COGEN SOFTWARE

Optimizing Cogeneration Systems in Industrial Processes

COGEN is a state-of-the-art flowsheeting-type modeling software that helps simulate and optimize industrial cogeneration systems. COGEN brings together powerful diagnosis and optimization capabilities to quickly identify and deliver energy management solutions that improve the performance of integrated utility systems, while considering a range of operational and design constraints.

THE CHALLENGE FOR INDUSTRY

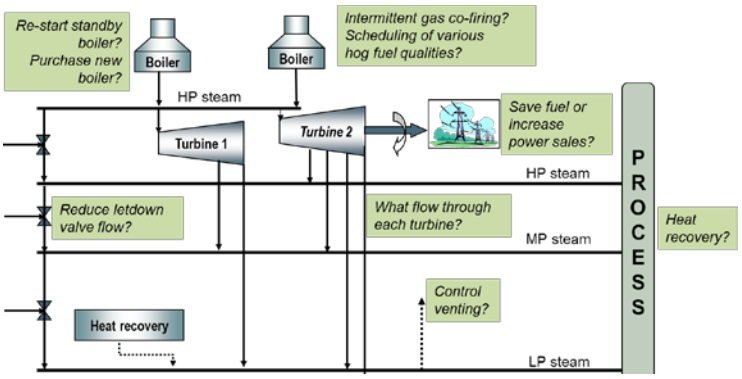
Industrial processes use large amounts of energy in the form of heat and power, which represent a significant portion of operating costs for industry. In recent decades, industrial cogeneration has grown considerably as a strategy for better managing heat and power efficiently in many industrial sectors including pulp and paper, chemicals, steel, and oil and gas. Cogeneration is the simultaneous production of power and thermal energy from a single energy source, and it offers a cost-effective way of improving profitability and reducing gas emissions and effluents. However, finding the best design options in complex systems is challenging. Certain key questions must be answered to develop energy-efficient solutions:

- What is the potential for improving the performance of industrial cogeneration systems, and how can opportunities be uncovered?
- What modifications can be made, considering practical design and economic constraints?
- How can utility systems be better designed and operated to reduce waste heat generation and increase profitability?

THE INTEGRATED SOLUTION

To improve the energy performance of their processes, plant engineers need to better understand how heat and power are being used and produced across the plant. They must be able to rapidly identify areas of inefficiencies, and pinpoint potential improvements to current systems, before investing in new equipment.

COGEN is a flexible and easy-to-use software with powerful modeling and optimization capabilities that can quickly identify and evaluate cost-saving measures.



COGEN enables the user to identify the optimal cogeneration pathway to profitability

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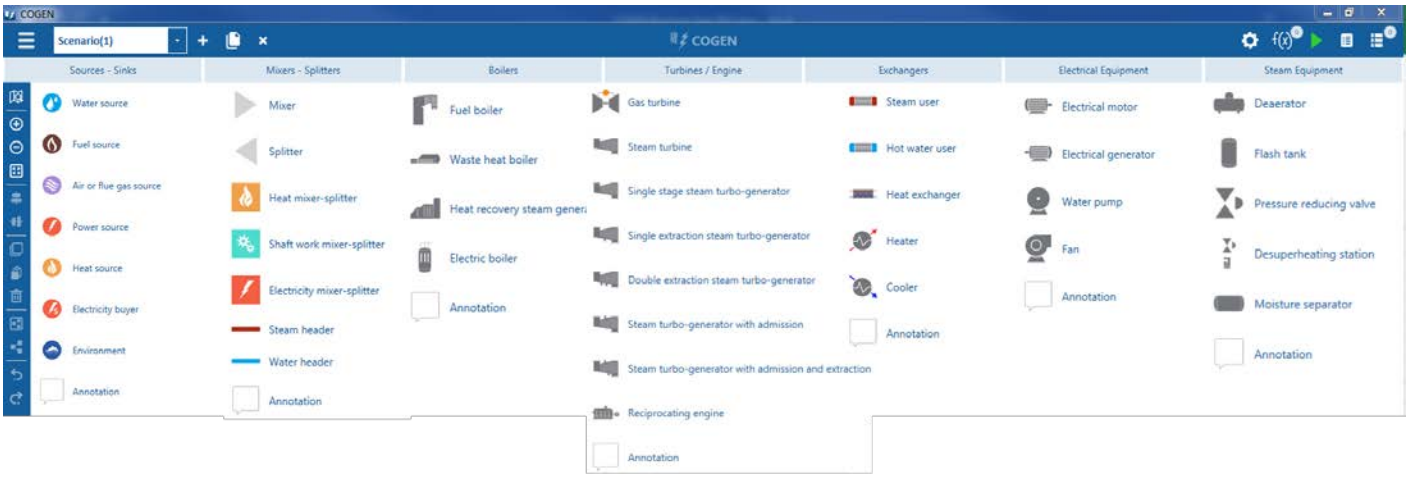
KEY FEATURES

COGEN allows the user to easily assess and improve the energy and economic peformance of industrial cogeneration systems. The software is supported by a user-friendly graphical interface that allows to identify existing inefficiencies and opportunities to optimize heat and power production.

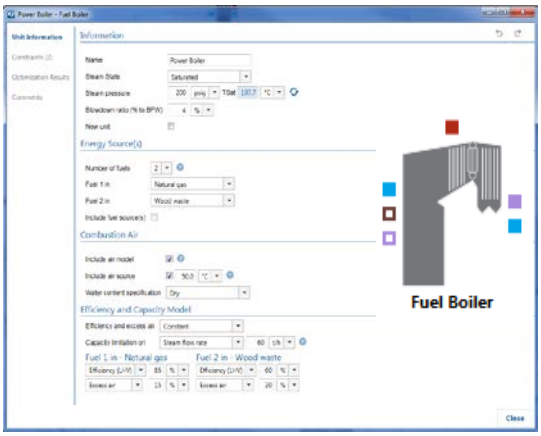
COGEN offers a range of models for cogeneration-related equipment together with powerful optimization capabilities.



COGEN incorporates simple and detailed performance models for a wide range of industrial cogeneration-related equipment.

USER-FRIENDLY INTERFACE

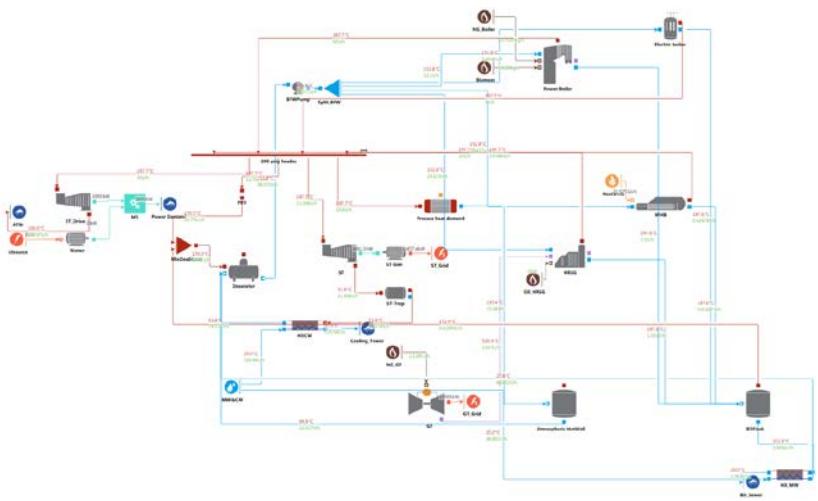
- Quickly assess existing and retrofitted cogeneration systems via a drag-and-drop interface and flowsheet visualization tools
- Seamlessly compare various “what-if” scenarios in a single file
- Take into account each unit operation via detailed equipment editors
- Identify and diagnose data entry errors with the smart error bar



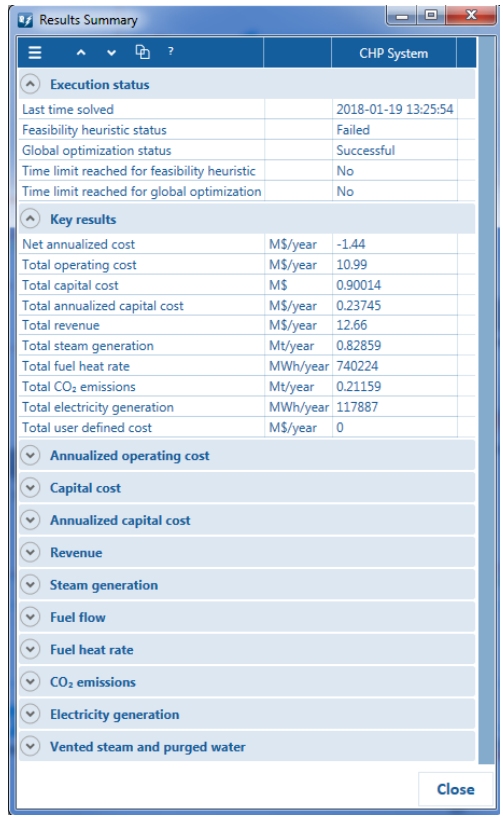
Fuel boiler and its specific editor that allows the user to simulate and optimize different scenarios

ANALYSIS FEATURES

- Steam path and fuel blend optimization with trade-off between fuel savings and power sales
- "What-if" scenarios such as:
  - Topological modifications
  - Equipment modifications
  - Contractual changes
  - Operational changes
- Calculation of the true cost of incremental steam, which can vary by fuel type, steam generator, pressure level, process steam loads and time of day
- Condensate recovery/management



User-friendly interface that allows for the modeling and optimization of complex industrial cogeneration systems



Results Summary

		CHP System
Execution status		
Last time solved		2018-01-19 13:25:54
Feasibility heuristic status		Failed
Global optimization status		Successful
Time limit reached for feasibility heuristic		No
Time limit reached for global optimization		No
Key results		
Net annualized cost	M$/year	-1.44
Total operating cost	M$/year	10.99
Total capital cost	M$	0.90014
Total annualized capital cost	M$/year	0.23745
Total revenue	M$/year	12.66
Total steam generation	Mt/year	0.82859
Total fuel heat rate	MWh/year	740224
Total CO_2 emissions	Mt/year	0.21159
Total electricity generation	MWh/year	117887
Total user defined cost	M$/year	0
Annualized operating cost		
Capital cost		
Annualized capital cost		
Revenue		
Steam generation		
Fuel flow		
Fuel heat rate		
CO_2 emissions		
Electricity generation		
Vented steam and purged water		

Close

Analysis summary of key operational and financial outcomes

CAPABILITIES

- COGEN incorporates simple and detailed models for cogeneration-related equipment
  - Boilers, steam and gas turbines, pumps and fans, heat exchangers, desuperheaters, flash tanks, steam headers, condensate systems, etc.
  - Detailed models rigorously simulate equipment part-load operation
- Complex layouts (steam/condensate/fuel/air/electricity) can be modeled in full detail
- User-defined equations for the system and equipment
- World-class solvers used for highly complex, large-scale, linear and non-linear problems

CanmetENERGY

Leadership in ecoInnovation

For more information on **COGEN**, please contact us: **COGEN@canada.ca**

CanmetENERGY's Systems Analysis Software

To allow for effective transfer to industry, CanmetENERGY is developing innovative software solutions that reflect the most recent advancements from our research activities.

COGEN – For maximizing revenues from cogeneration systems
INTEGRATION – For optimizing heat recovery in plants
EXPLORE – For improving process operation, using the power of advanced data analysis
I-BIOREF – For evaluating the economic viability and environmental impacts of biorefinery technologies

For more information, please visit our website or contact us: www.nrcan.gc.ca | 1-450-652-4621

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