue gas after coal combustion. (750 MW plant)**
- **Why? Limited water resources in various locations around the country that require water for FGD Systems.**
- **Cooling Flue Gas in order to condense out water. (which can be used elsewhere in the plant)**



FGD System

FGD (Flue Gas Desulfurization) System requires a Limestone and Water slurry to mix with the flue gas to remove SO2 emissions.



IPRO 302 - Organization

Leader: Don Dornbusch (CHE)

Group1: Direct Contact

Group Leader: Alex (MMAE)

Members - Sithhambara Kuhan (CHE)
- **Jesse Reinhardt (BIOCHEM)**
- **Don Dornbusch (CHE)**
- **Sajid Ali Khan (MMAE)**

Group2: Indirect Contact

Group Leader: Dave (CHE)

Members - McLain Hubbard (MMAE)
- **Kwong Hann Tan (MMAE)**
- **Wai Kit Ong (CHE)**

Sargent & Lundy LLC

Faculty: Don Chmielewski
Myron Gottlieb

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Sponsor Contacts: Ajay Jayaprakash
Dave Stopek

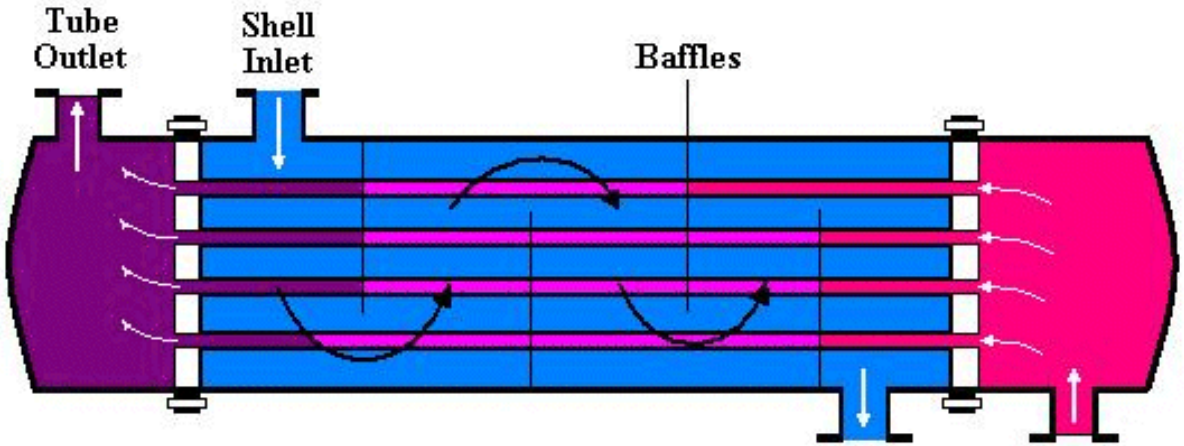
Goals of the Project

- **Determine the quantity and quality of moisture in the flue gas.**
- **Estimate the capital and operating cost for water recovery.**
- **Estimate the cost per 1000 gallons of water recovered.**
- **Analyze and study which different technologies used in water recovery is most cost effective.**

Indirect Cooling Example

Heat Exchangers

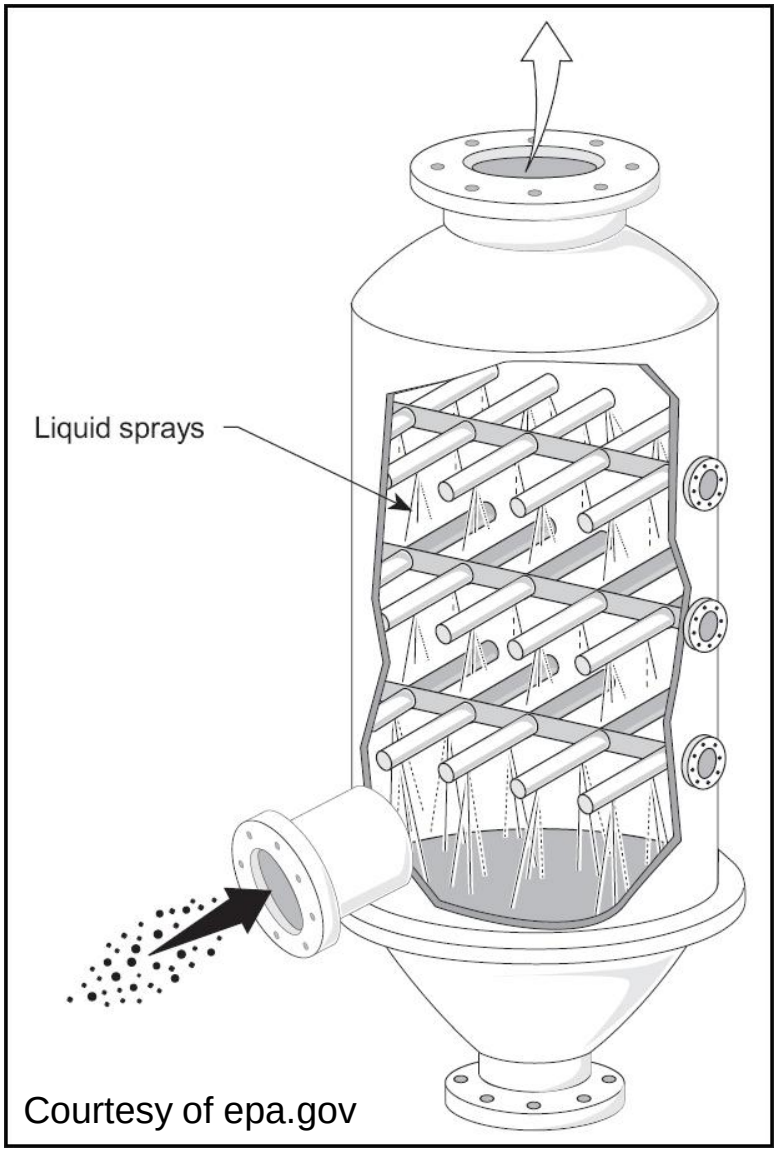
- **Shell and Tube**



Courtesy: Washington University

Direct Cooling Example

- **Spray Tower**



Progress Towards Goals

Total Team Progress

- The flow rate of the flue gas.
- Molar compositions of gas.

Indirect Cooling

- Heat exchanger types and requirements.
- Initial Estimate - roughly 71% water can be recovered.

Direct Cooling

- Spray tower.
- Sizing of the tower.
- Cost (Estimated 70-150$/kW 1990)

Obstacles & Anticipated Challenges

Obstacles

- **Upstream components alter characteristics of flue gas stream.**
- **Direct Contact: Utilizing recovered water through the spray tower.**

Anticipated Challenges

- **Attempting to size emerging technologies to our scale.**
- **Indirect removal of water pre FGD. (containing SO_2)**
- **Determining potential working fluids for Indirect Contact on the scale of our power plant.**

Emerging Technologies

To be analyzed:

1)Desiccants:

Absorb specific types of particles.

2)Membranes:

Allows specific types of particles to pass through it.

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Questions/Comments?