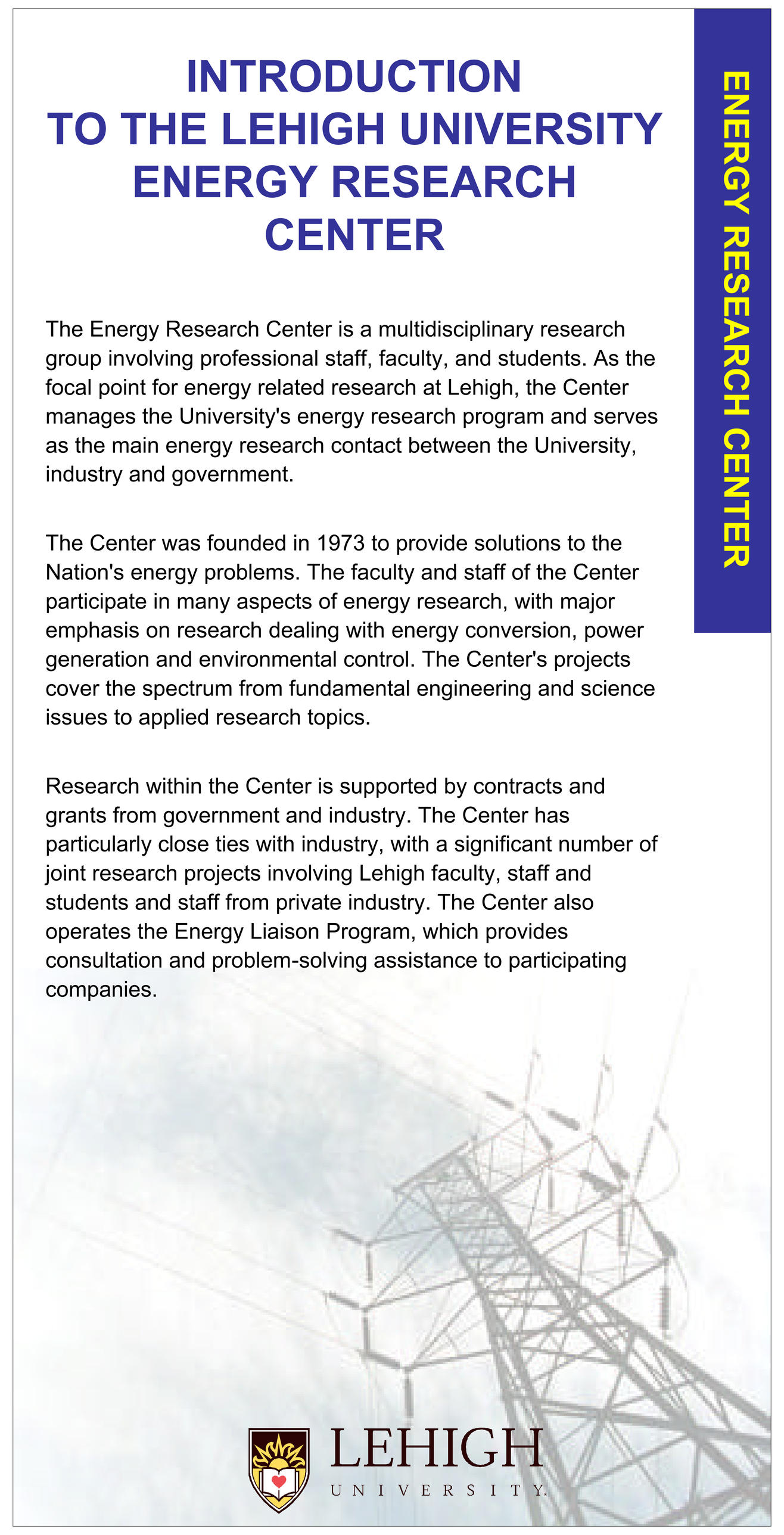
INTRODUCTION TO THE LEHIGH UNIVERSITY ENERGY RESEARCH CENTER

ENERGY RESEARCH CENTER

The Energy Research Center is a multidisciplinary research group involving professional staff, faculty, and students. As the focal point for energy related research at Lehigh, the Center manages the University's energy research program and serves as the main energy research contact between the University, industry and government.

The Center was founded in 1973 to provide solutions to the Nation's energy problems. The faculty and staff of the Center participate in many aspects of energy research, with major emphasis on research dealing with energy conversion, power generation and environmental control. The Center's projects cover the spectrum from fundamental engineering and science issues to applied research topics.

Research within the Center is supported by contracts and grants from government and industry. The Center has particularly close ties with industry, with a significant number of joint research projects involving Lehigh faculty, staff and students and staff from private industry. The Center also operates the Energy Liaison Program, which provides consultation and problem-solving assistance to participating companies.



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BALANCING OF PULVERIZED COAL FLOWS TO BURNERS WITH PRESSURIZED VERTICAL SPINDLE MILLS

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BACKGROUND

In a large pulverized coal boiler, coal and primary air flow from the pulverizer to the burners through an array of coal pipes. Imbalances in coal and air flow rates from one coal pipe to the next are a limiting factor in the ability to reduce NO_x emissions.

Burner imbalances can cause:

- High NO_x and CO Emissions
- High Fly Ash Unburned Carbon Levels
- Elevated Particulate Emissions Levels
- Boiler Maintenance Problems

PROJECT GOAL

Development of coal flow control capabilities for a pressurized vertical-spindle pulverizer. (Figure 1)

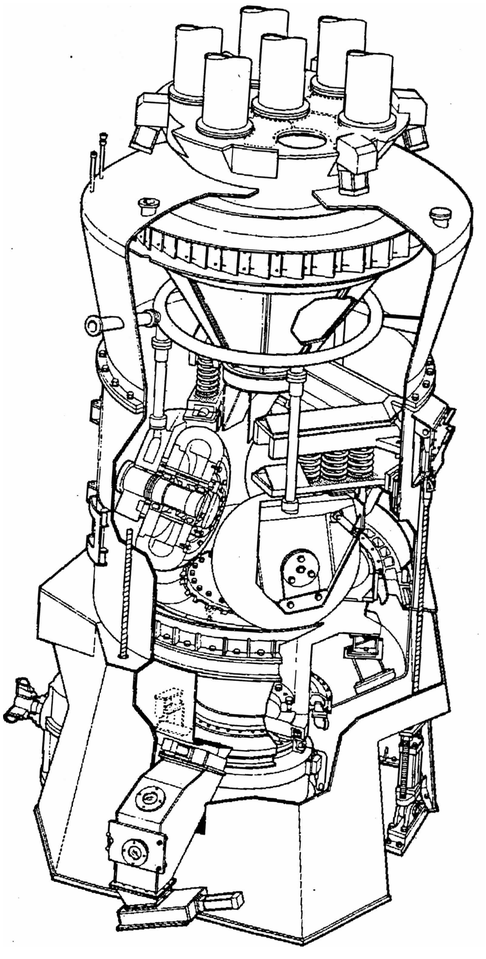

Figure 1: Babcock & Wilcox Type MPS Pulverizer (Courtesy B&W Steam)

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PROJECT OBJECTIVES

The project will emphasis development of a physical understanding of the nature of the flow patterns in the pressurized vertical-spindle pulverizer (Figure 2). This will be followed by the design and testing of flow control elements.

Key issues to be resolved include:

- Required shape and size of the flow elements.
- Placement of the flow elements.

PRINCIPAL TASKS

The principal tasks in the first year include:

- Computational Fluid Dynamics (CFD) simulations of the turbulent two-phase flow patterns.
- Effect of the flow control element design to control coal flow distribution.

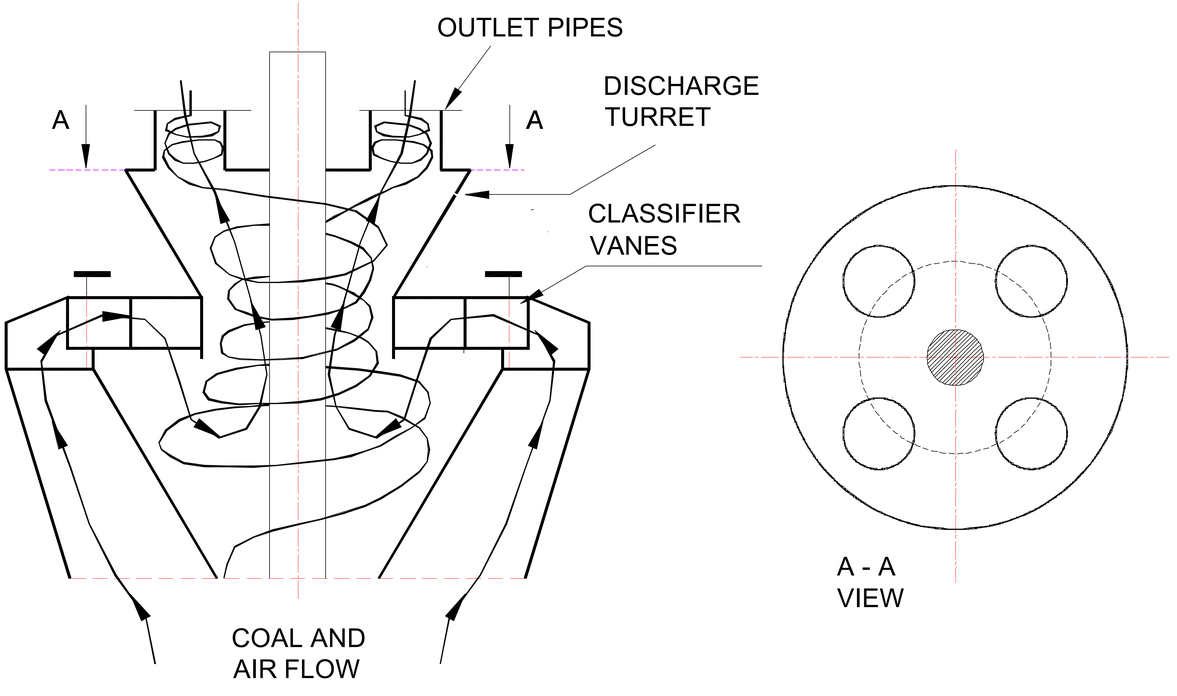

Figure 2: Flow Patterns in the Top Half of a Pulverizer with Four Outlet Pipes

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COAL COMBUSTION RESEARCH AT LEHIGH

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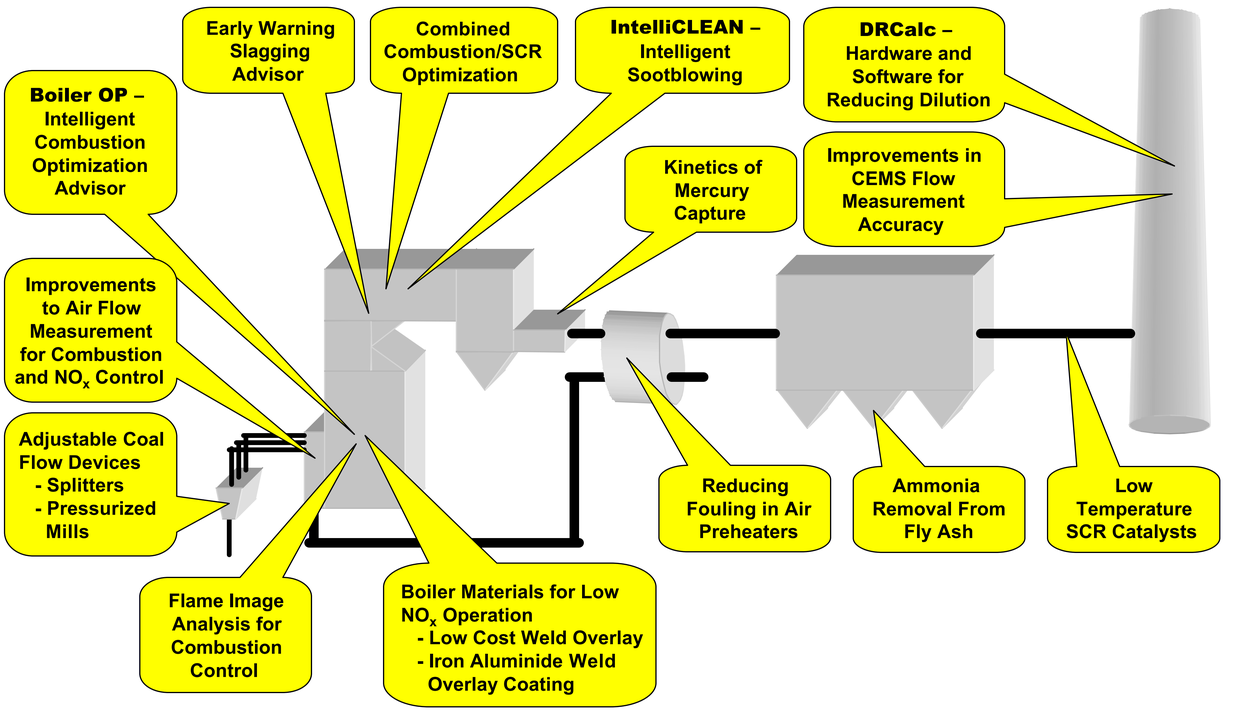

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