REINHOLD ENVIRONMENTAL Ltd.

2010 APC Round Table
& Expo Presentation

July 18-20, 2010, in Concord, NC / Hosted by Duke Energy

URS

Small Boiler FGD Systems

Presentation to:

APC Round Table

July 20, 2010

Meeting Agenda

- Regulatory Overview
- Small Boiler Market Overview
- Conventional Small Boiler FGD Systems
- URS Co-Flo™ Small Boiler FGD System
  - ü Design
  - ü Performance
  - ü Schedule

Regulatory Overview

Regulatory & Legislative Direction

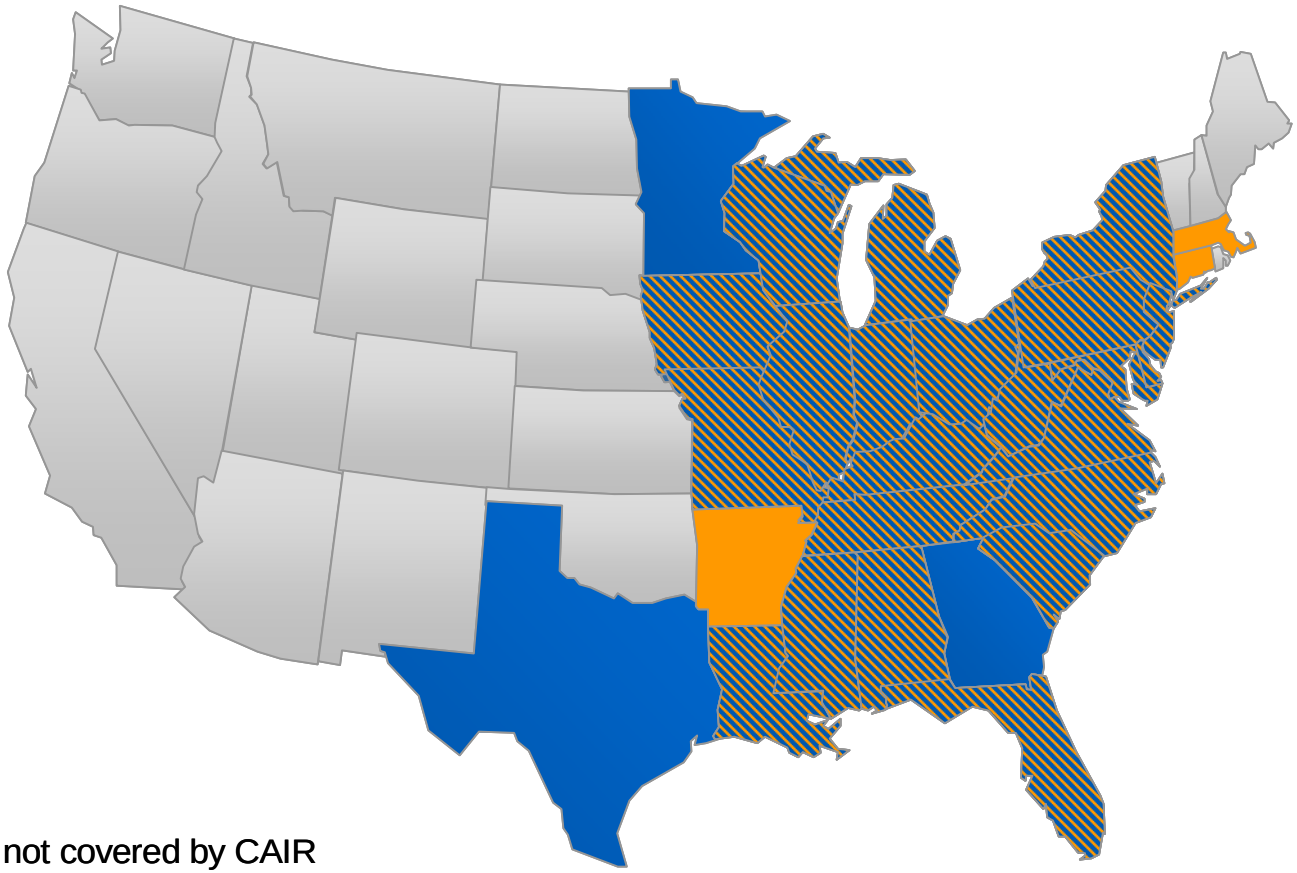
- URS believes that future regulations will result in further reduction in all major Air Pollutants identified by the EPA or the Administration
  - ü **SO_2** CAIR, NAAQS, CAAA 2010
  - ü **NO_x** CAIR, NAAQS, CAAA 2010
  - ü **PM 2.5** NAAQS
  - ü **Hg** CAMR, CAAA 2010
  - ü **HAPs** New HAPs regulations
  - ü **Ash** New Pending Regulatory Classification
- By 2020, URS expects that all Coal Fired Power plants will require environmental controls

CAIR Overview

CAIR is in full operation and will remain in effect until a replacement is put in place

- Finalized in 2005 and went into effect in 2006
- Affects 28 states + DC
- Annual SO_2 and NO_x Phase I requirements in place
  - ü Annual SO_2 cap,
    - û 5.2 million tpy in 2010
    - û 3.9 million tpy in 2015
  - ü Annual NO_x cap
- Expect CAIR Phase II limits to be replaced by new Transport Rule

CAIR Region



States not covered by CAIR

States controlled for fine particles (annual SO_2 and NO_x)

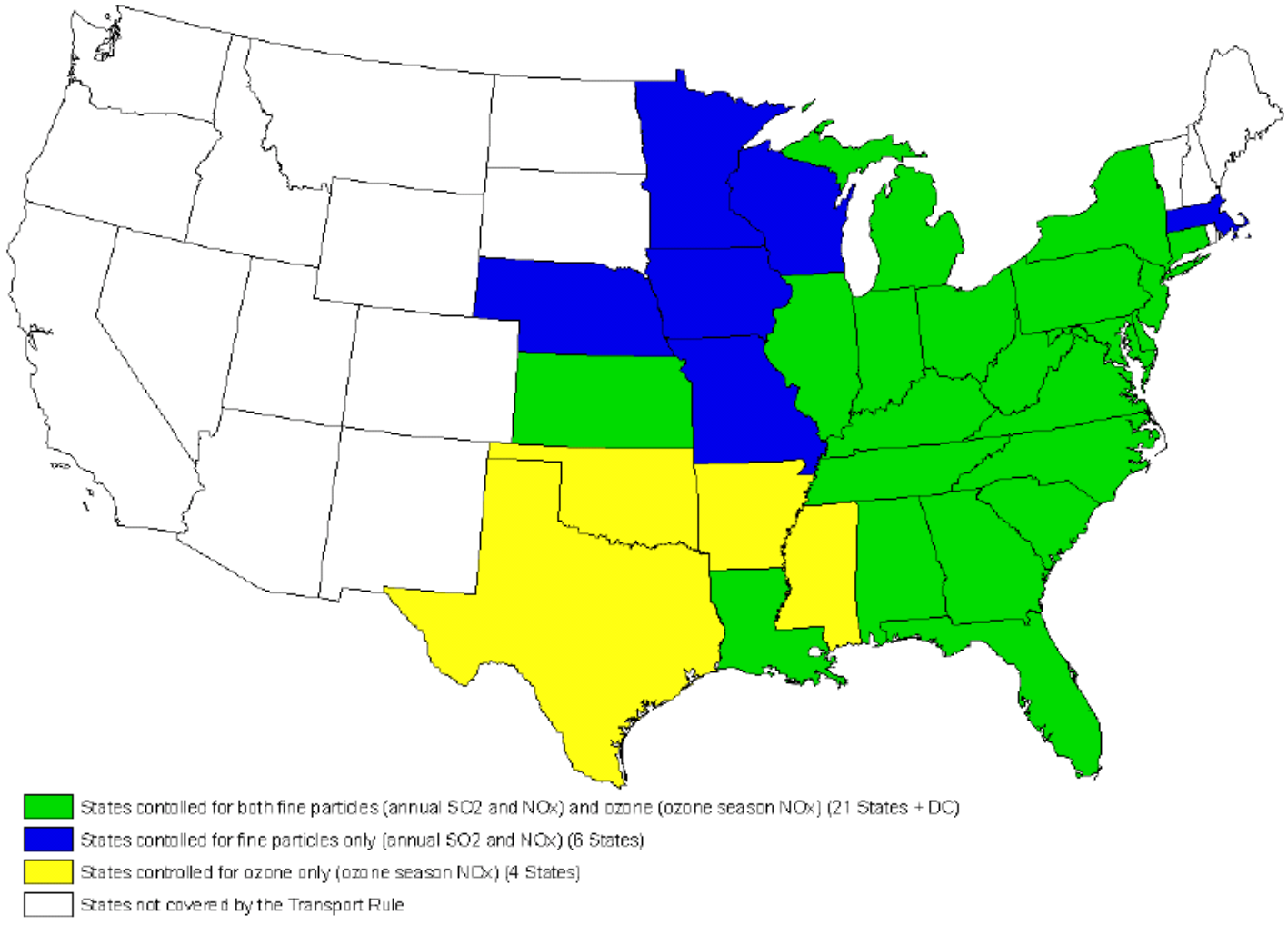
States controlled for both fine particles (annual SO_2 and NO_x) and ozone (ozone season NO_x)

States controlled for ozone (ozone season NO_x)

Transport Rule (Replacement of CAIR)

- Introduced July 6, 2010
- Affects 31 states + DC
- Expected to go into effect 2012
- Emission reduction targets by 2014 based on 2005 emission levels
  - ü 71% or 6.3 million tons per year of SO_2
    - û From 10.2 to 4.1 million tons per year
  - ü 52% or 1.4 million tons per year of NO_x

Transport Rule Region



CAAA 2010 (Pending Federal Legislation)

- Clear Air Act Amendment of 2010 (March) – Proposes the following Reductions
  - ü Reduce SO_2 by 80 Percent
    - û Cut SO_2 emissions by 80 percent (from 7.6 million tons in 2008 to 1.5 million tons in 2018). A 3.5 million ton annual cap would be in force 2012-2014.
  - ü NO_x by 53 Percent,
    - û Cut NOx emissions by 53 percent (from 3 million tons in 2008 to 1.6 million tons in 2015).
  - ü Hg by 90 Percent
    - û Cut mercury emissions by at least 90 percent no later than 2015.
    - û Mercury emissions would utilize the maximum available control technology (MACT).
- Establishes nationwide trading systems for SO_2 and NO_x emissions by January 1, 2012.

NAAQS NOx and SO2 Rules Change

- National Ambient Air Quality Standard - NAAQS
  - ü Reduce Ambient SO_2
  - ü From 300 ppb 8 Hr rolling average to 50-100 ppb (depending on attainment and non-attainment status) 1 hr average.
- Reduce Ambient NOx
  - ü By nominally 50 percent with similar requirement in averaging
- NAAQS reductions drive compliance at nearly every stationary source
- Changes from 8 hr to 1 hr averaging time will drive AQCS system reliability requirements

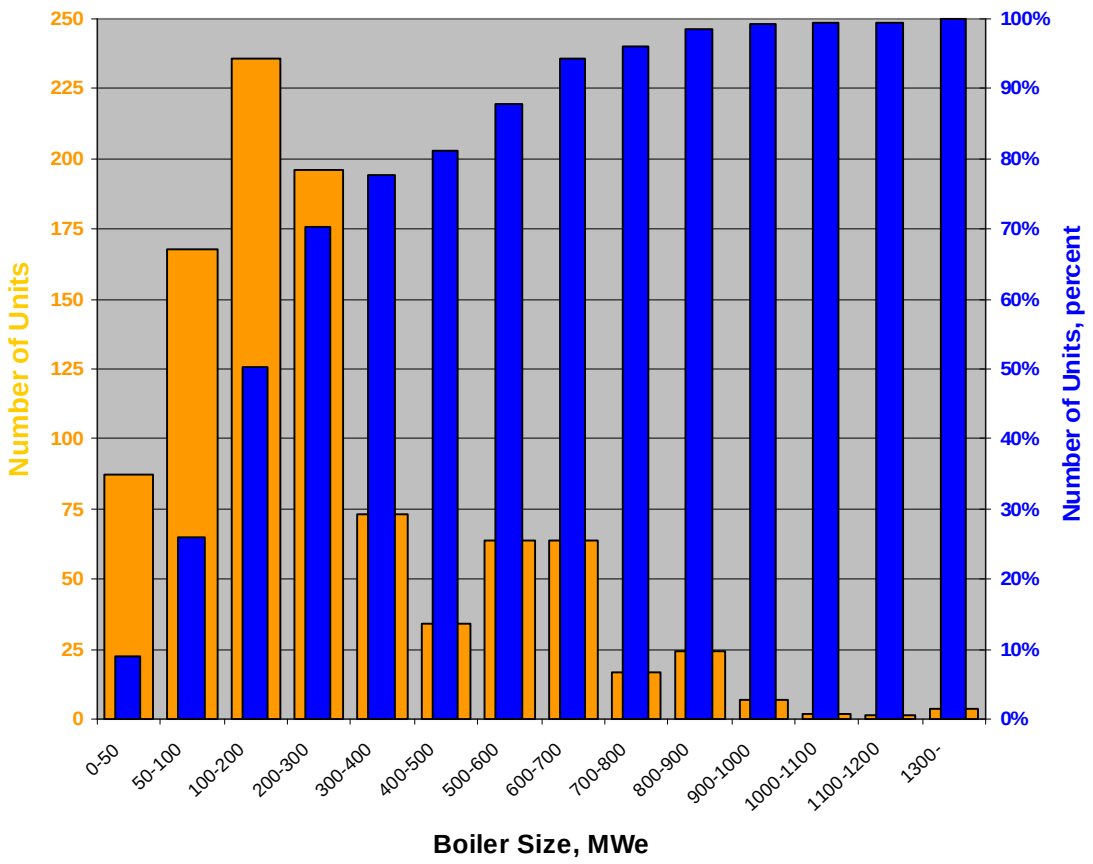
Ash Classification and Storage

- EPA Evaluation of Coal Combustion Byproducts
  - Evaluating Coal Ash and FGD Byproduct Classification
    - CCPs may be classified as hazardous if landfilled
    - CCPs may be classified as non-hazardous if sold
  - Also Evaluating Storage of Ash
    - Wet storage of ash typical throughout the Industry
    - Being evaluated in wake of TVA Kingston accident
    - Industry conversion from wet to dry landfills would be the expected outcome

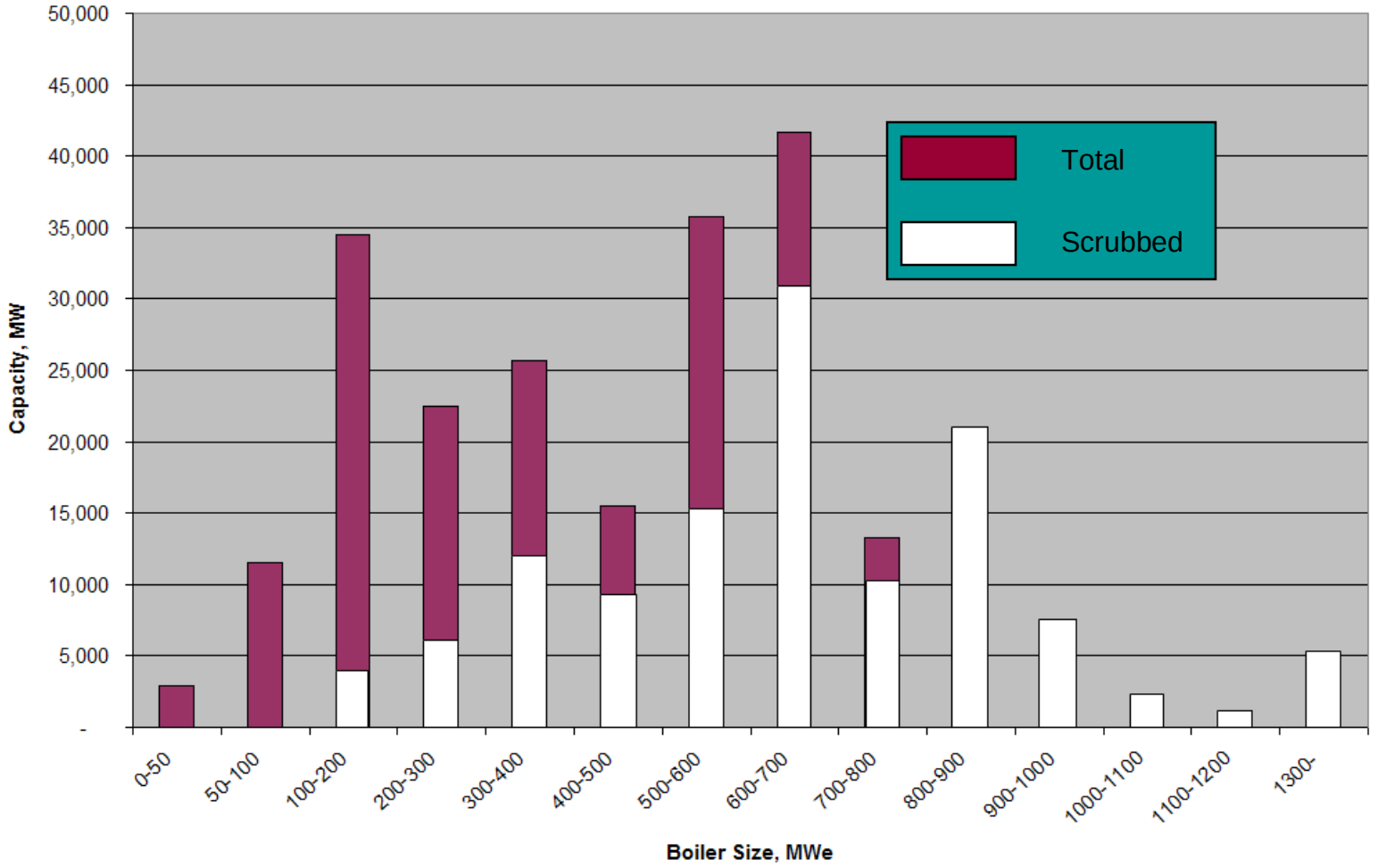
SO_2 Control Market Overview

Number of Coal-fired Boilers

- 78 percent of U.S. boilers are less than 400 MWe
- 760 boilers are less than 400 MWe
- Boilers below 400 MWe produce 40% of coal-fired generation



Scrubbed Boilers

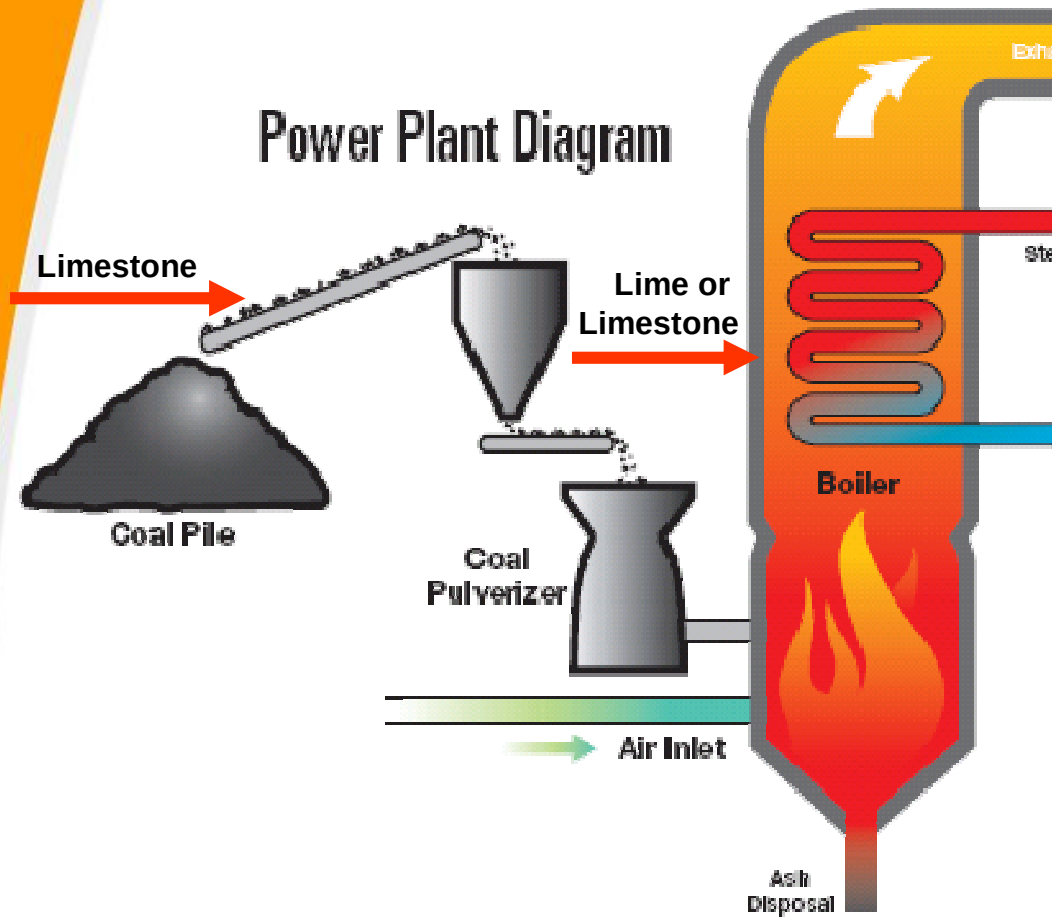


Conventional Small Boiler SO_2 Control Technologies

Small PC Boiler FGD Systems

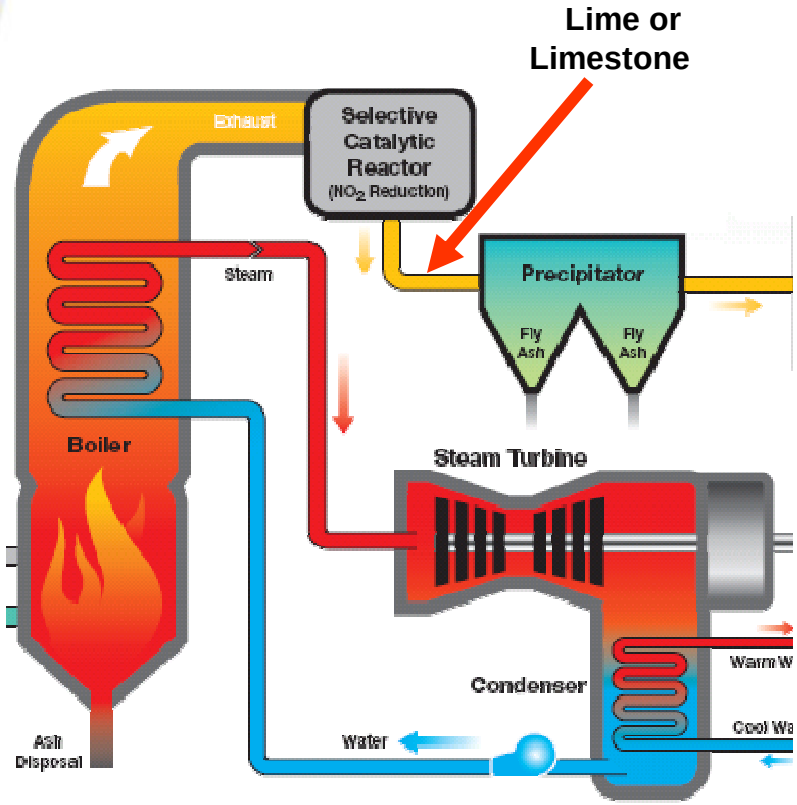
- 1st tier
  - ü Conventional Dry FGD Systems
    - û Lime
  - ü Circulating Dry FGD Systems
    - û Lime
  - ü Wet FGD Systems
    - û Limestone
- 2nd Tier
  - ü Furnace Injection
    - û Lime or limestone
  - ü Duct Injection
    - û High surface area lime

Furnace Injection



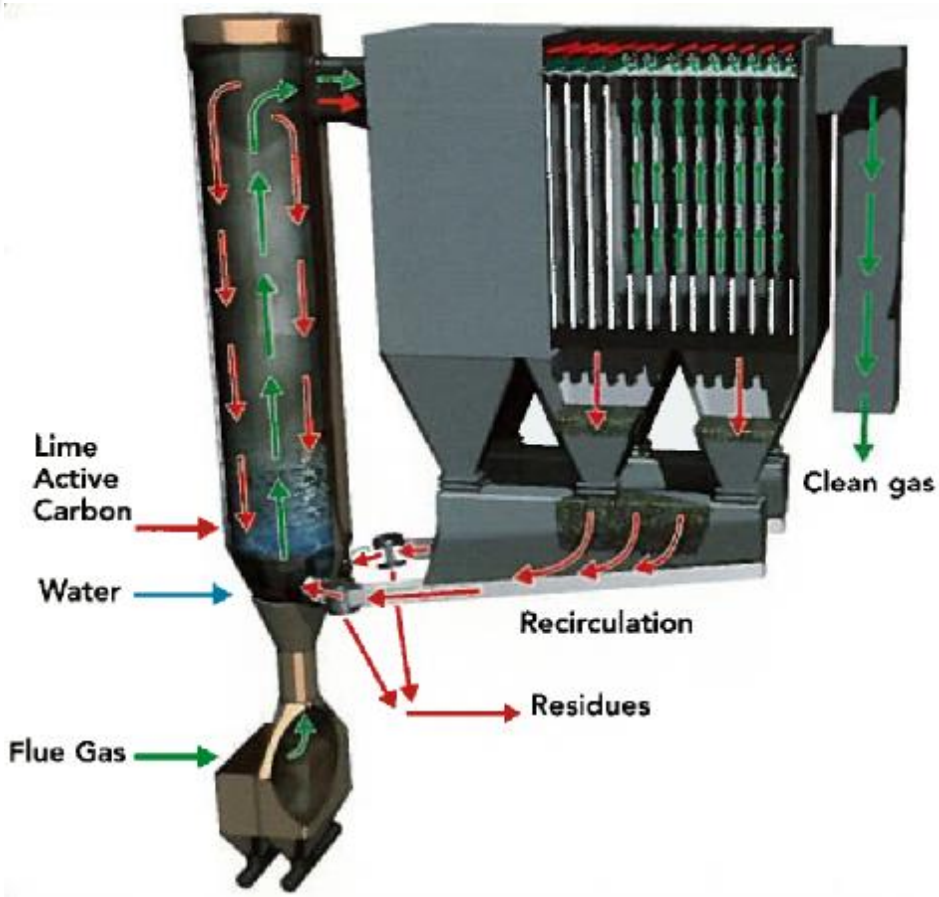
- Very low capital
- Low removal
  - ü 30 to 60 percent
- Poor limestone utilization
- Slagging issues
- Heat rate impacts
- Fly Ash quality

Duct Injection



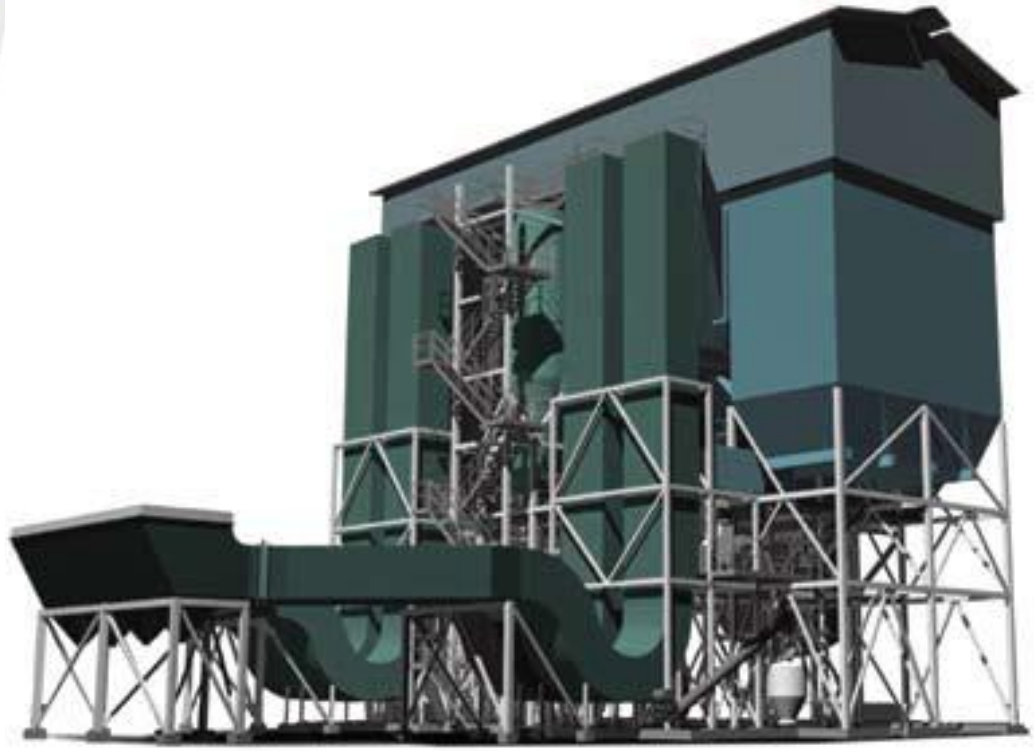
- Low Capital
- Moderate removal
  - ü 50 to 70 percent
- Poor lime utilization
- Expensive reagent
  - ü High surface area lime
- Duct deposition and scaling

Circulating Dry FGD – Turbosorp^{R}



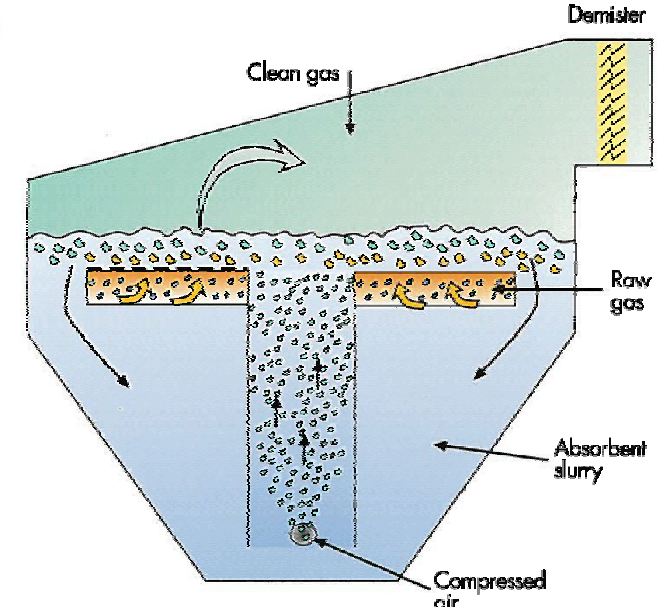
- Circulating fluid bed scrubber
  - ü Lime based system
  - ü Fluid bed with no rotating parts
  - ü Baghouse
- 97% SO_2 removal up to 5 lb/MM btu fuel
- Multi-pollutant control
- Dry byproduct
- High vertical profile
- 10-14 inch pressure drop

Circulating Dry FGD – NID™



- Circulating fluid bed scrubber
  - ü Lime based system
  - ü Baghouse inlet duct - absorber
  - ü Baghouse
- 90 – 98% removal on low to high sulfur coals
- Multi-pollutant control
- Dry byproduct
- Very high mass loadings
- 10-14 inch pressure drop

Wet FGD - FlowPac

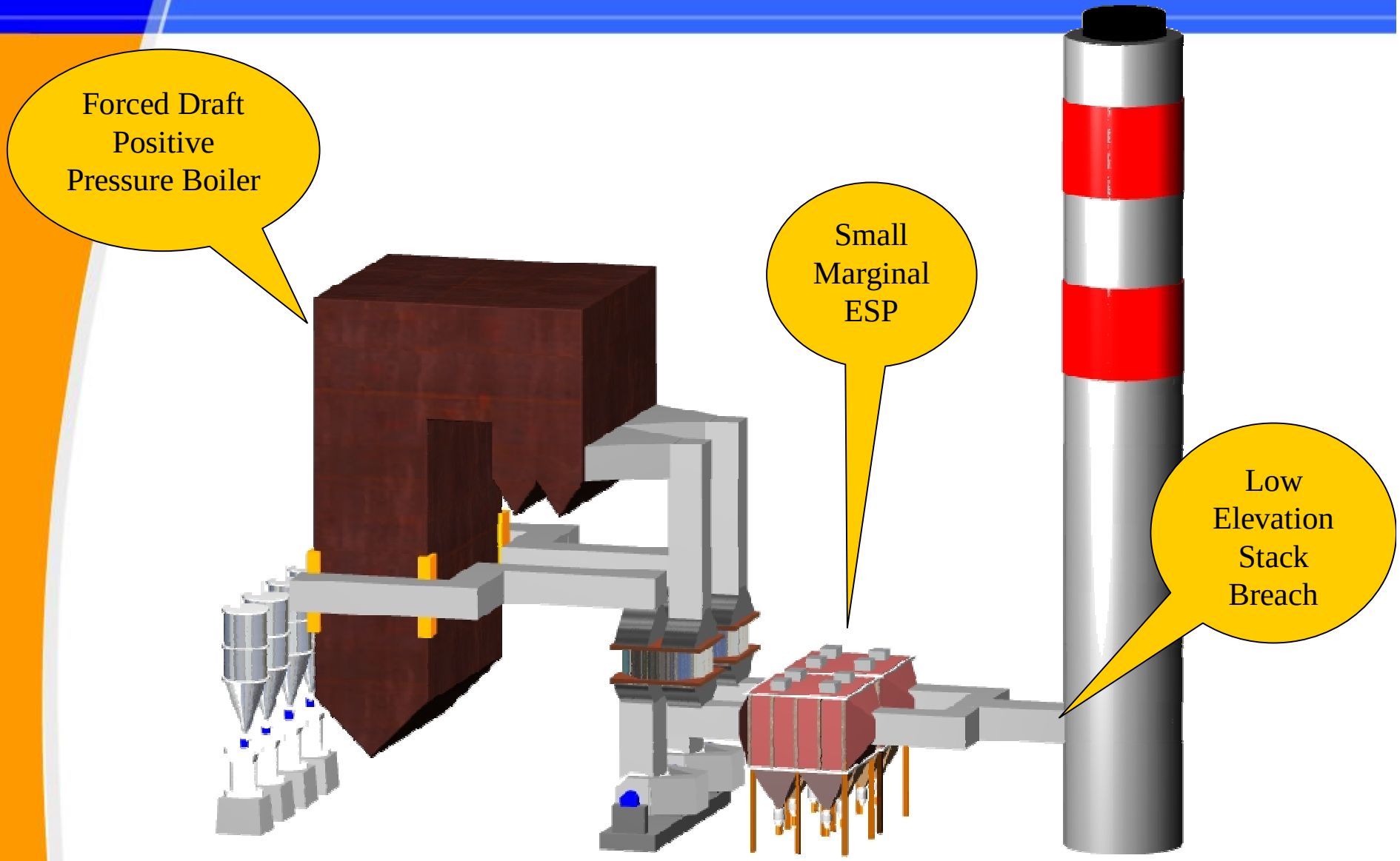


- Circulating wet scrubber
  - ü Limestone based
  - ü Gypsum byproduct
- Above 99% SO_2 removal
- High pressure drop
  - ü 12-24 inches
  - ü No recycle pumps

Co-Flo™

FGD System Designed Specifically for Smaller Boilers

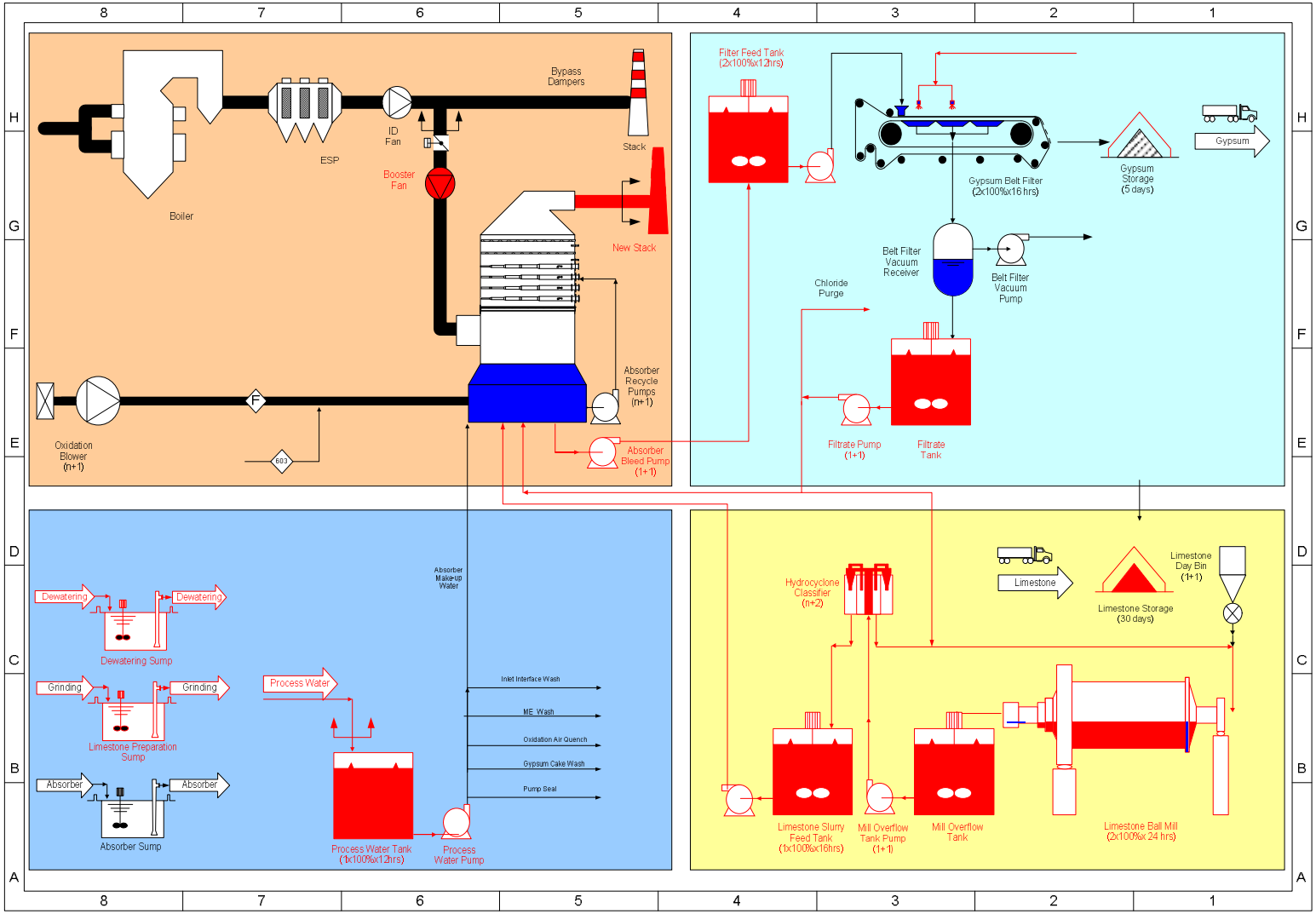
Small Boiler Characteristics



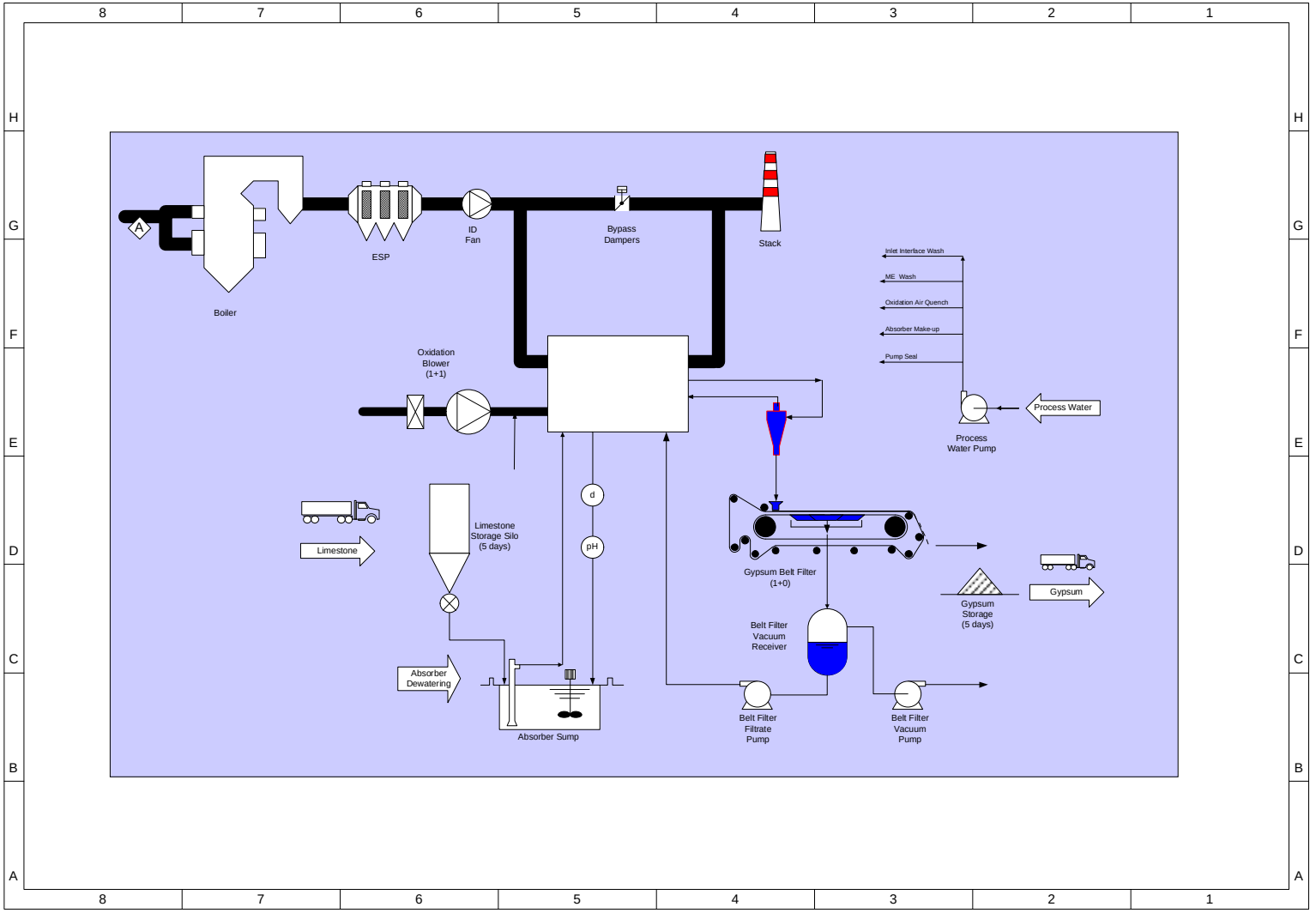
Small Boiler FGD Wish List

- No pressure drop
  - ü Avoid balance draft conversion and costly structural reinforcement of boiler and ductwork
- Multi-pollutant control
  - ü Greater than 98% SO_2 removal
  - ü Greater than 90% Hg^+ removal
- Low cost reagent
  - ü Limestone
- Marketable or disposable byproducts
  - ü Gypsum
  - ü Fly ash
- Zero liquid discharge
- Reusable stack
- Low capital cost
- Short project schedule

Typical New Scrubber PFD

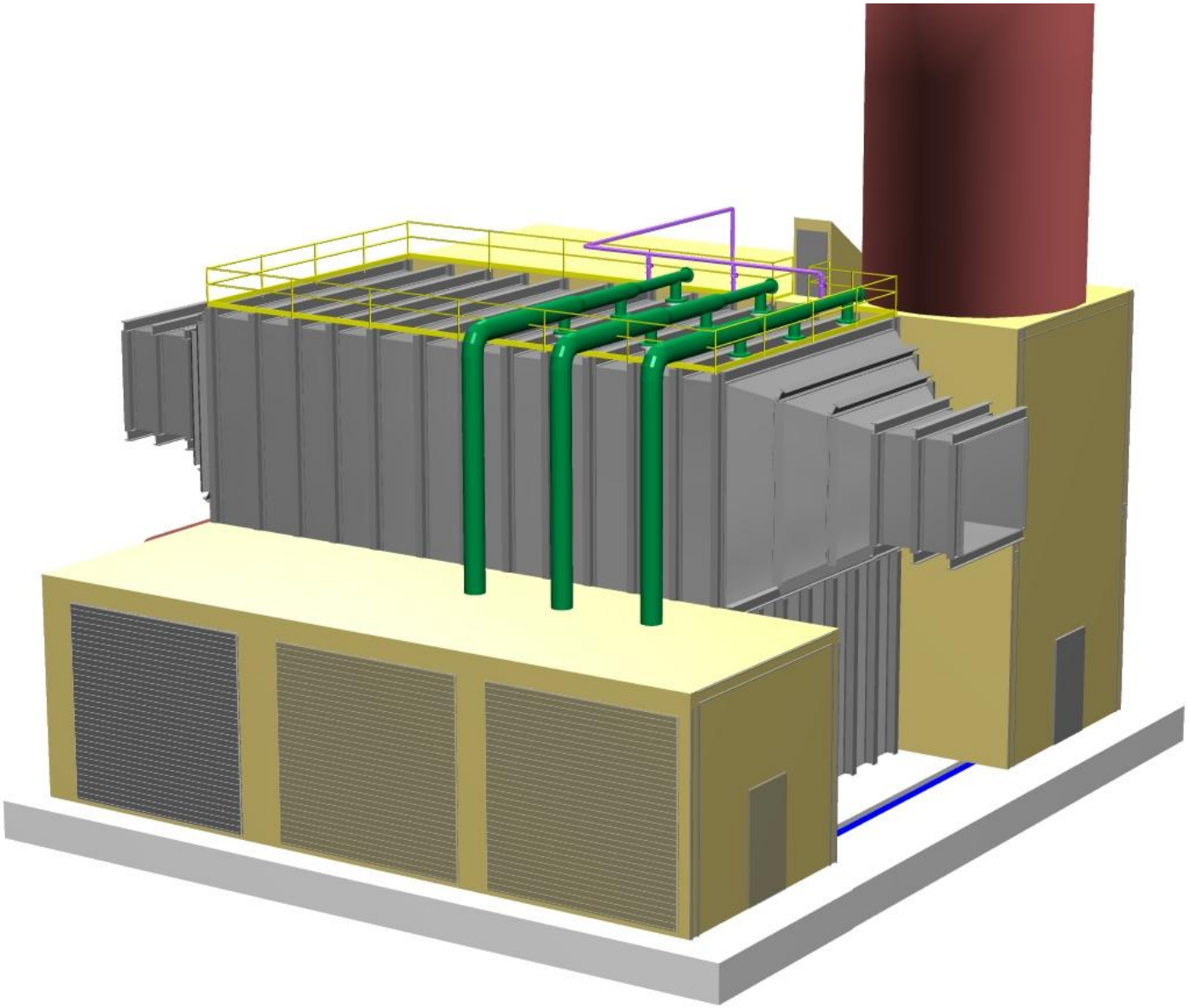


Co-Flo™ PFD (Patent Pending)



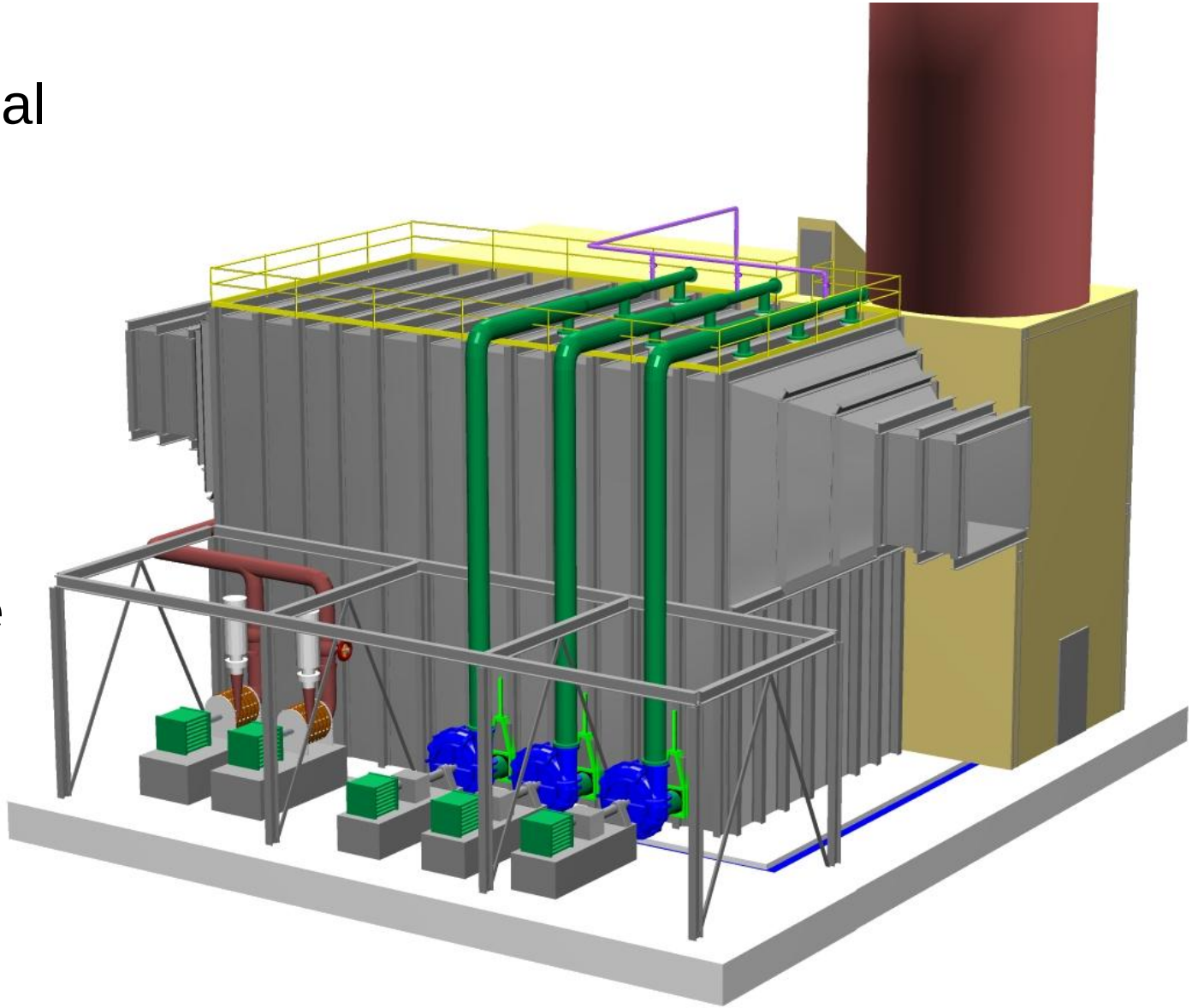
Co Flo™ FGD System

- Integrated Process Island
  - ü Reagent prep
  - ü Absorber
  - ü Dewatering
- Integrated Structure
  - ü No free standing buildings
- Low Profile
  - ü 40 ft



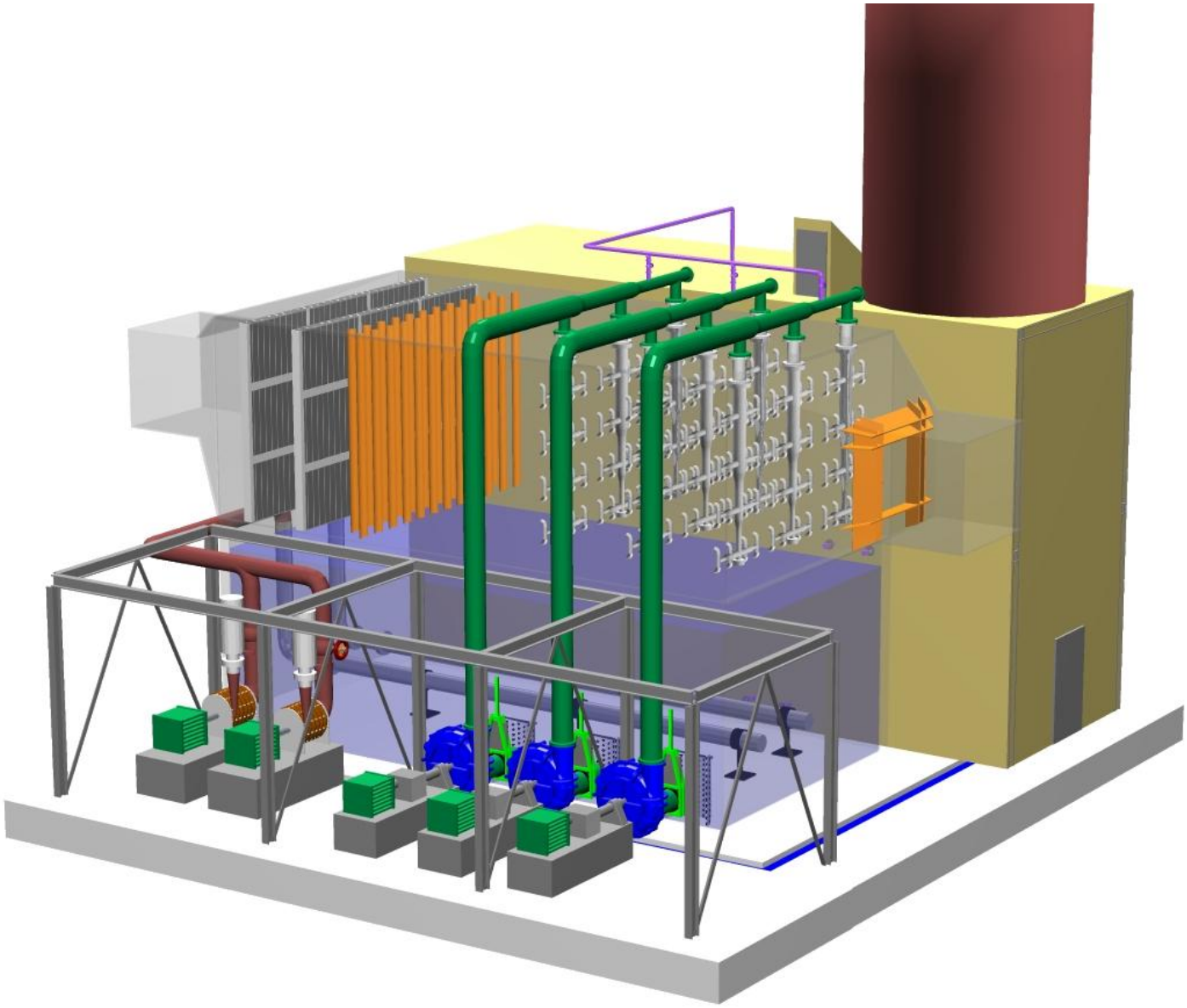
Pump & Compressor Bay

- Conventional recycle pumps and spray headers
- Air blowers for forced oxidation and recycle tank agitation
- No bleed pumps

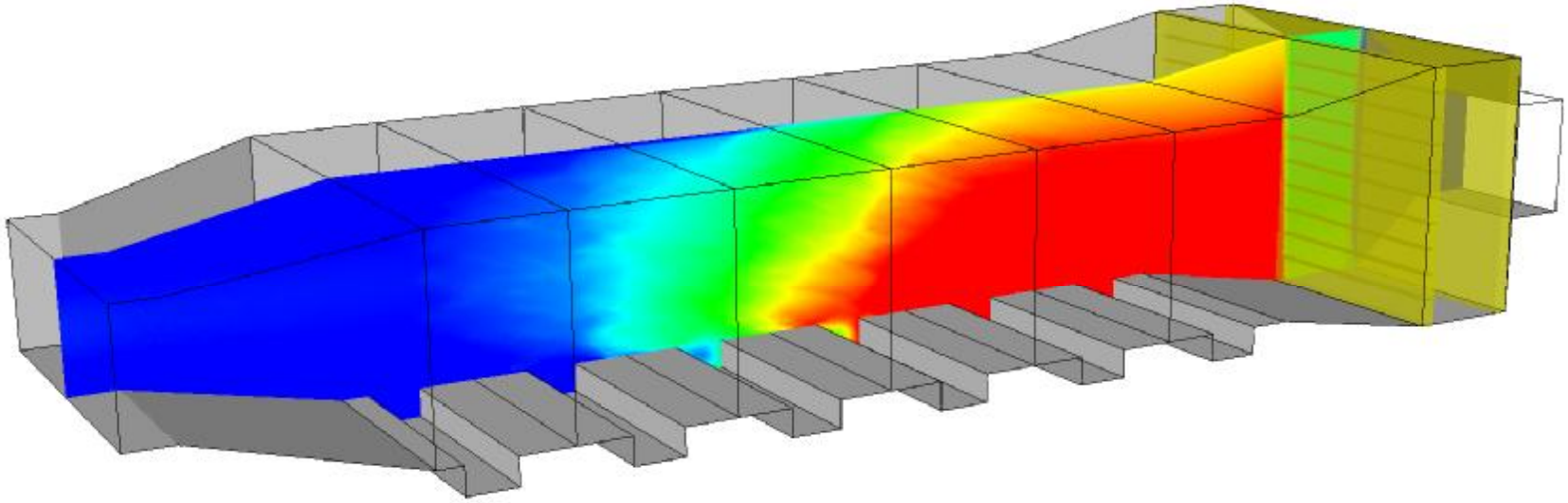


Absorber Internals

- Co-current spray headers
  - ü High velocity
  - ü Pressure rise – no pressure drop
- BES and typical horizontal mist eliminator



Pressure Rise Relative to Module Inlet



Static + Dynamic Pressure

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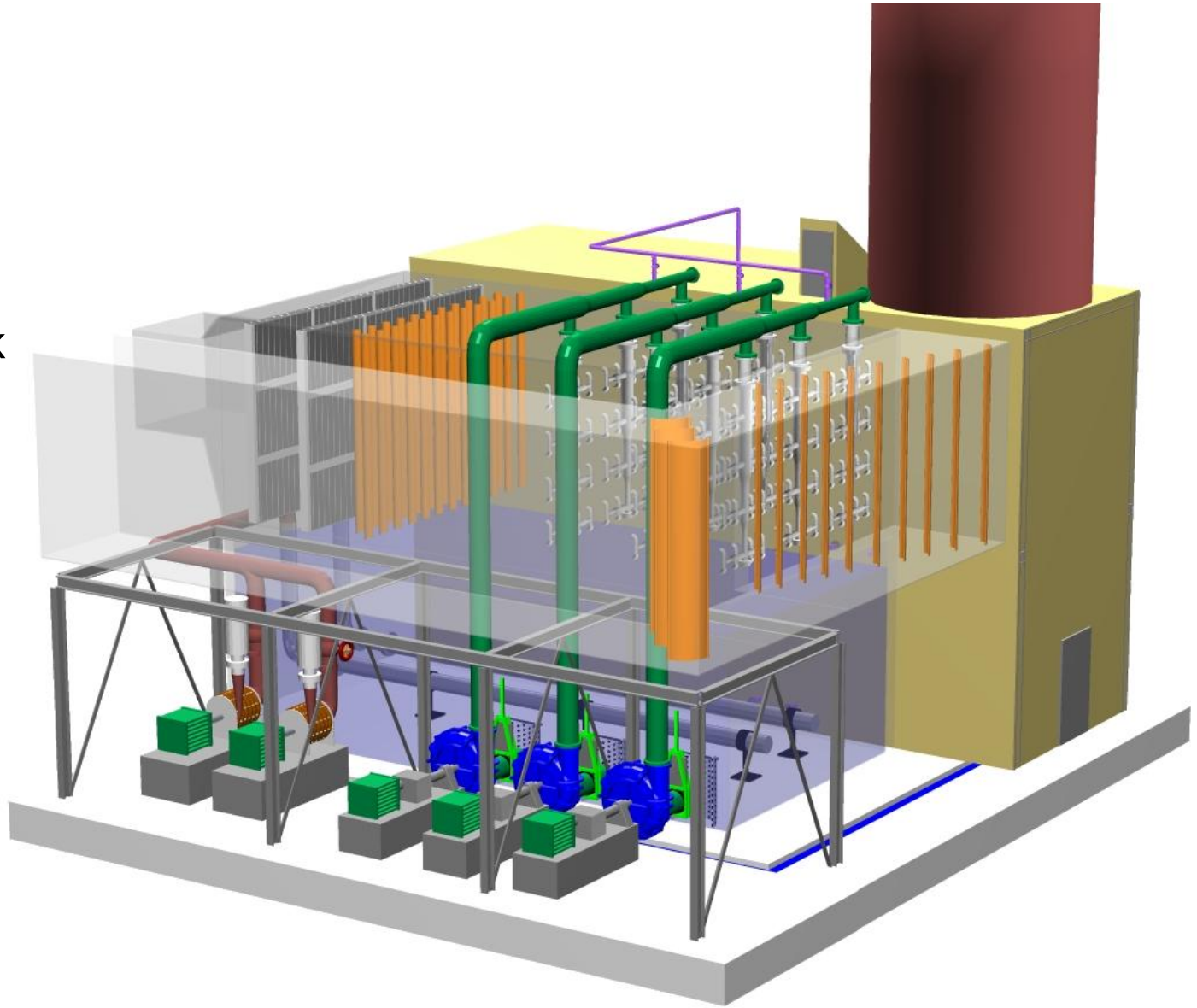
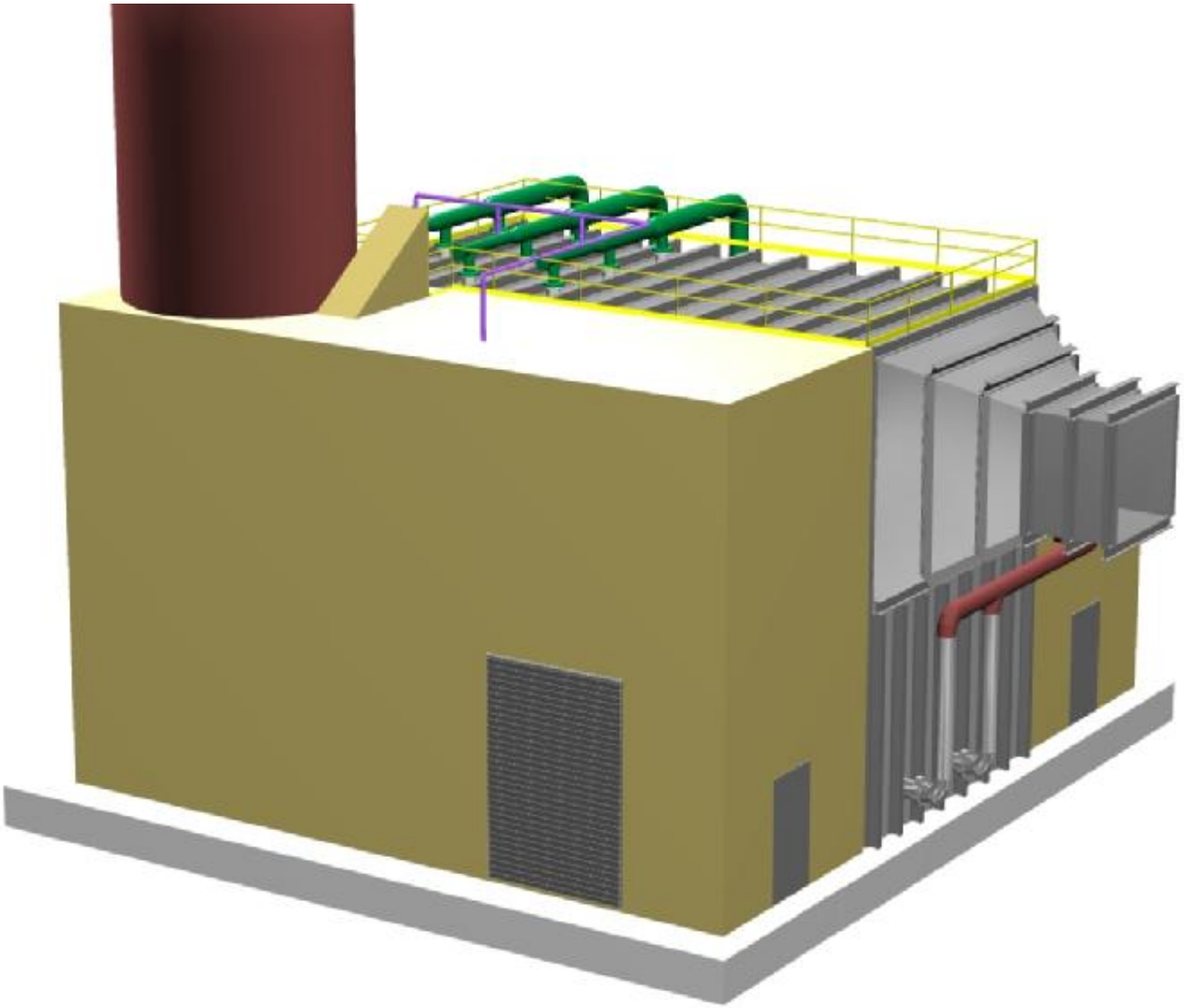
- Duct work flexibility
  - ü Straight through
  - ü In and back



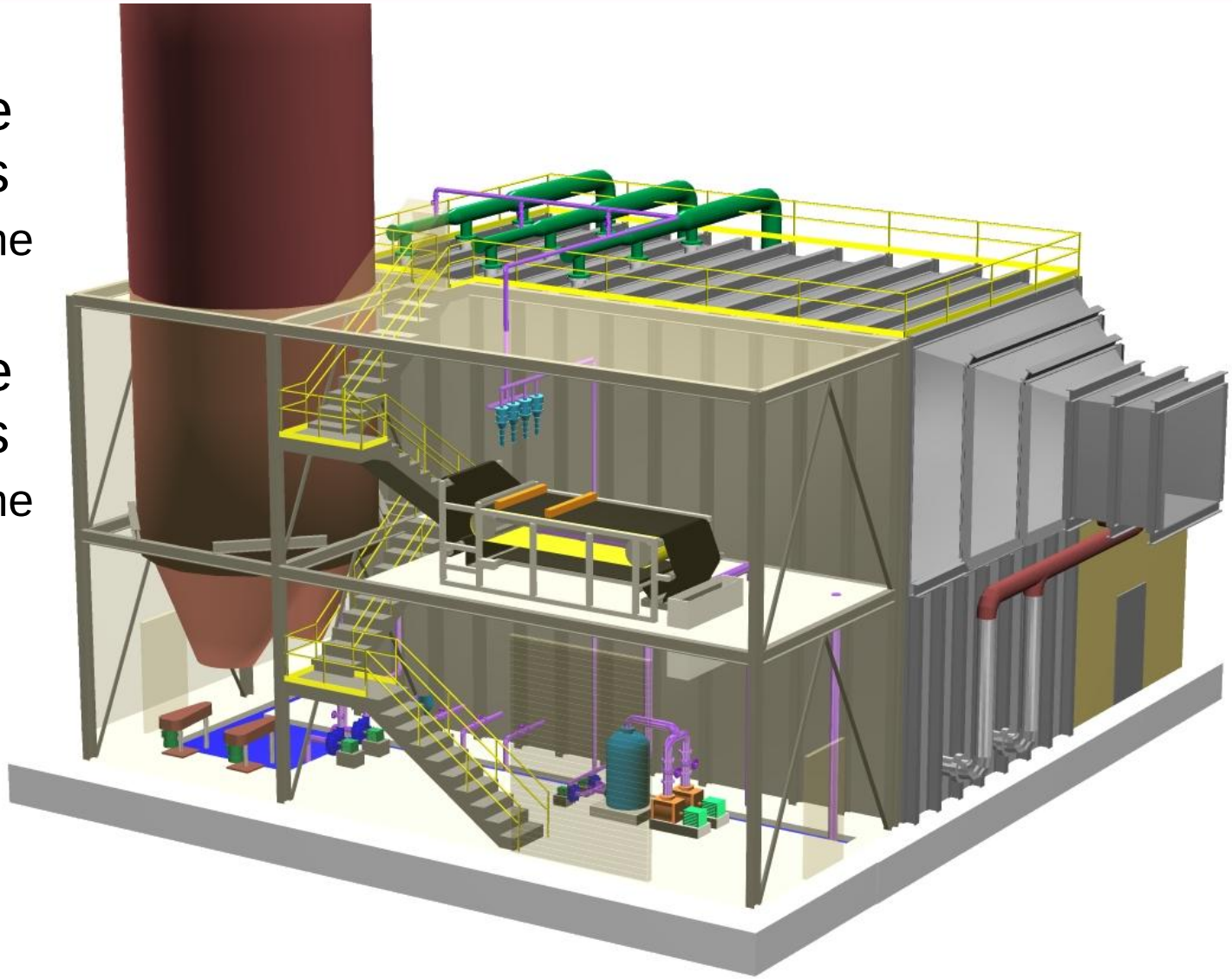
Integrated Support Systems

- Reagent prep
  - ü Preground limestone or lime
- Dewatering



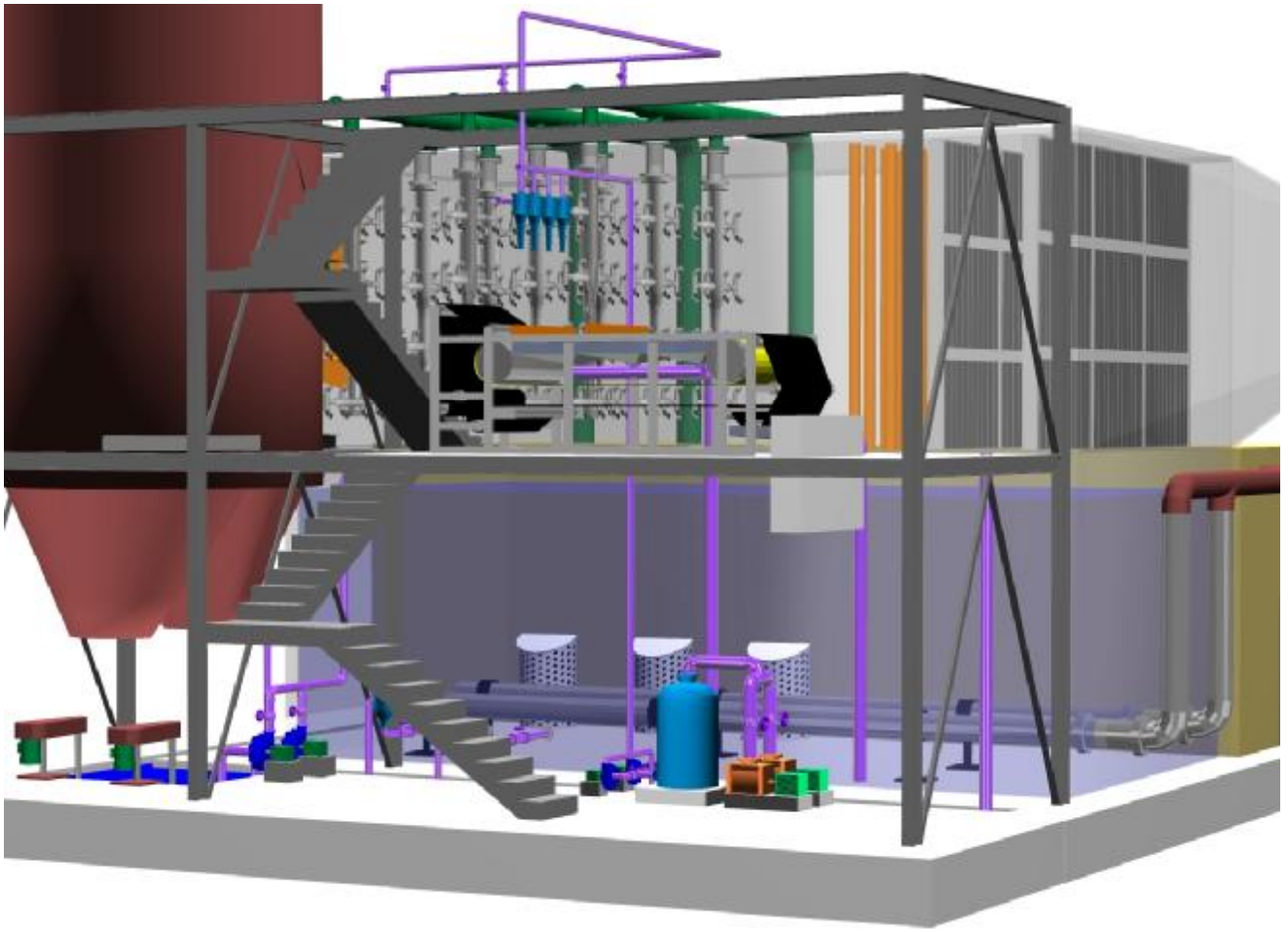
Flexible Dewatering Options

- Marketable byproducts
  - ü Hydroclone
  - ü Belt filter
- Disposable byproducts
  - ü Hydroclone
  - ü Pug mill



No Process Tanks

- Integrated Process Island
  - ü Limited piping and electrical cable runs
- Limited rotating equipment
  - ü Full redundancy
- No process tanks
  - ü One sump
  - ü No free standing tanks and associated equipment



Performance

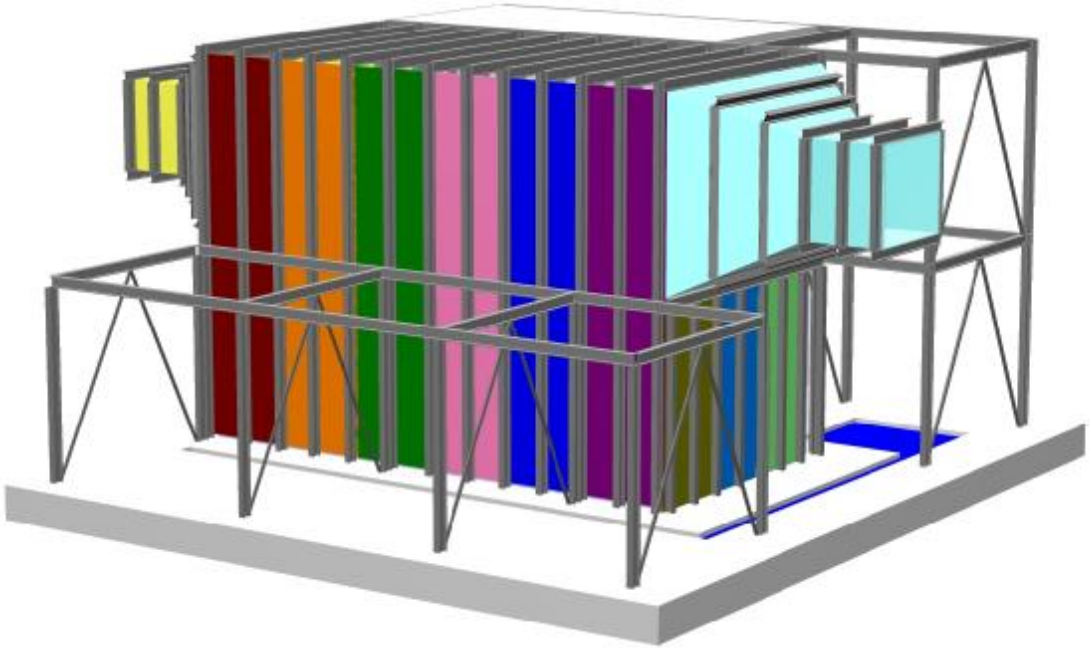
Expected Performance

- Conventional Performance
  - Sulfur Dioxide
    - Low to high sulfur coal
    - Greater than 98 percent producing a gypsum byproduct
  - Pressure drop
    - Absorber – 1 inch pressure rise
    - System – less than one inch pressure drop
    - Higher removal or higher coal sulfur results in higher pressure rise
  - Mercury
    - Greater than 90 percent removal of oxidized mercury
  - Particulate
    - 90 percent measured

Schedule

Modular Prefabricated Design

- Modular Design
- Prefabrication of 10’ by 40’ panels
- Delivery by truck, rail or barge



Schedule

- Fast Track Schedule
  - ü 24 months total project schedule
    Prefabricated absorber panels
    - û Standardized
      - 100, 200, 300 MWe designs

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