



Case Study – Implementation of a Biomass CHP System at a US Federal Hospital

Speakers:

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Agenda

- VA Battle Creek Project Overview
- Advantages of Biomass
- VA Battle Creek Project Requirements
- Key Technical/Design Challenges
- Gasification System Overview
- Lessons Learned
- Questions

VA Renewable Energy Goals/Strategies



- EO 13514: Reduce GHGs by 28% by 2020
- VA Goal: 7.5% of energy from renewable sources by 2020
 - Targeted Technologies: Biomass, Solar & Geothermal
 - VA Battle Creek Medical Center selected for biomass system

VA Battle Creek Project Overview

Energy Production

- Maximum of 2MWe Electricity or;
- Up to 24,000 lb/hr steam for campus heating

GHG Reductions

- 14,000 Tonnes per Year

System Start Up

- March 2014

Partners



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Advantage of Biomass

- Baseload
- Renewable
- Diversifies fuel supply
- Easily Integrates with steam system
- Utilizes locally sourced fuel
- Creates local jobs (fuel procurement)



VA Battle Creek Project Requirements

- Technology – Gasification
- Combined Heat and Power
- Scale: 1M SF Campus
- 10,400,000 kWh- 84% of Load



Team



Owner



**General
Contractor**



**Engineer/Architect
Commissioning Agent**



**Technology
Provider**



**Civil/Environmental
Engineer**

Subcontractors

Key Technical/Design Challenges

- Adaptation of VA SDTM and Standards
- Value add engineering to fuel handling
- Ensure high utilization of the system
- Aesthetic integration with campus



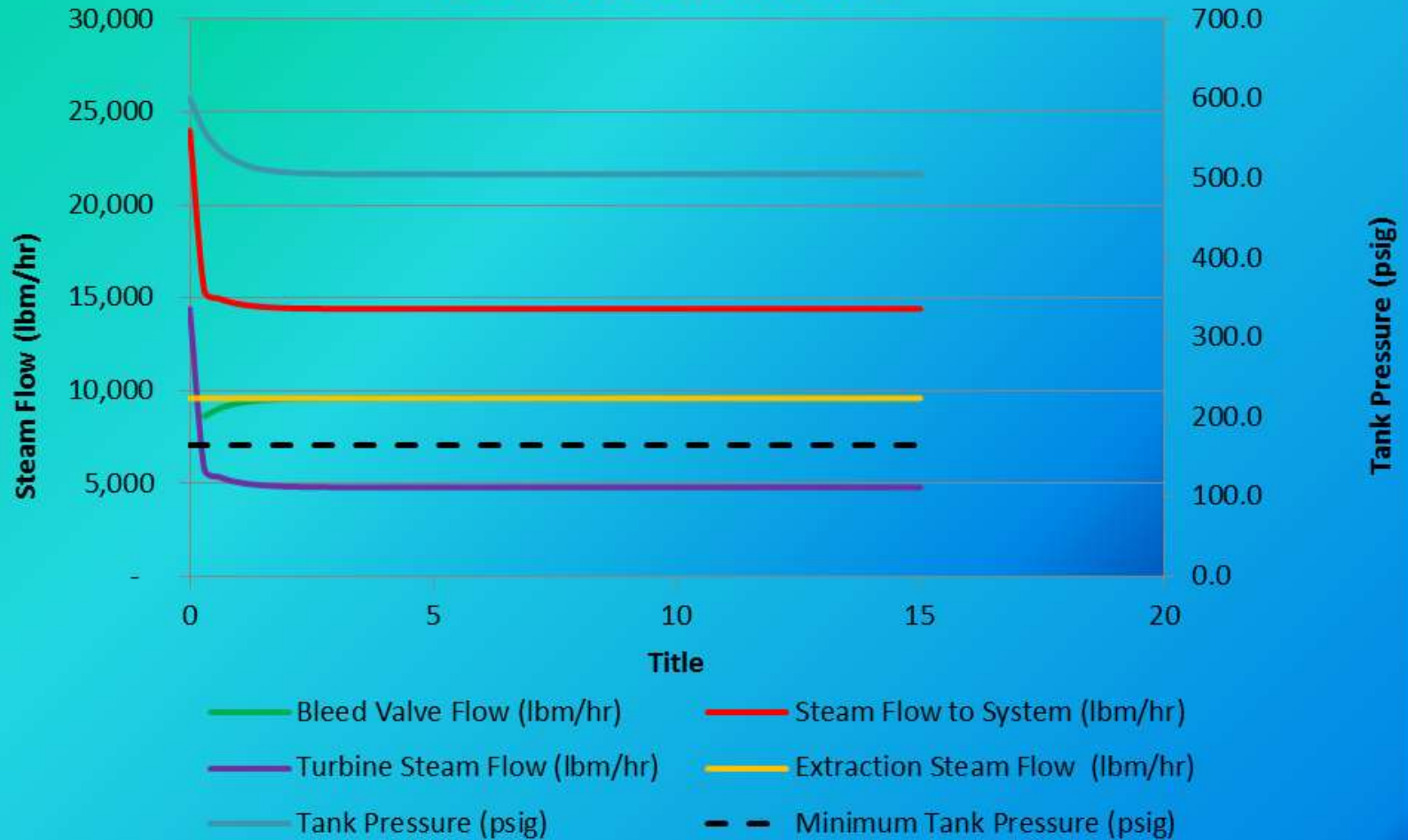
Key Technical/Design Challenges

- Interface of 600 #/750 F with 60 psig Gas Plant
 - Feedwater Pumps in Series with gas plant
 - Casing Pressure rating
 - Control of minimum flows
 - Gas Plant Pump Curve
 - Bypass for S/U
- Integrated Secondary Condensing Economizer
- Natural Ventilation System

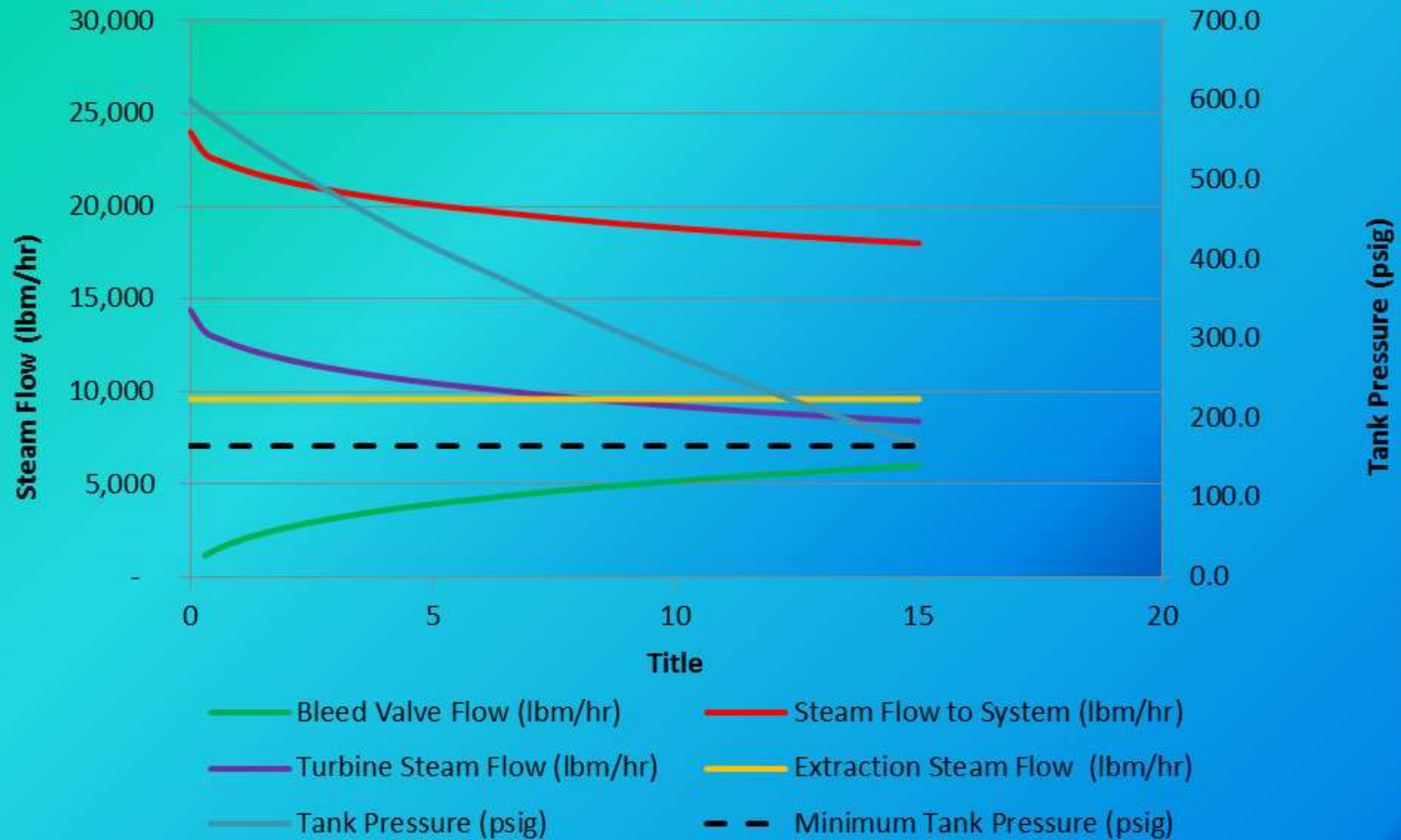
Key Technical/Design Challenges

- Thermal Expansion
 - Extraction Steam DSH
- Coordination of Transients
 - Start-up and Turbine or Gasifier Trip-out
- Sootblower could be 50% of design steam flow
 - Blow duration
 - Buffer tank on steam side

VA Battle Creek Sootblower Discharge Cycle with TK-1



VA Battle Creek Sootblower Discharge Cycle with TK-1



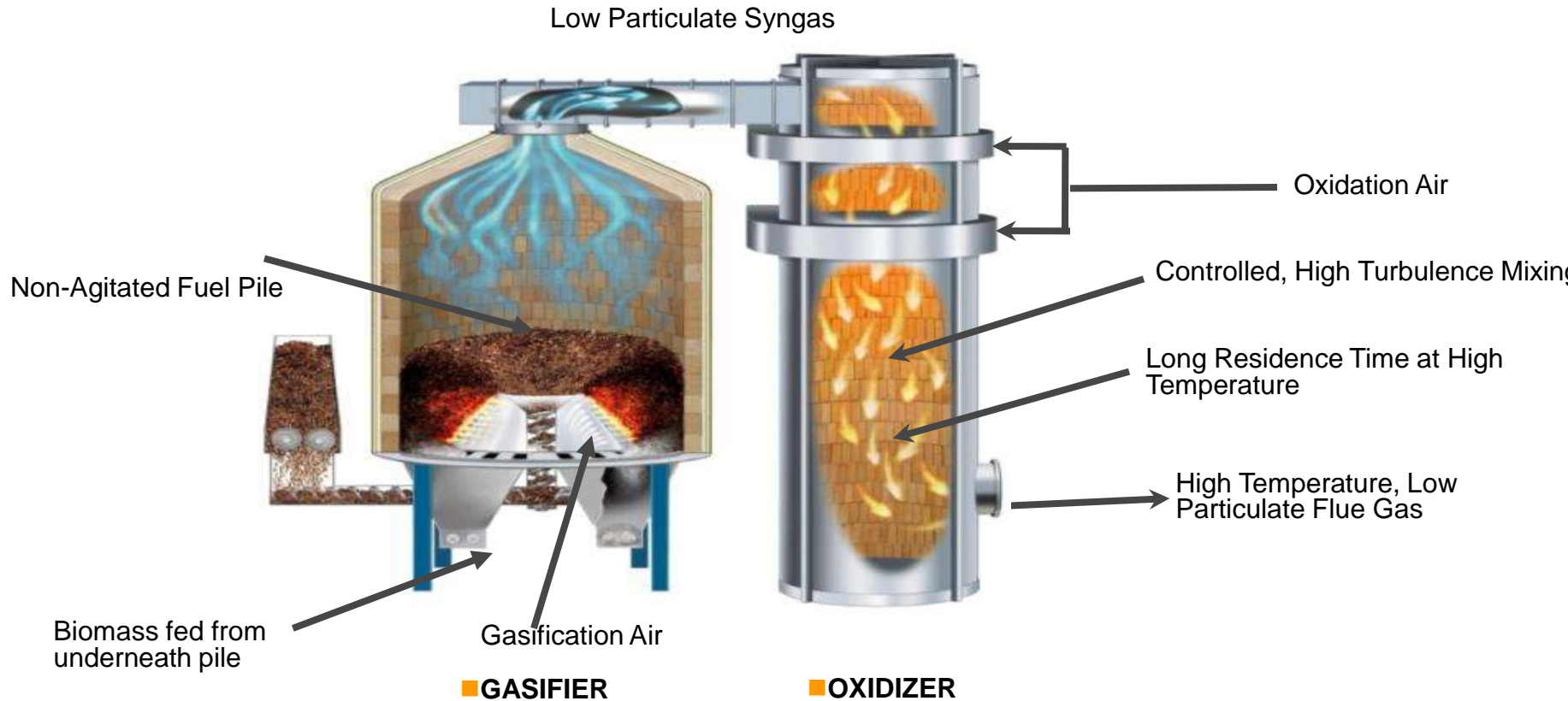


■ VA Battle Creek – Battle Creek, MI

- 2 MWe and 4.4 MWth for heat and power
- 1 – 20 ft gasifier – 60 dtpd fuel input
- GHG Reduction: 14,000 tonnes/yr



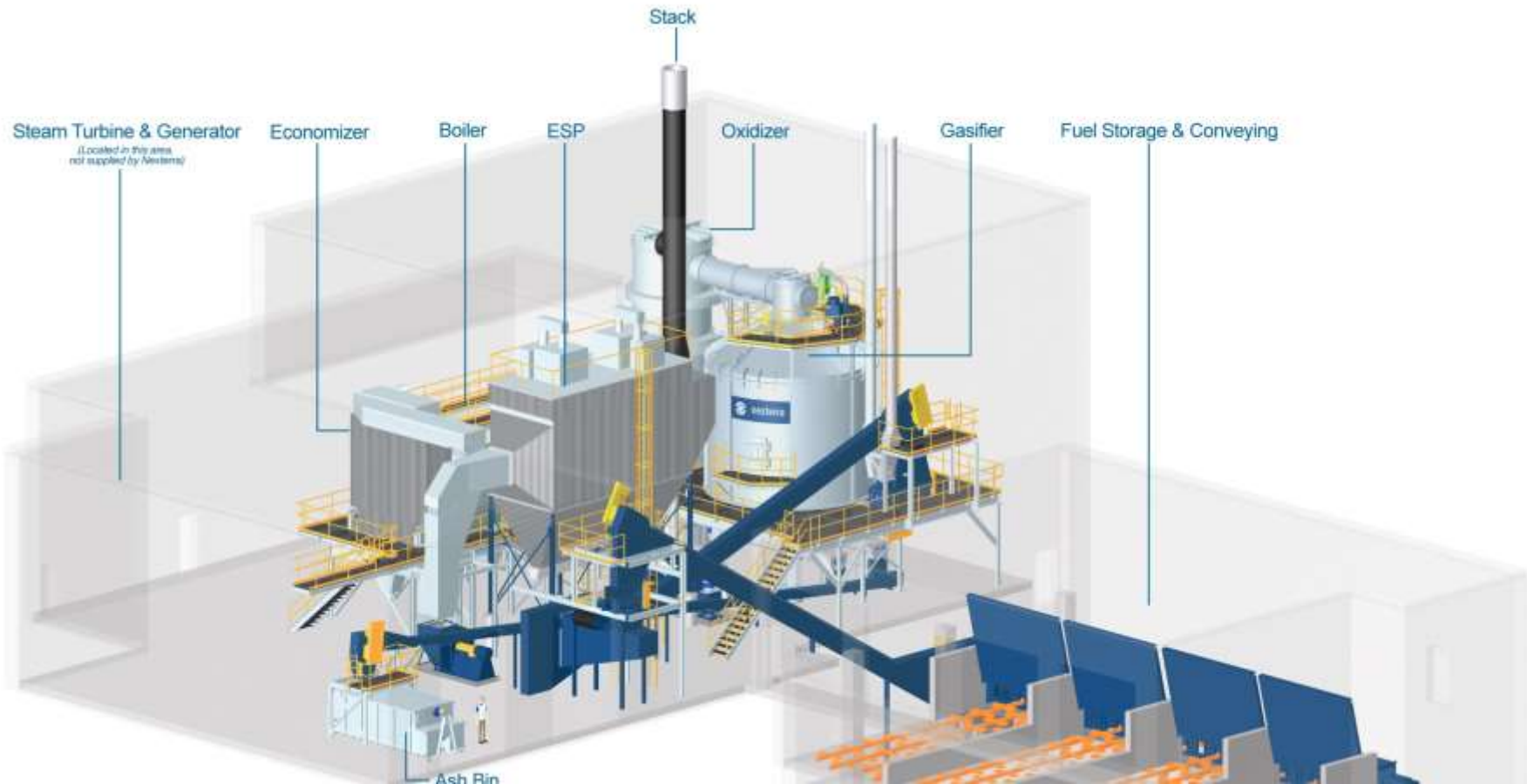
Gasification Process Overview



Standard System Configuration



Nexterra Solution for VA Battle Creek



Advantages of Gasification

- Simplicity
- Low emissions
- Fuel flexibility
- Attach heat recovery units based on project demand

Fuel Storage and Handling



- 3 days storage
- Truck tipping system
- Live bottom rakes
- Disc screen and magnet

Gasifier



- 20 ft internal diameter
- 35 MMBtu/hr net output
- 75 – 140 wet tonnes per day

Heat Recovery Steam Generator



- 24,000 lb/hr super heated steam
- 600 psig/740 deg F
- Seven soot blowers

Emission Controls



- Electrostatic precipitator
- Electric charge captures particles
- Emissions similar to natural gas boilers

Lessons Learned

- Partner with experienced parties
- Contract should provide for expenses associated with delay
- Make sure commissioning expectations are detailed in contract

Lessons Learned

- Validate standards prior to contracting
- For technologically complex projects, Schematic Design level may not be sufficient for pricing.
- Design-build does not always equate to faster delivery

QUESTIONS?



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