Eastman – Perspectives on New Nuclear

Lisa Lambert, Site Energy Coordinator and Group Leader, Global Natural Resource Management
David Bustetter, Strategy and Compliance Manager, Power Department, Utilities Division
July 20, 2021

A global industry leader

- Fortune 500 specialty materials company with 2020 revenue of ~$8.5B
- Global manufacturer and marketer of advanced materials and specialty additives
- Operates four business segments
- Global team of ~14,500
- Serving customers in >100 countries

MITIGATING CLIMATE CHANGE

Eastman will:

- Reduce our absolute GHG Scope 1 and 2 emissions by one-third by 2030 to **achieve carbon neutrality by 2050**
- **Comprehensively understanding our downstream Scope 3 footprint** and developing a strategy that begins to address it in 2021
- Innovate to provide products that **enable energy savings and greenhouse gas reduction** down our value chains and at the consumer level

Kingsport, Tennessee Manufacturing Site (TNO)

- The Tennessee Operations (TNO) site is Eastman's largest manufacturing facility worldwide, covering approximately 900 acres.
- TNO produces a variety of chemicals, fibers, and plastics and also serves as the worldwide headquarters for Eastman.
- The facility began operating its first CHP system in 1920's and continued adding to the system until its last expansion in 1993.
- TNO is located approximately two miles from Kingsport city's downtown area.

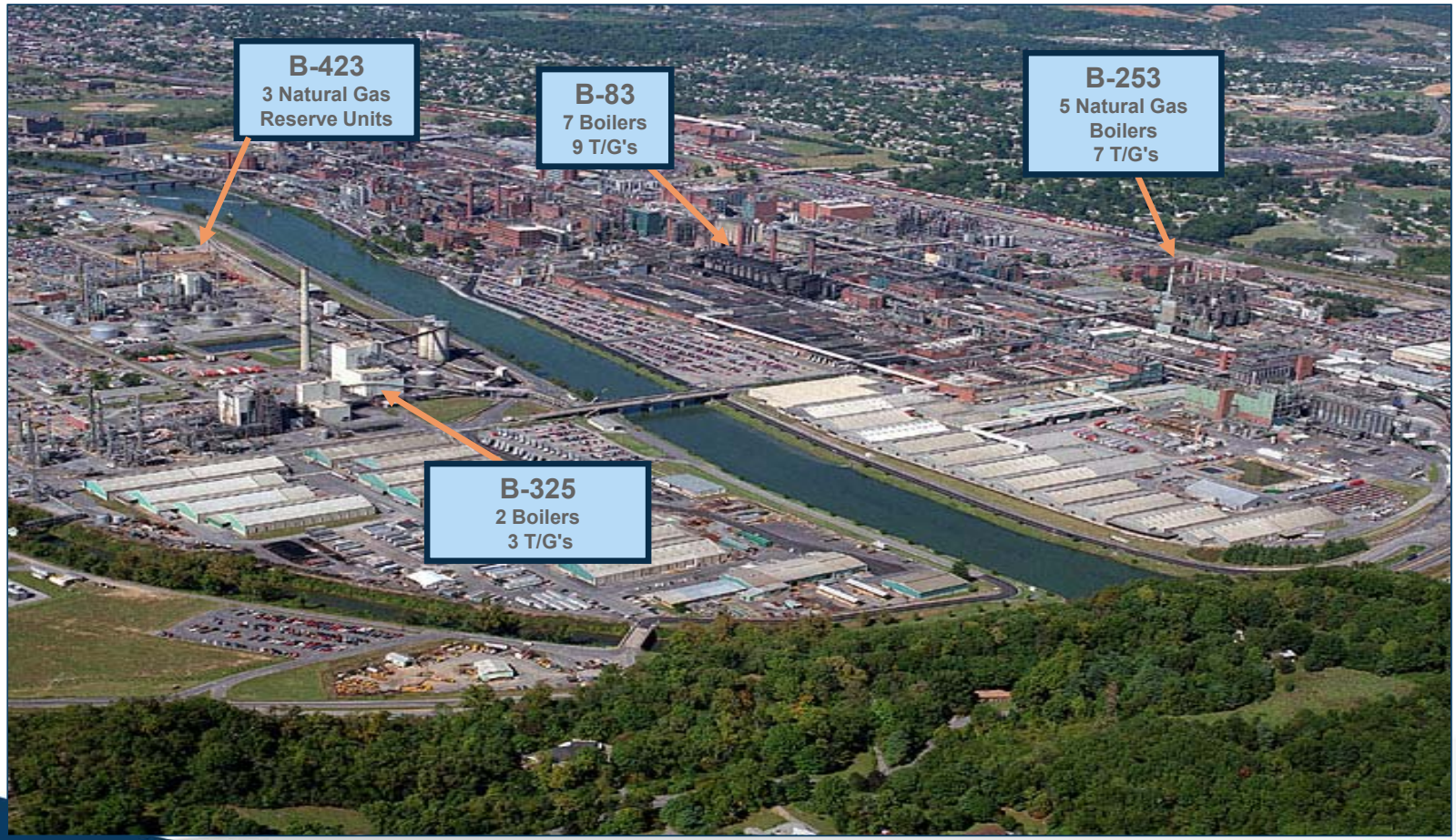
EASTMAN

Power Department Operations

- Four Powerhouses
  - 17 Boilers
  - 19 Turbine-Generators
  - 13,800V Electric distribution
- Similar in size to 700 MW station
  - Coal
  - Natural gas
  - Waste-to-Energy
- Combined Heat & Power
  - Cogenerating steam + power
  - ~ 3,600,000 lbs/h steam
  - ~ 170 MW electricity
- Purchase additional 15 MW from local utility

EASTMAN

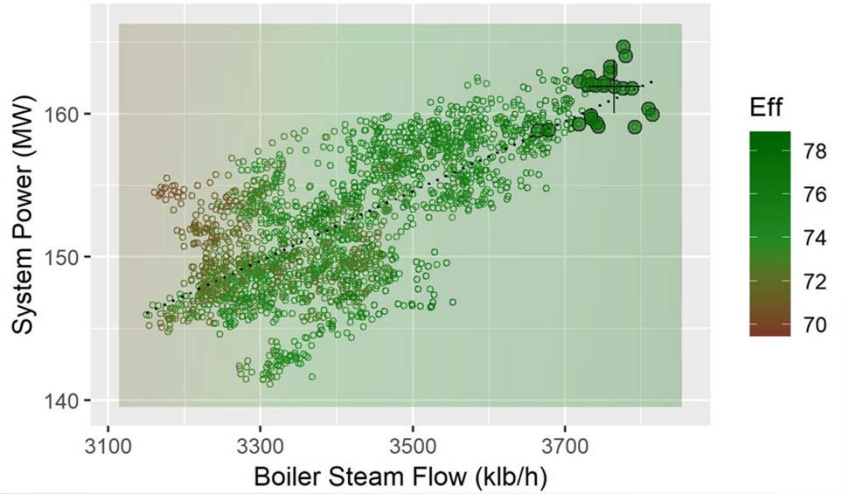
Physical Locations within Plant Site



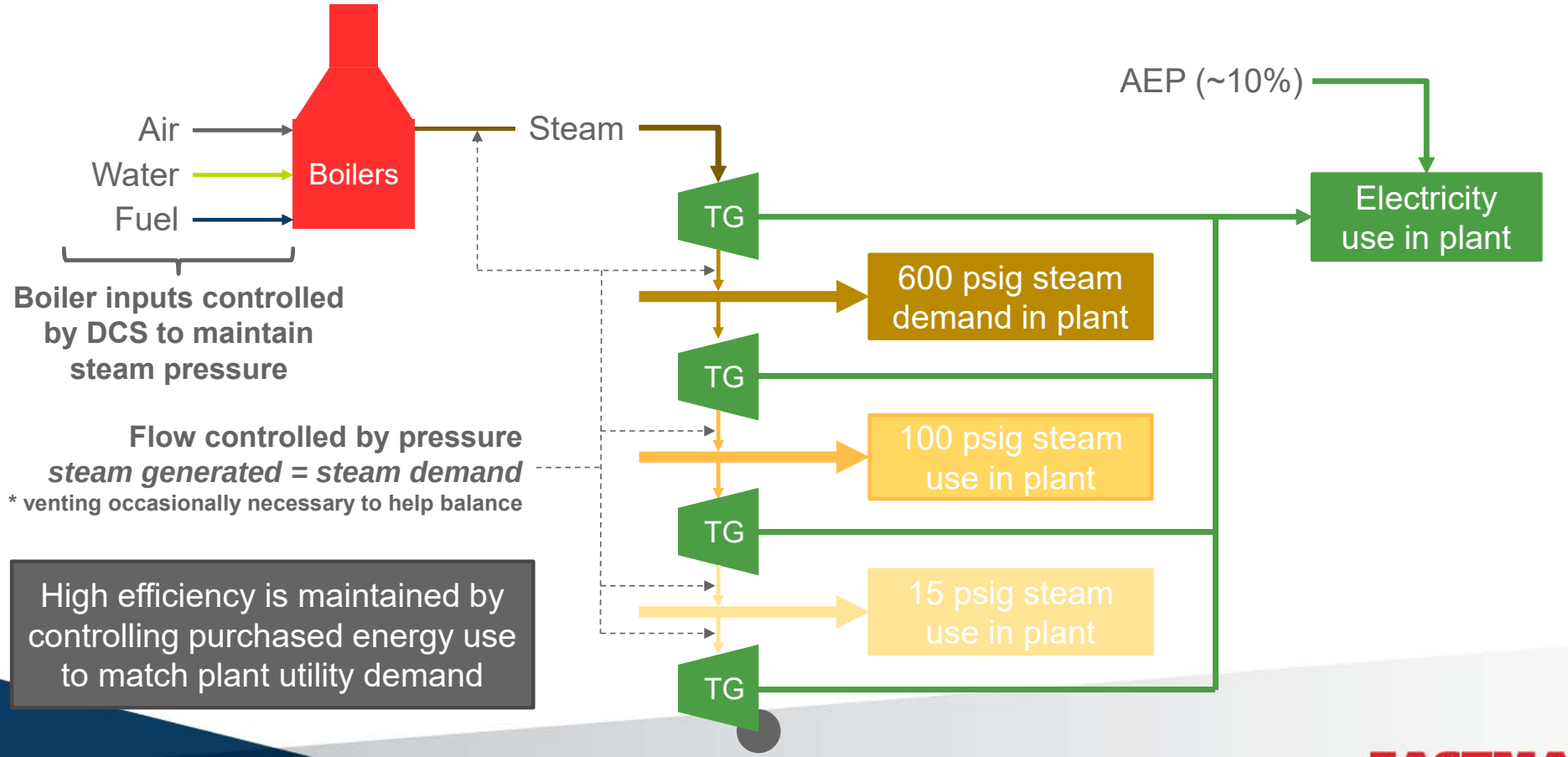
EASTMAN

Steam & Electricity at TNO

- Combined heat and power (CHP) is used to simultaneously produce multiple forms of energy from coal and natural gas fuels
- Thermal steam/mechanical load ~3.6 Mlbs/hr
- Electric power is only 12% of the TNO power system energy demand
- CHP using boilers and TGs is the most cost effective and environmentally sound method of meeting energy needs for TNO
- Steam pressure/temperatures
  - 600 psig steam header/750° F
  - 100 psig steam header/375° F
  - 15 psig steam header/260° F

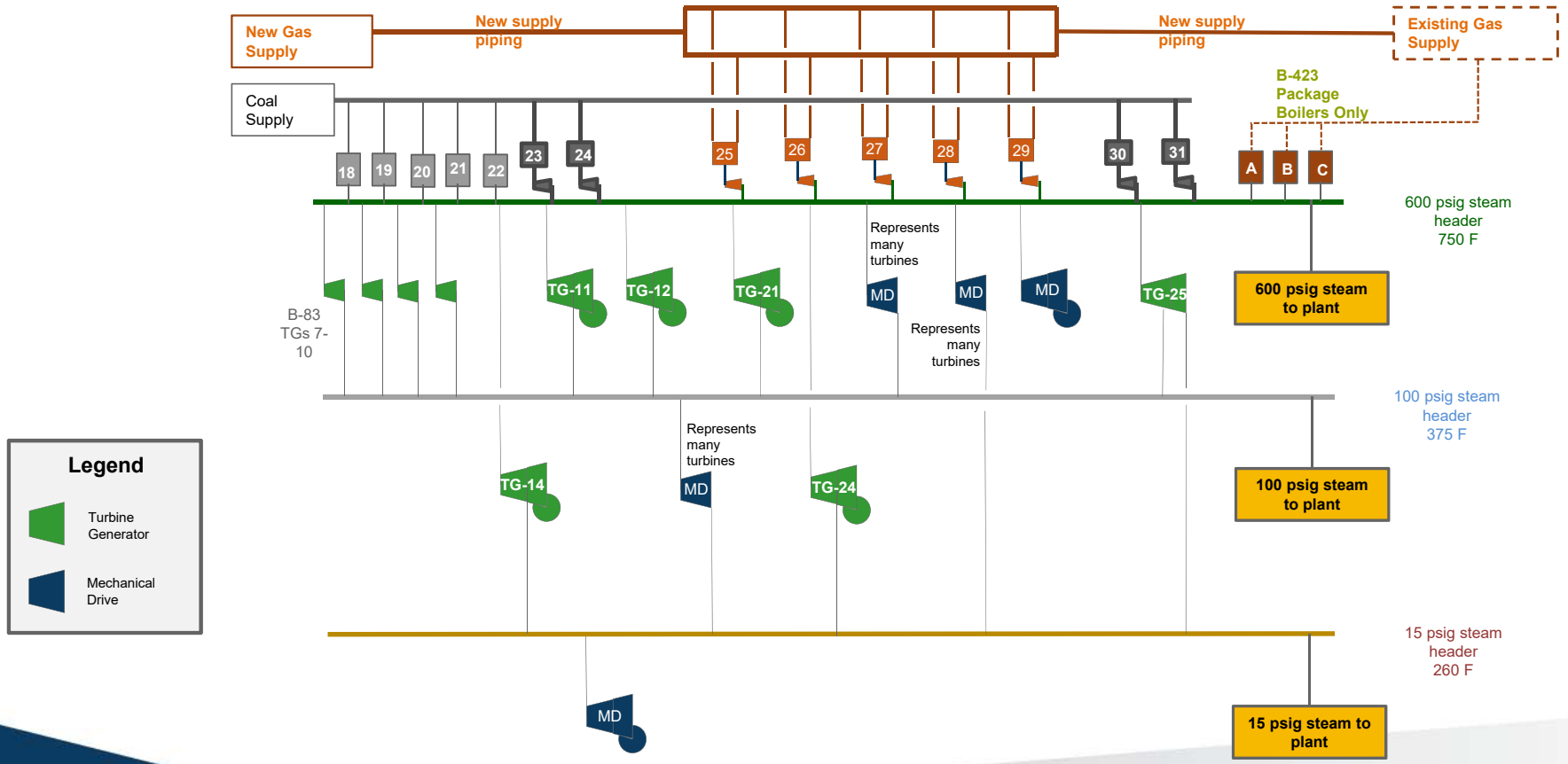


Steam and electricity generation at TNO



EASTMAN

Current System Configuration



EASTMAN

Integrated Energy System (IES) Investigation

- Eastman consistently evaluates opportunities to reduce emissions and conserve energy
- Eastman received Department of Energy Office of Nuclear Energy voucher in late 2018 funded through Gateway for Accelerated Innovation in Nuclear (GAIN)
- Funding provided to Oak Ridge National Lab (ORNL)
- Purpose - to assist Eastman in evaluating potential deployment scenarios of IES at the Kingsport site
- Full report included in pre-read

Feasibility Study Findings

- Reactor Technology and Simulation
  - Current light water reactors are too large
  - Small modular light water reactors cannot meet steam temperature and pressure requirements by themselves
  - Advanced reactors could meet temperature and pressure needs but still have a need to respond to rapid load changes
  - Load response needs (could swing 200k to 300k lbs./hr. within 30 minutes) still require some fossil capability

Feasibility Study Findings

- Operational Reliability
  - Eastman's power system operates with high redundancy
  - Six small modular reactors required to provide needed reliability while allowing module to be down for refueling
- Siting requirements
  - Under current siting guidance, issues exist due to population around the plant site and hazardous operations risks
  - More advanced reactor technology and new siting guidance needed to eliminate siting issues
- Economic Analysis involves significant amount of uncertainty

Summary

- Needed technology is still under development
- Current technology will require fossil to meet desired steam conditions
- Current siting requirements make placement at site impossible
- Solution is very capital intensive – rough order of magnitude $2.5B-$3.6B

EASTMAN

Questions?