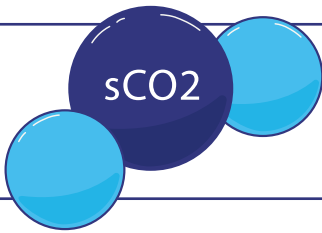# SUPERCRITICAL CO2

Bringing nuclear quality and standards
to system simulation.

# FLOWNEX®
## SIMULATION ENVIRONMENT

**sCO2**

*Flownex® SE simultaneously solves mass, momentum and energy in conjunction with two-phase fluid properties for system models. This makes it ideal for modeling super critical CO2 cycles.*

# TYPICAL USES

## ANALYSIS
- Performance assessment
- Modification assessment
- Root cause failure analysis

## DESIGN
- System sizing
- Component sizing
- Determining operating ranges
- Calculate flow, temperature, pressure, power consumption, etc. at different operating conditions
- Evaluate different control philosophies
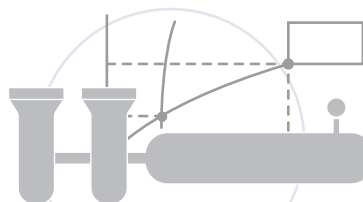
## OPTIMIZATION
- Heat exchanger length optimization
- Efficiency optimization at different design points

# SOFTWARE CAPABILITIES & FEATURES

- Comprehensive component library
- Powerful and intuitive user interface
- Well defined two-phase CO2 fluid properties
- Detailed fluid dynamic models (choking, real gas behavior, etc.)
- Incremental heat transfer with framework for custom correlations
- Full transient capabilities, including:
  - Stable implicit flow solver
  - Adaptive time-step functionality
  - Thermal and rotational inertia
  - Analogue and digital control library
- Built in design and analysis features allowing automated parametric studies

*Flownex® is developed within an ISO 9001:2015 quality management system that is ASME NQA-1 compliant.*

## SOME OF OUR CLIENTS

KEPCO KEPRI

gti®

GE

sCO2

## LINKS TO EXTERNAL SOFTWARE



# DESIGN sCO2 CYCLE

- Evaluate different sCO2 cycle configurations
- Optimize cycle efficiency with changes in cycle parameters
- Develop detailed component specifications
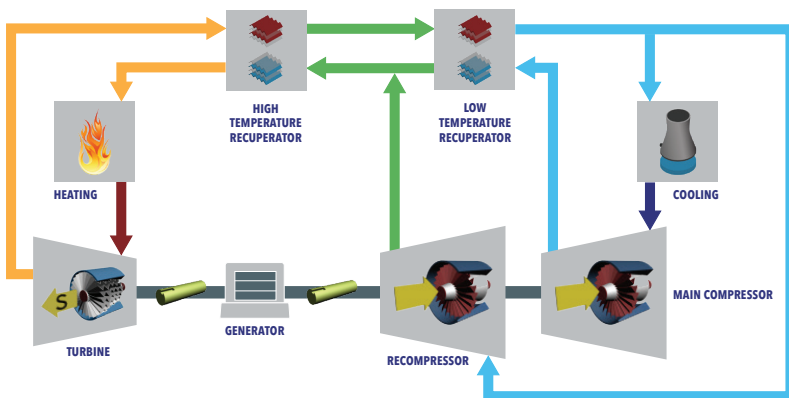
# INTEGRATE BALANCE OF PLANT

- Lubrication systems
- Cooling water systems
- Turbine cooling systems
- Safety auxiliary systems

# DESIGN CONTROL SYSTEM

- Build a virtual DCS using the extensive control
- component library
- Integrate the control system with the fluid system model in the same software environment
- Determine the optimal transducer locations for fast and stable control of the plant
- Tune PID controllers in a virtual plant environment and save time during commissioning of the plant



**STEP DEMO**

GTI utilizes Flownex® to simulate and optimize the transient operation of their $119M, 10 MWe, sCO2 pilot plant's main process loop. Allowing them to better understand the transient operational ranges of their components and evaluate control philosophies.





**WORKBENCH INTEGRATION**