TRAX Engineering Capabilities

TRAX Engineering Capabilities

TRAX provides modeling and control system services for all types of power plants as well as process plants in the following areas:

- Optimization

- Piping analysis

- NFPA analysis

- Fuel conversion

- Unconventional power

- Renewable energy

- Electrical analysis

- Carbon capture

- Pollution control additions

Piping Analysis

- **Determine size and placement of relief valves**
- **Evaluate ability of headers to handle supply and consumption changes**
- **Evaluate effectiveness of turbine bypass systems (valve sizing and stroke times)**
- **Long piping runs**
- **Dynamic impact of pipe and valve sizing**
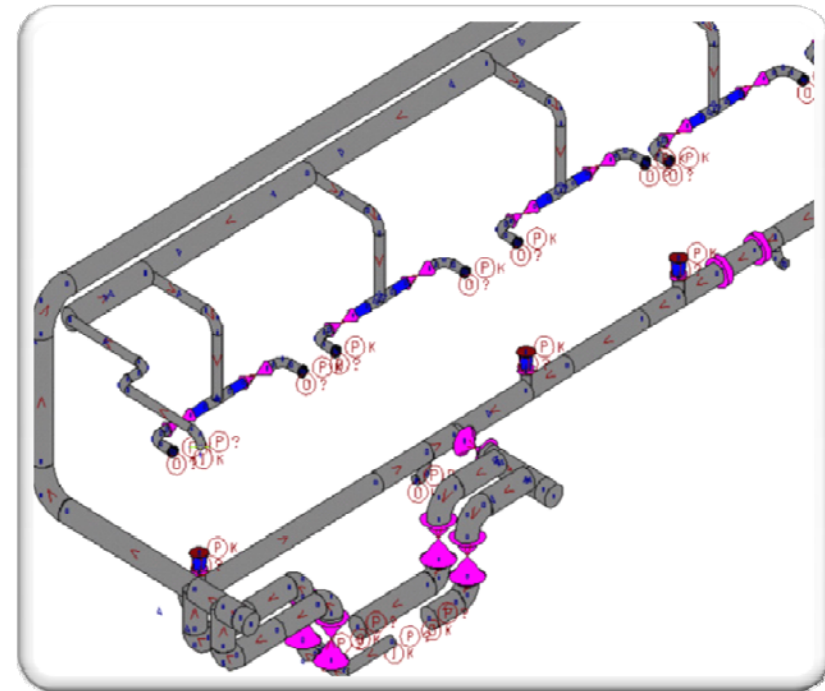
Optimization

- **Six reservoirs and 23 generators**

- **Constraints on water flow and reservoir level**

- **Economic dispatch to provide required load at lowest possible cost**

- **Calculations include operating costs and cost to start and stop units**

- **24 hour load scheduling**

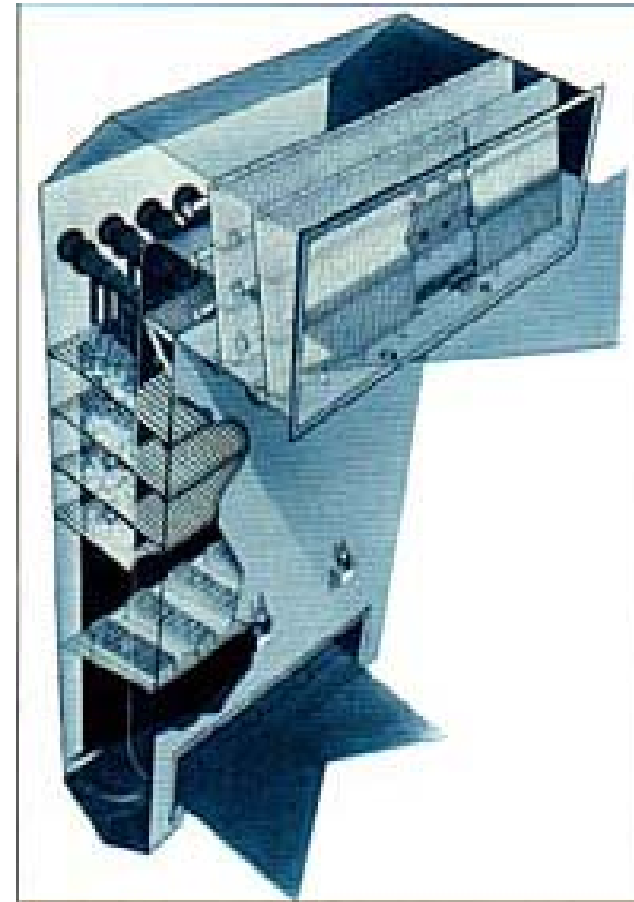- **Optimize on maximizing generation or minimizing costs**

Optimization
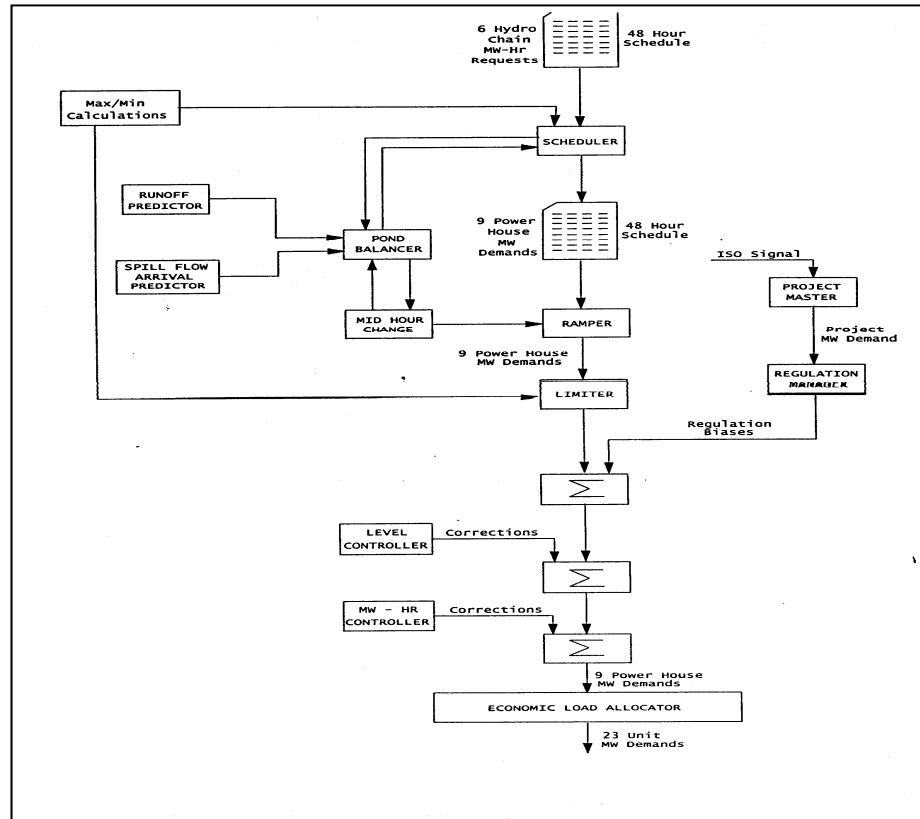
Load Allocation Algorithm

- **Optimization algorithms adaptable to hydro, wind, solar and fossil plants**
- **On and off-line optimization of geographically remote generating facilities**
- **Get the most MW from each unit of fuel**
- **Arm plant personnel with economic information to make smarter decisions**
- **Multiple day scheduling**

Pollution Control Additions

- **Addition of scrubbers, baghouse**

- **Design controls**

- **Evaluate fan sizing**

- **Furnace implosion protection**

NFPA Compliance

- **Evaluate existing or proposed controls**

- **Determine areas of non-compliance**

- **Modify controls to ensure compliance**

- **Test all controls before delivering**

Electric Network Analysis

- Economic
  - Optimal Load Flow
  - Optimal Capacitor Placement

- Reliability
  - Short Circuit (AC & DC)
  - Protective Device Coordination
  - Reliability Assessment
  - Transient Stability

- Safety
  - Arc Flash (AC & DC)
  - Electric Shock Protection
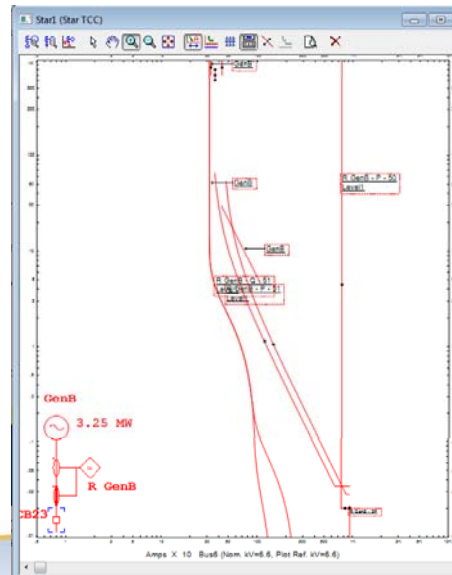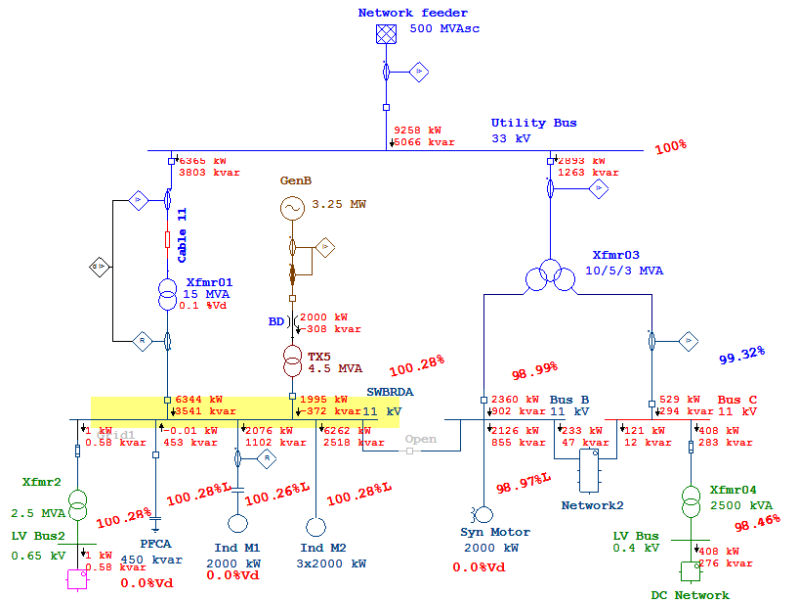
Fuel Conversion

Coal-to-Biomass

- Co-fire up to 50% biomass pellets
- Evaluate combustion characteristics
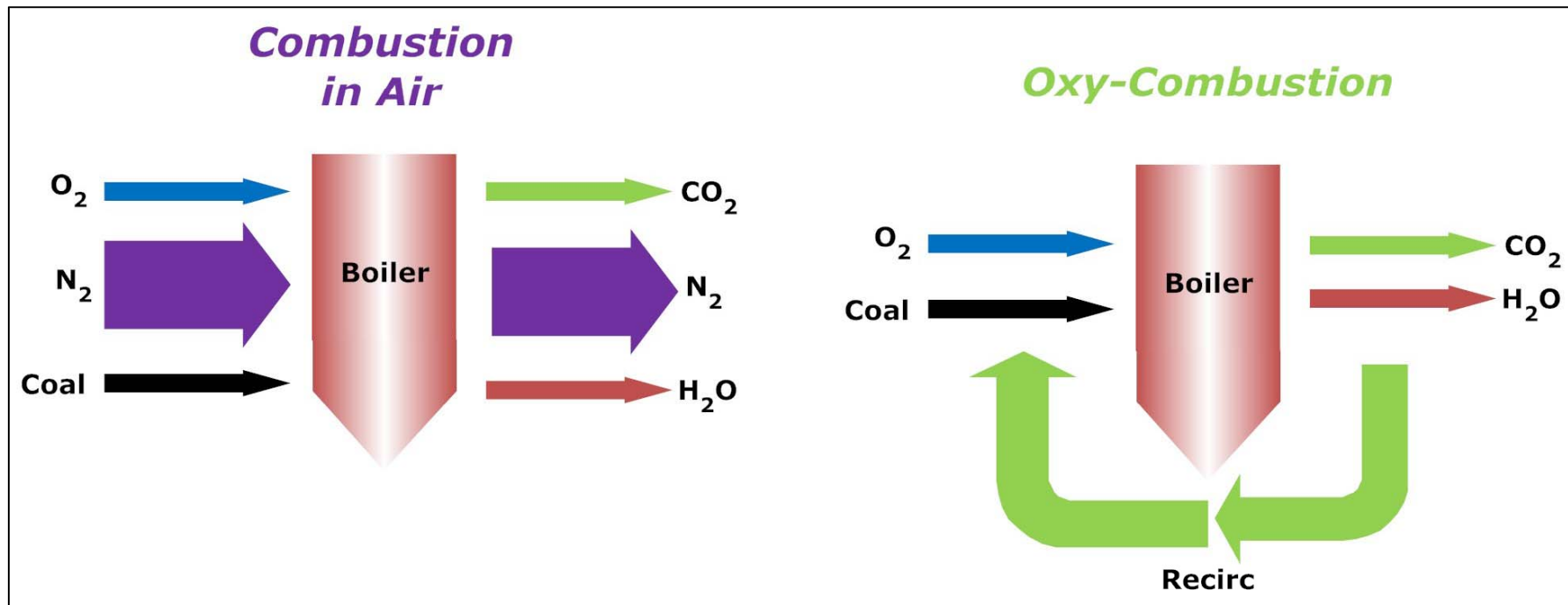- Modify fuel and combustion controls

Coal-to-Gas

- Convert from coal to 100% gas-fired
- Confirm adequacy of existing of air and flue gas fans
- Evaluate safety of existing controls during normal operation and fuel trips

Carbon Capture

Oxy-Combustion

- Burn coal with pure oxygen
- Cool flue gas to remove water
- Result is pure CO_2 stream

- Evaluate combustion and heat transfer characteristics
- Determine gas recirculation requirements to moderate temperature

Unconventional Power Generation

Gasification

Cool Water

- Texaco gasifier
- Shell gasifier
- Engineering simulator

Wabash River

- Conoco gasifier
- Training simulator

TECo Polk

- Texaco gasifier
- Controls checkout
- Training simulator

ISAB

- Heavy oil gasification
- Texaco gasifier
- Controls checkout
- Engineering simulator

Unconventional Power Generation

Compressed Air Energy Storage

- Best 'utility scale' energy storage technology after Hydroelectric

- Two installations in the world: Huntorf, Germany & McIntosh, AL, U.S.

- In U.S., TRAX modeled all process components including underground cavern
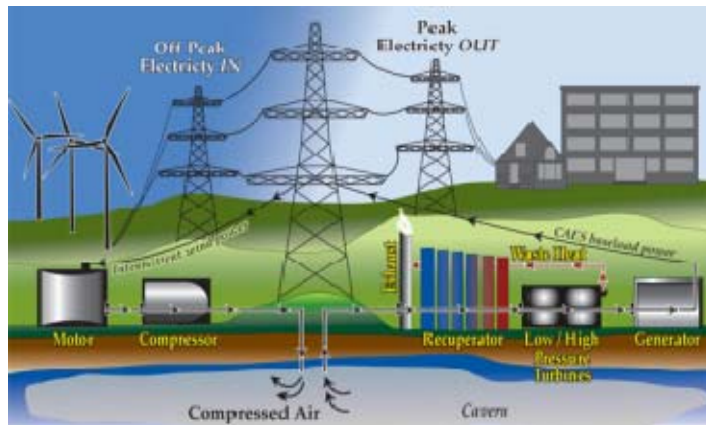
Storage Cavern:	19 M cu/ft.
Full Pressure:	1100 PSI
Compression Time:	41 Hrs.
Air Generation Time:	26 Hrs.
Full Load Output:	110 MW

Renewable Energy

Hybrid Power Generation: Combined Cycle + Solar

FP&L Martin Next Generation Solar Energy Center, Florida, USA


- Solar energy used to boil water and heat steam in pipes

- 190K mirrors; 75 MW of superheated steam

- World's first hybrid solar energy complex

- Solar field capacitance & piping modeled

- TRAX verified performance & controls design

- Establish startup procedure for bringing solar field steam into combined cycle

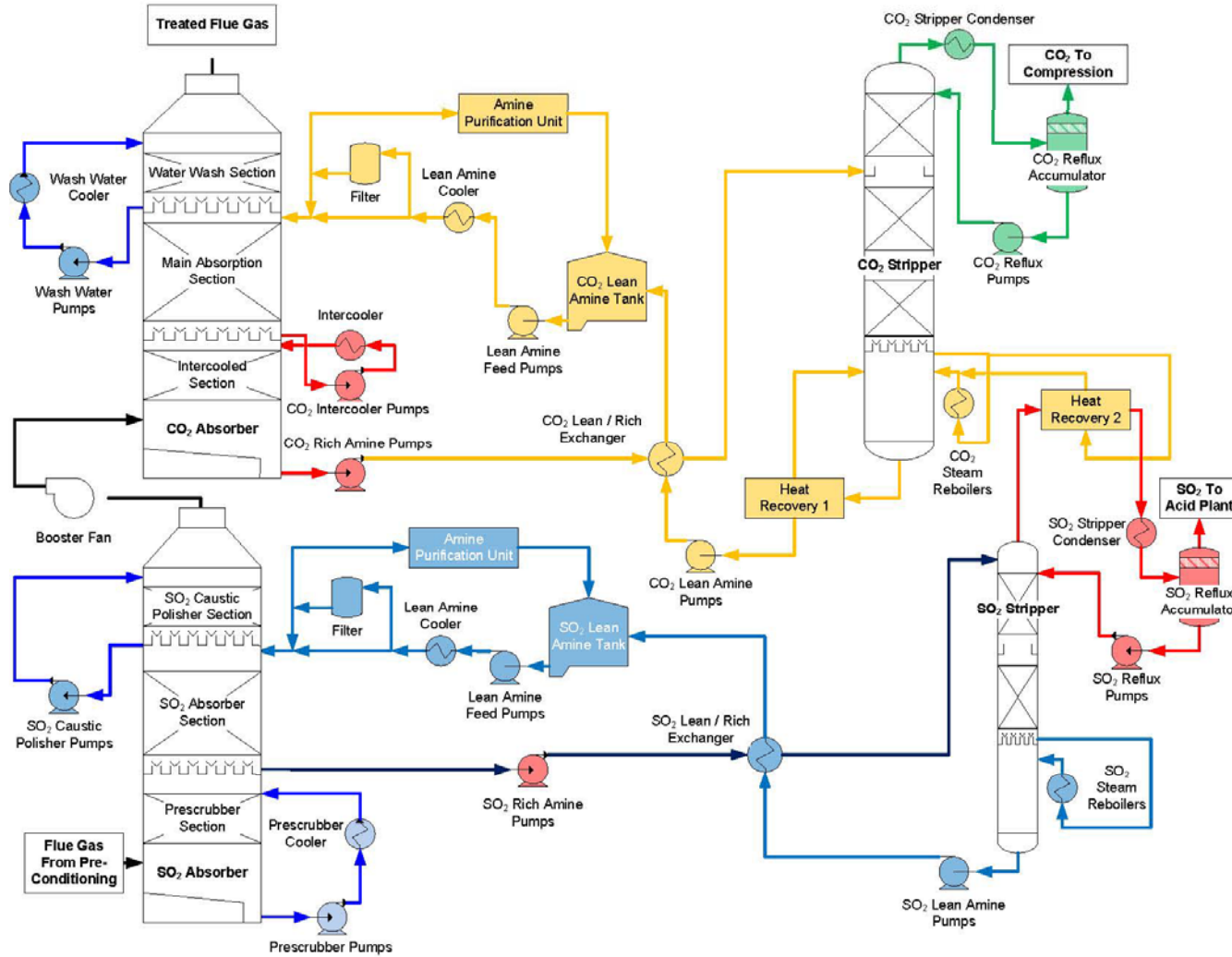**TRAX** *International*®

Carbon Capture

Carbon Capture Addition

- World's first post-combustion coal-fired CCS facility
- Capturing full gas stream – not slip stream
- System provides both CO_2 and SO_2 capture
- CO_2 transported via pipeline to enhanced oil recovery site 100 km away
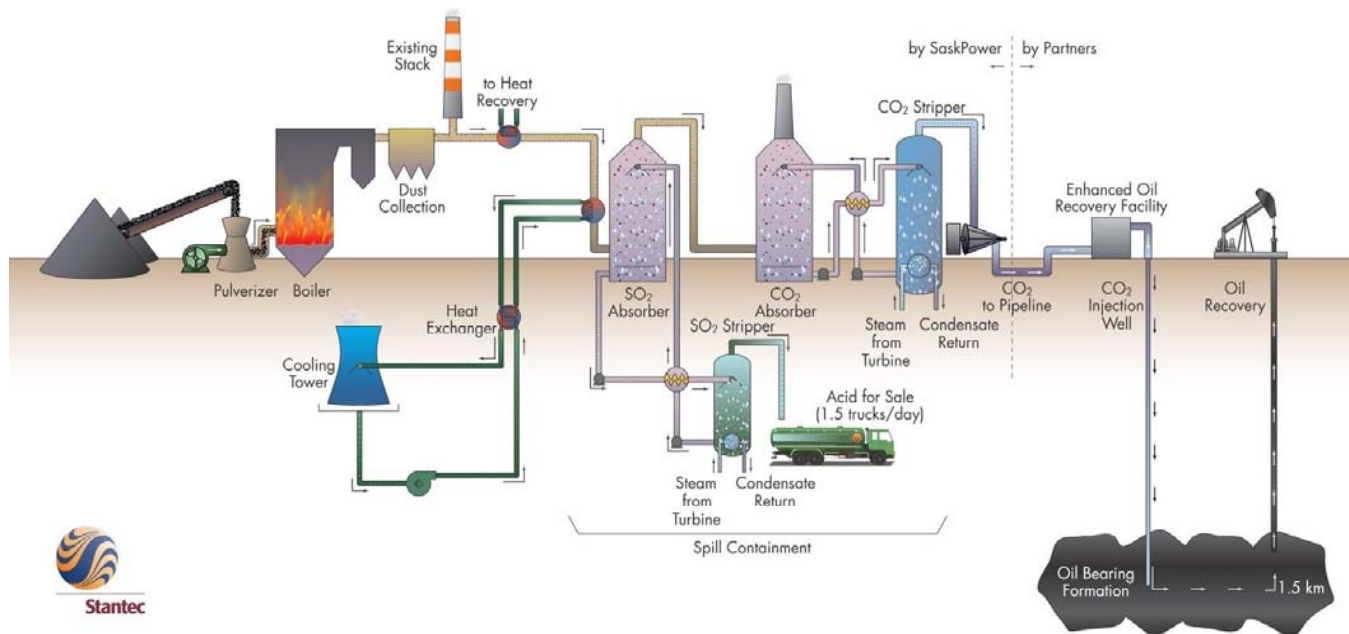
Carbon Capture Utilization and Storage Process

Carbon Capture

Carbon Capture

- SO2 stripper
- CO2 stripper
- Sulfur to sulfuric acid plant
- CO2 to compression and into pipeline