

NOVEMBER 17TH 2022

Integrated utilities and emissions modeling using AVEVA Process Simulation

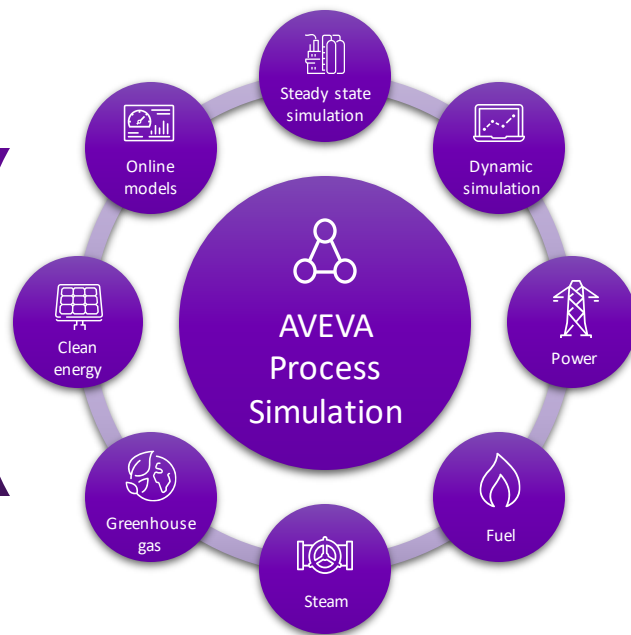
Cal Depew, AVEVA

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AVEVA

AVEVA Process Simulation

A valid, fully closed balance supports design, operating, and planning decisions



Integrated utilities and emissions modeling

Challenge

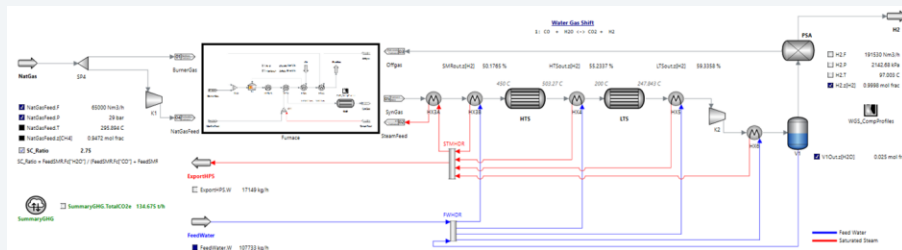
- Utilities are a major operating cost and emissions source for all process plants
- Steam, Power, and Fuel gas balances** are performed separately in specialized tools and never fully closed site-wide.
- The introduction of **green hydrogen** further complicates the overall utility balances
- Process plants now need to minimize **greenhouse gas emissions** from utilities.

Solution

- AVEVA Process Simulation simultaneously balances power, steam, fuel gas, and hydrogen while calculating greenhouse gas emissions in seconds

Benefits

- A valid, fully closed balance supports design, operating, and planning decisions
- A single integrated tool reduces need for specialization and improves engineering efficiency



Adding Green H₂ impacts hydrogen (SMR) plant production, reducing HP steam export, increasing power and steam generation and fuel gas consumption

NOV 2022

Integrated utilities and emissions modeling using AVEVA Process Simulation (APS)

Energy lives here™

Matt Curran



ExxonMobil Corporation:

- Presence on six continents
- More than 70,000 employees
- Leader in safety
- Three main business lines
 - Upstream
 - Product Solutions
 - Low Carbon Solutions

OUR STRATEGY

Current focus is on carbon capture & storage, hydrogen, and lower emission fuels



Reduce
emissions in our
existing
operations



Develop and
deploy scalable
technology
solutions to
help
decarbonize
highest emitting
sectors



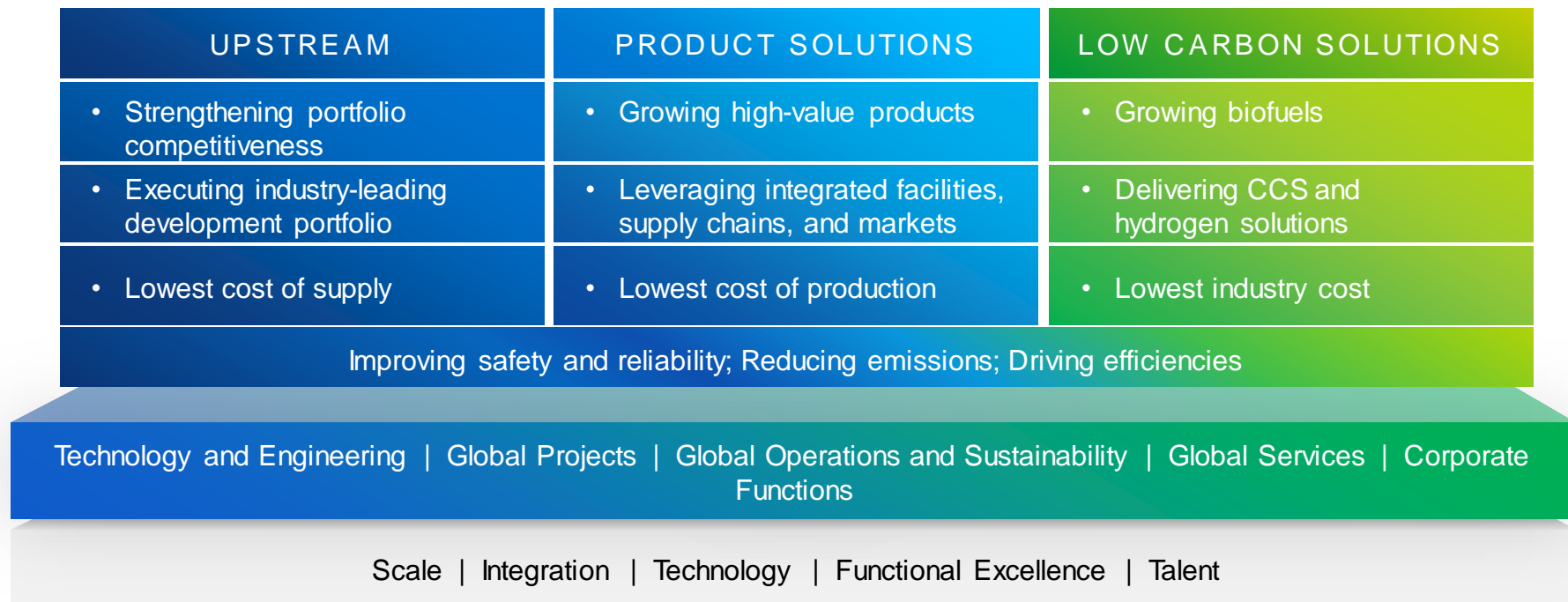
Provide new
products to help
our customers
reduce their
emissions



Proactively
engage on
climate-related
policy

Lead industry in the energy transition

Leveraging centralized expertise and capabilities to grow the portfolio



APS Model Building

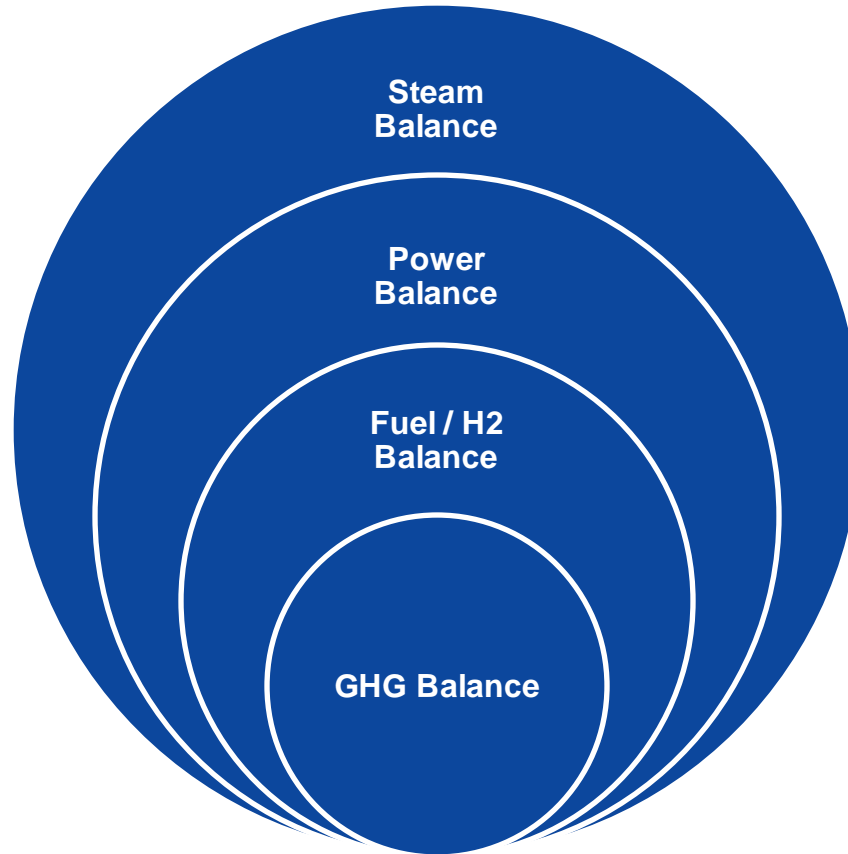
To facilitate building a steam balance template:

- solved Header and steam consumption and blocks then link to together
- solved extraction turbine and back pressure turbine blocks and then link to respective headers
- solved steam generation blocks and then link to respective headers
- solved flash steam and condensate blocks and then link to respective headers
- add deaerator to connect BFW and steam headers together – complete the bfw/steam loop

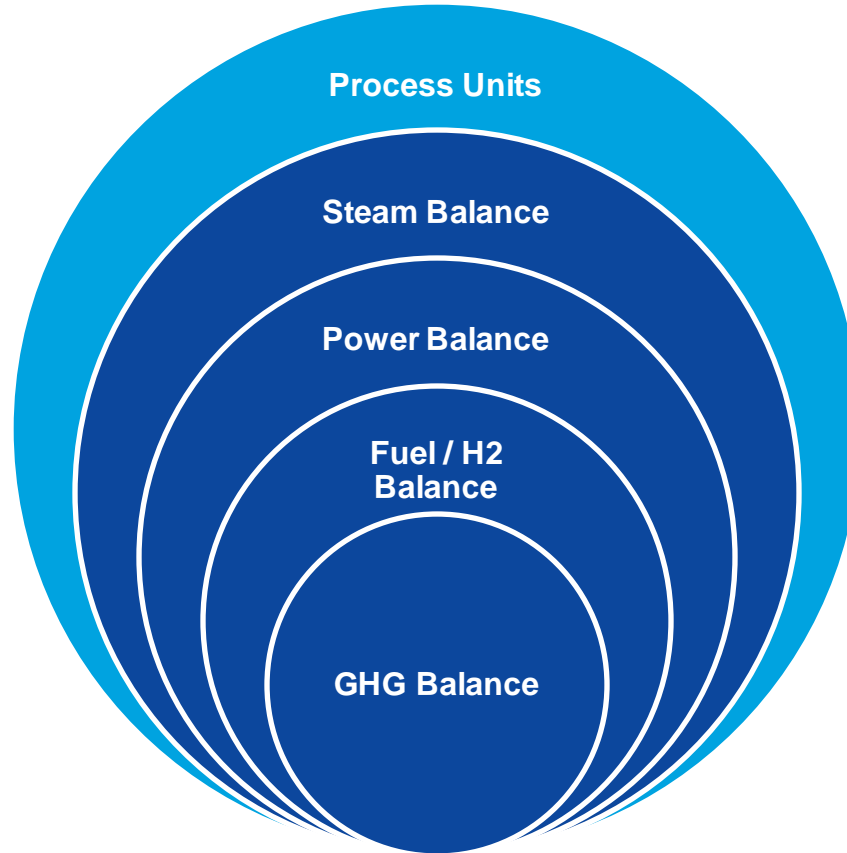
To facilitate fuel and GHG balance

- Add fuel gas sources and build fuel gas network
- Via stream Property View Option – select Fuel “Mass”
- Use equation to connect boiler fired duty to boiler fuel stream to set boiler fuel rate
- Use submodel WasteGHG on fuel streams to provide GHG emissions calculations

Integrated Steam / Power/ Fuel / GHG Balance



Vision - Integrated Process / Steam / Power/ Fuel / GHG Balance

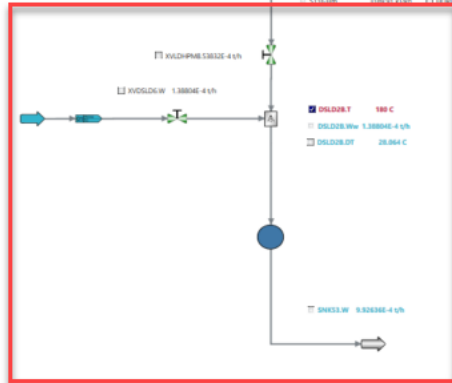


Header Block - solved Header with steam consumption and blocks then link to together

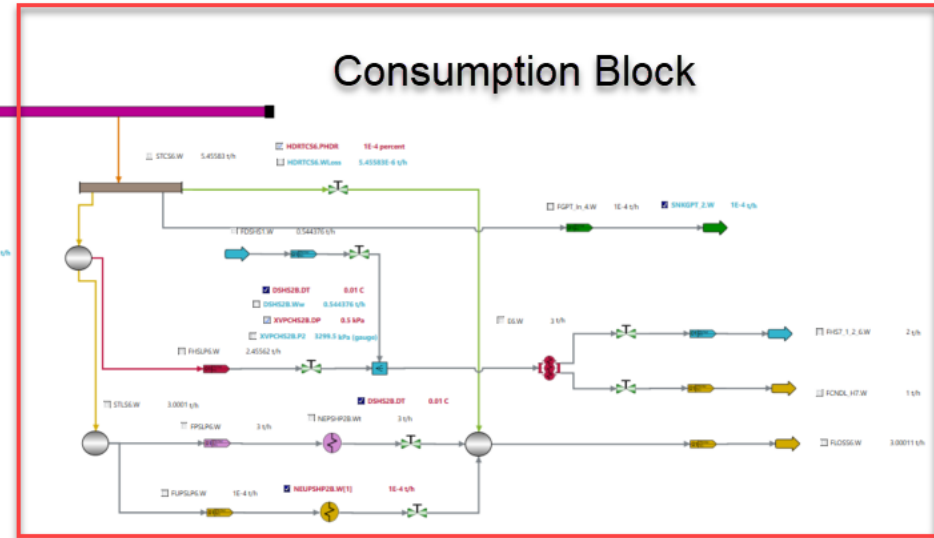


HP HDR

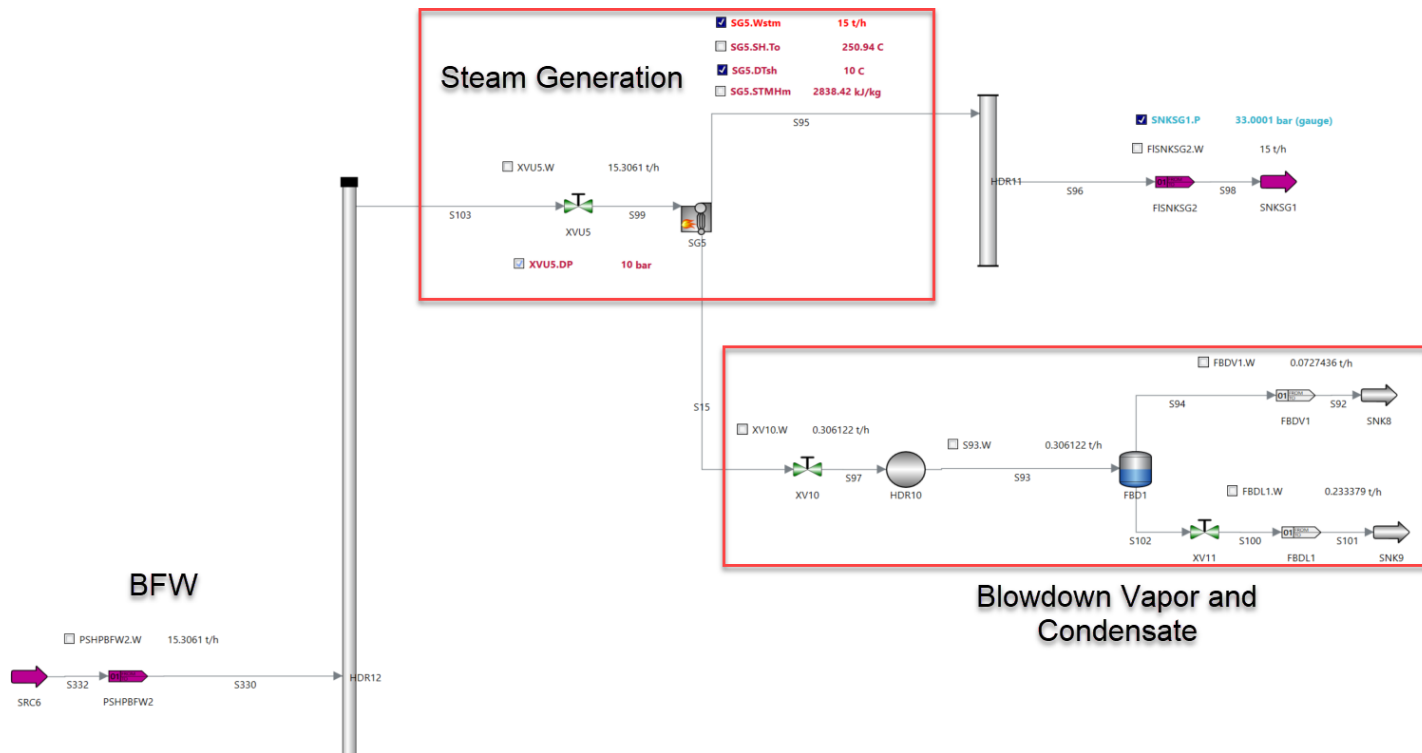
Inlet Flows



Let Down De-superheater

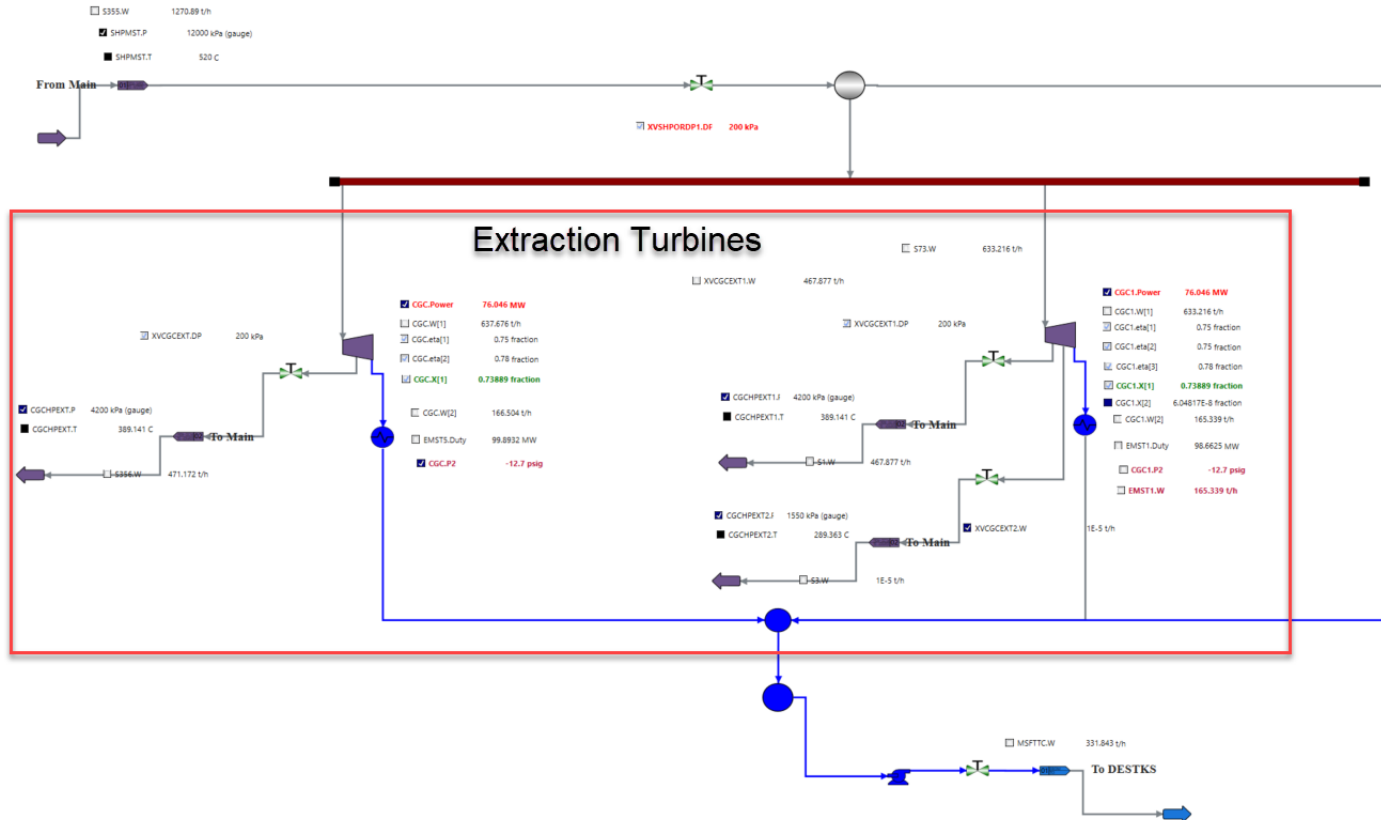


Steam Generation Block - solved steam generation blocks and then link to respective headers



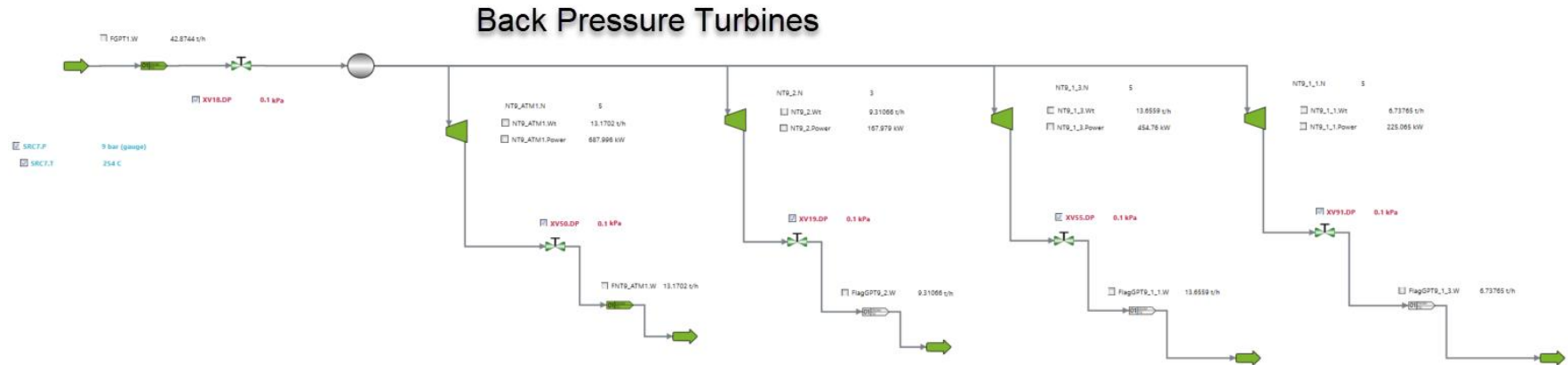
Extraction Turbine Blocks

- solved extraction turbine and then link to respective headers

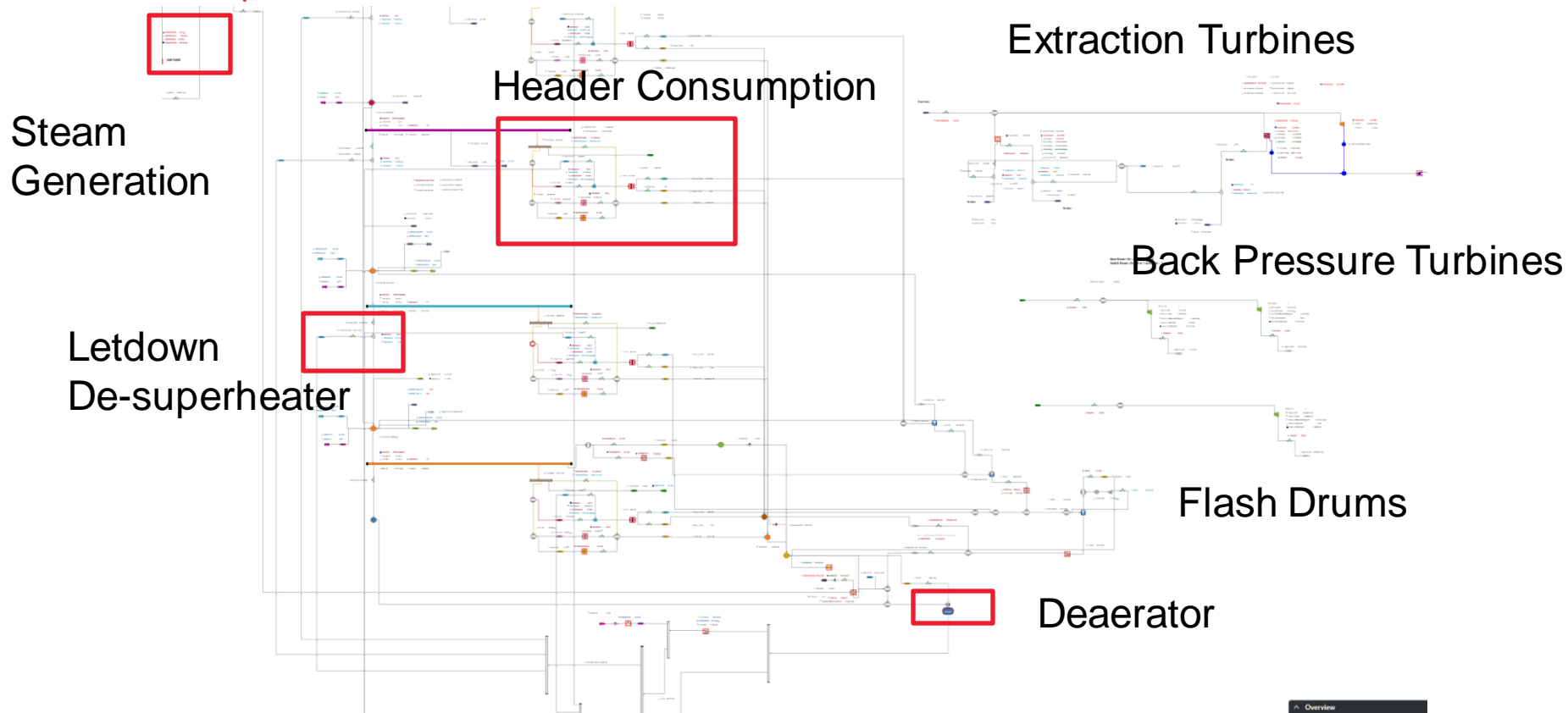


Back Pressure Turbine Blocks

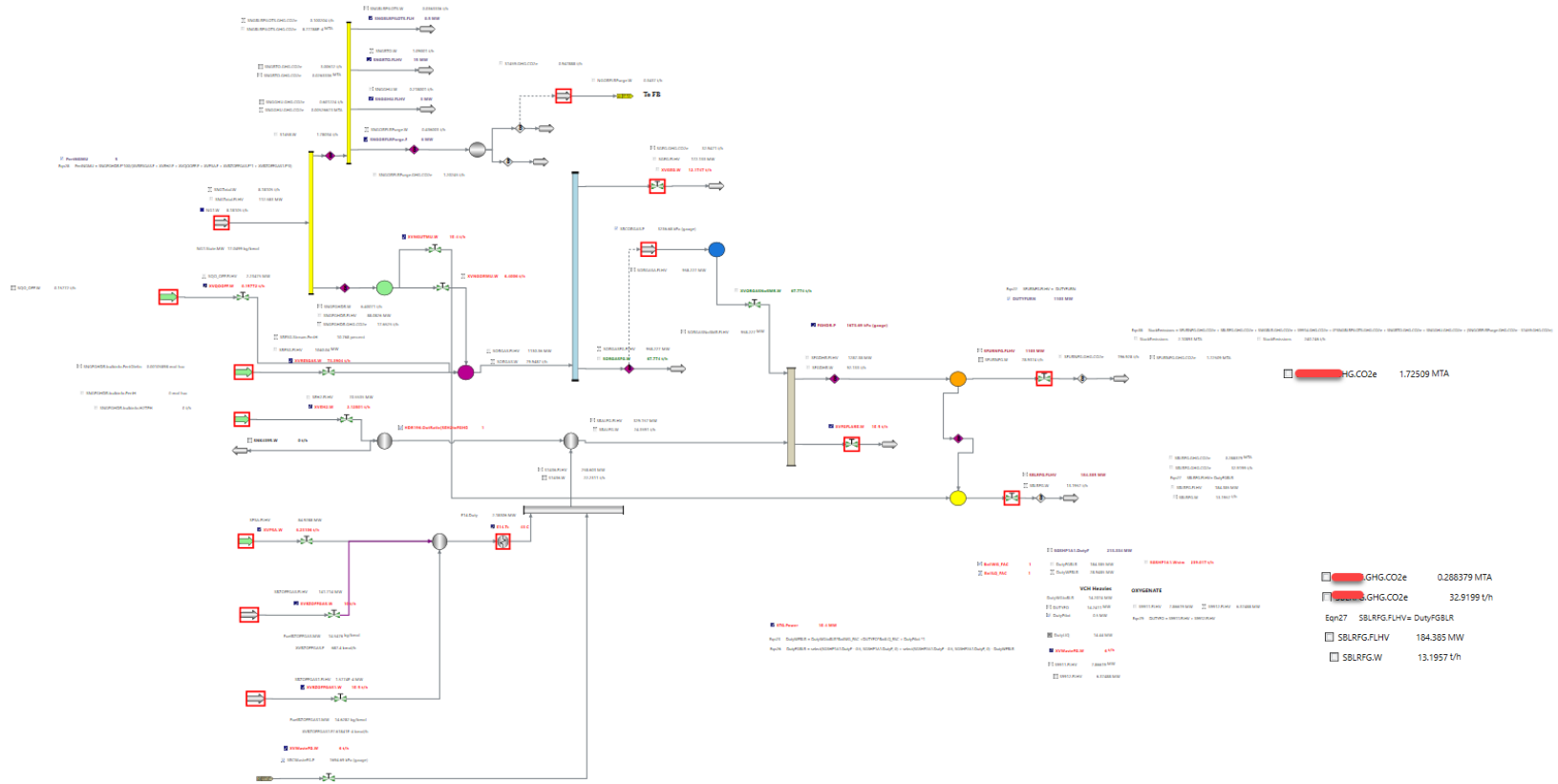
- solved back pressure turbine blocks and then link to respective headers



Steam Balance - add deaerator to connect BFW and steam headers together – complete the bfw/steam loop



Integrated Fuel Gas Block with CO2 Emissions



APS Next Steps

- Look to standardize a template for steam / fuel / GHG balances
- Develop / build new users skills / depth with APS
- Add developed custom models to steam library such boiler and other models
- Continue with Roll-out and training of APS to new users
- Continue to encourage Aveva to develop APS for more general use for EM designers
 - Encourage Aveva to include refinery library in roadmap
 - Feedback from Engineering office - interested in other applications of APS in addition to steam/utilities balances
- How to export info from APS into project deliverables

Questions?

Please wait for the microphone.
State your name and company.



Please remember to...


Navigate to this session in the mobile app to complete the survey.




Thank you!

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AVEVA is a global leader in industrial software, sparking ingenuity to drive responsible use of the world's resources. The company's secure industrial cloud platform and applications enable businesses to harness the power of their information and improve collaboration with customers, suppliers and partners.

Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life's essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

Named as one of the world's most innovative companies, AVEVA supports customers with open solutions and the expertise of more than 6,400 employees, 5,000 partners and 5,700 certified developers. With operations around the globe, we are headquartered in Cambridge, UK and listed on the London Stock Exchange's FTSE 100.

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