



Gasification Technologies Conference

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Washington D.C.

Emery's Pilot Gasifier Project for PRB Coal and Biomass Testing

Presented by:
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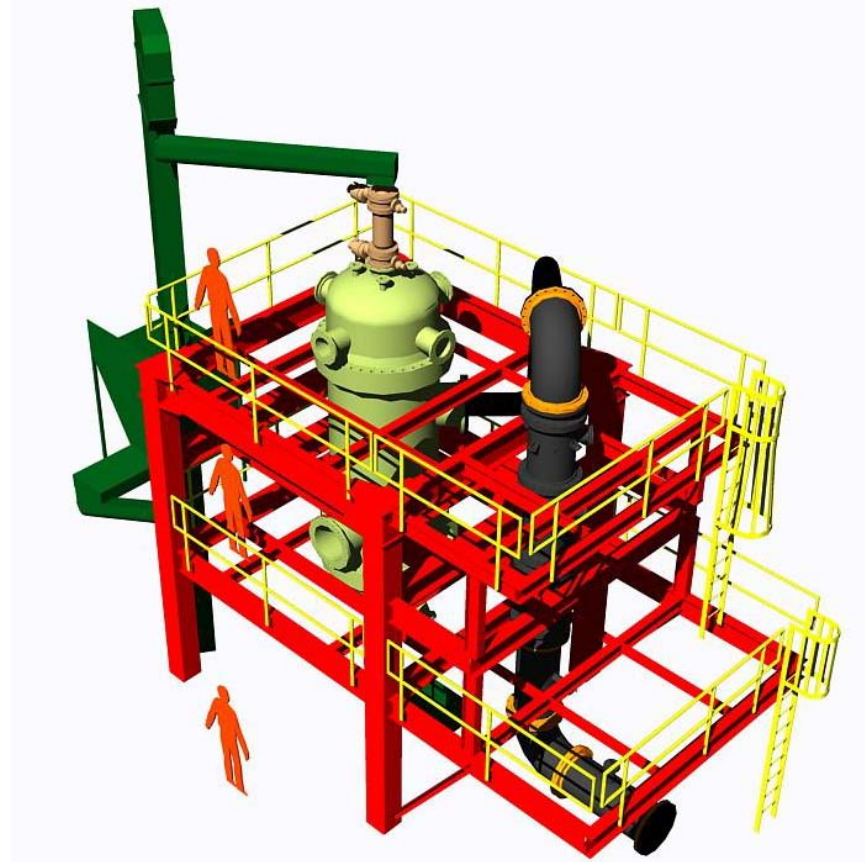
Project Overview

Emery was funded simultaneously by both the **Wyoming Clean Coal Technology Program** (for PRB Coal Gasification testing)

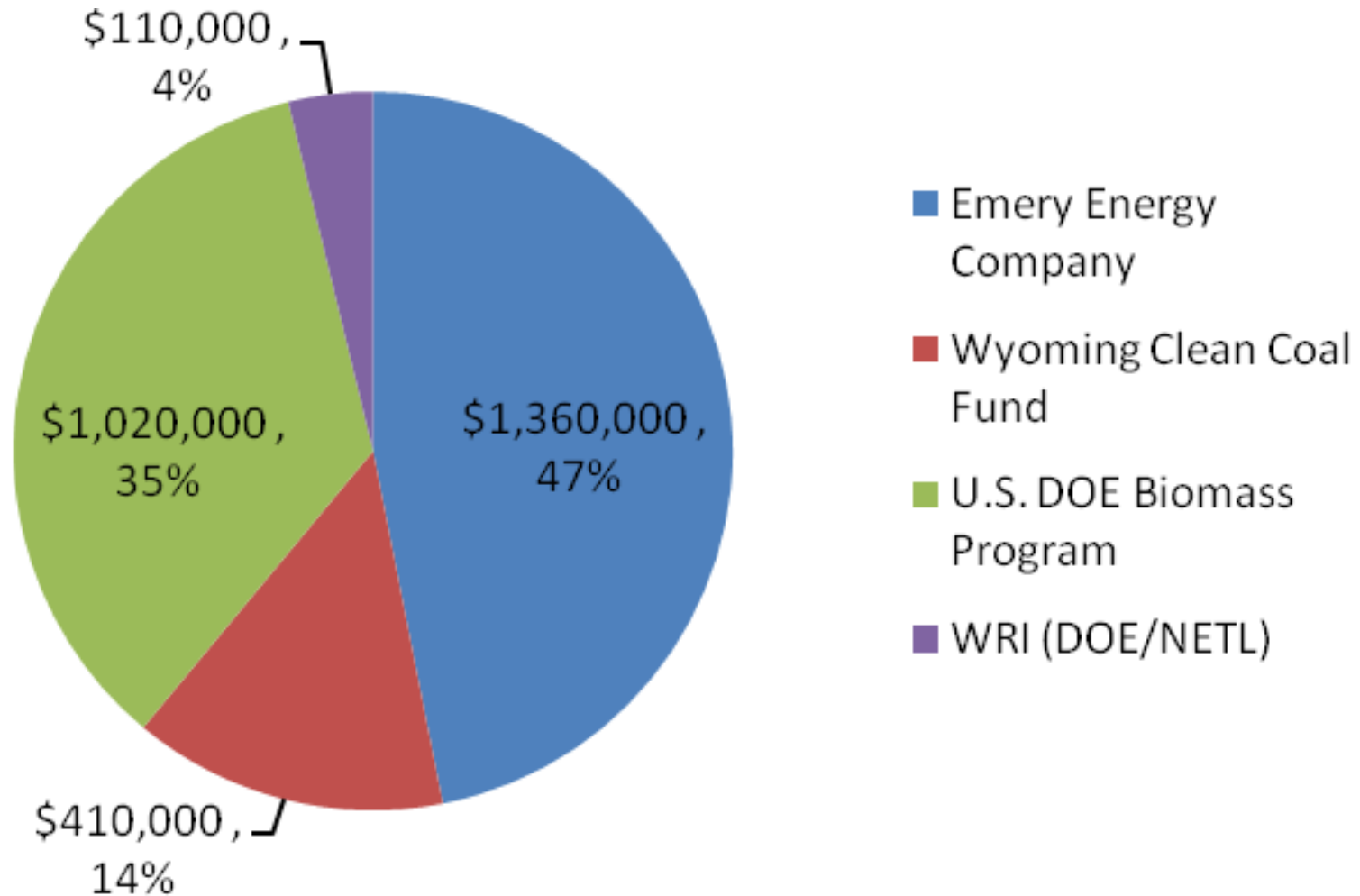
and

the **U.S. DOE Biomass** program (for Biomass Gasification, Syngas Cleaning and Liquid Fuels production).

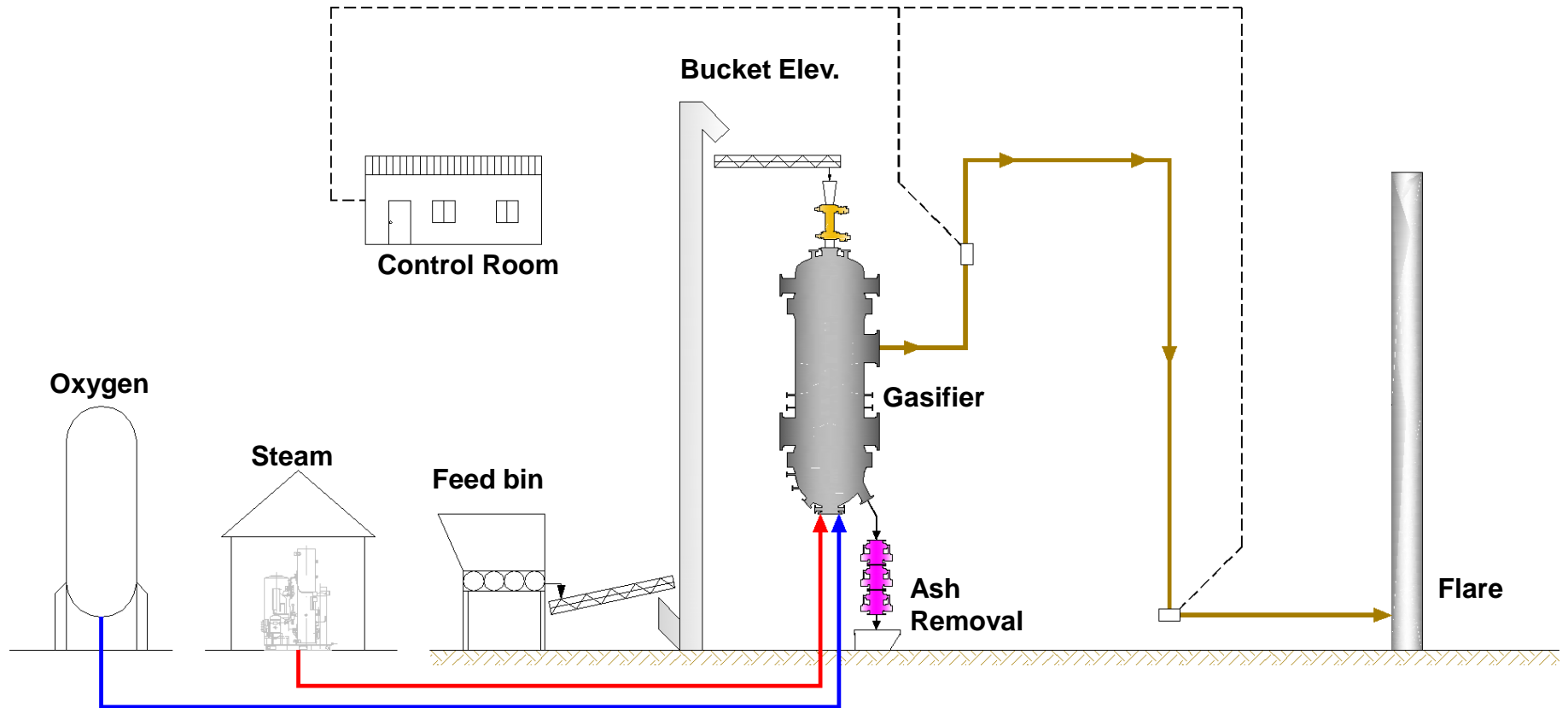
Project is located at the Advanced Technology Center of Western Research Institute in Laramie, WY.



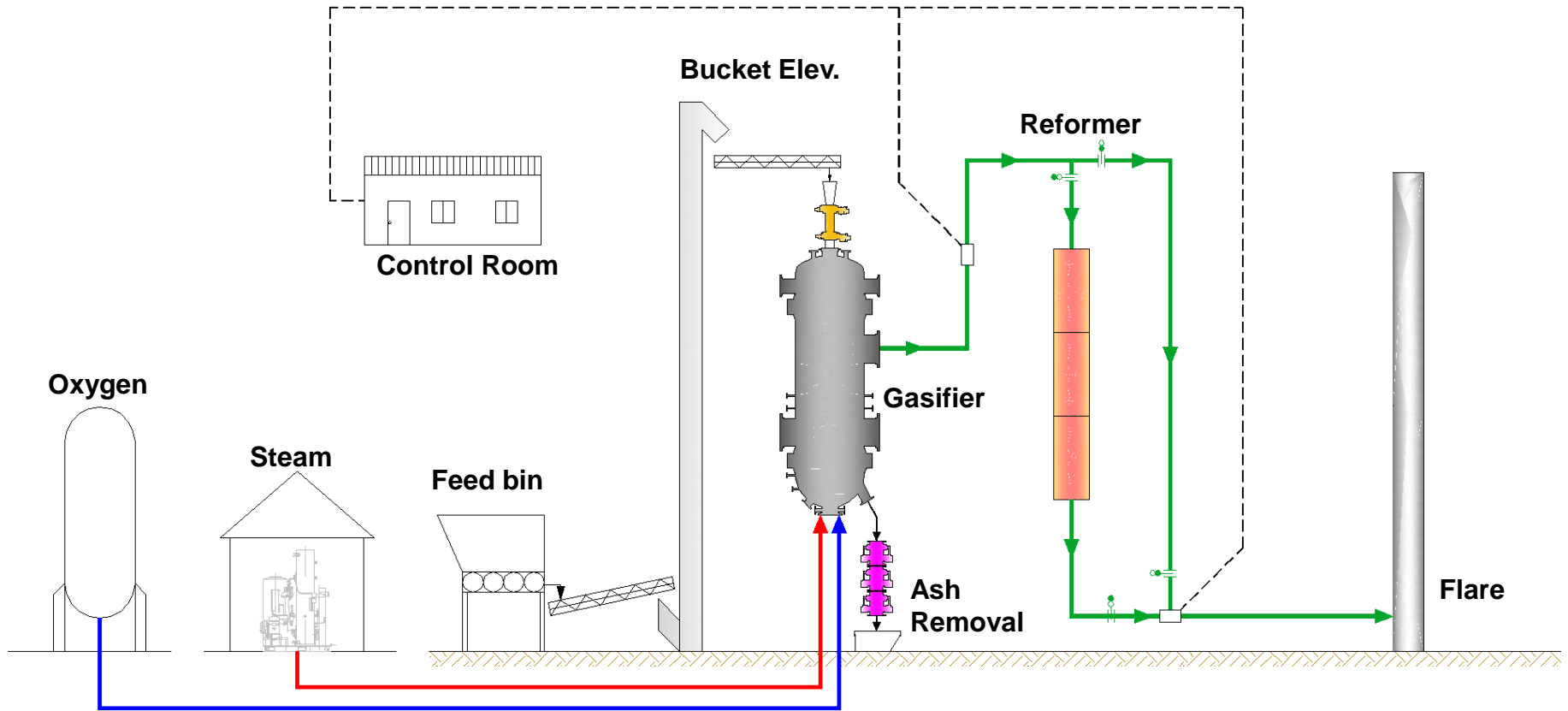
Project Funding To-Date



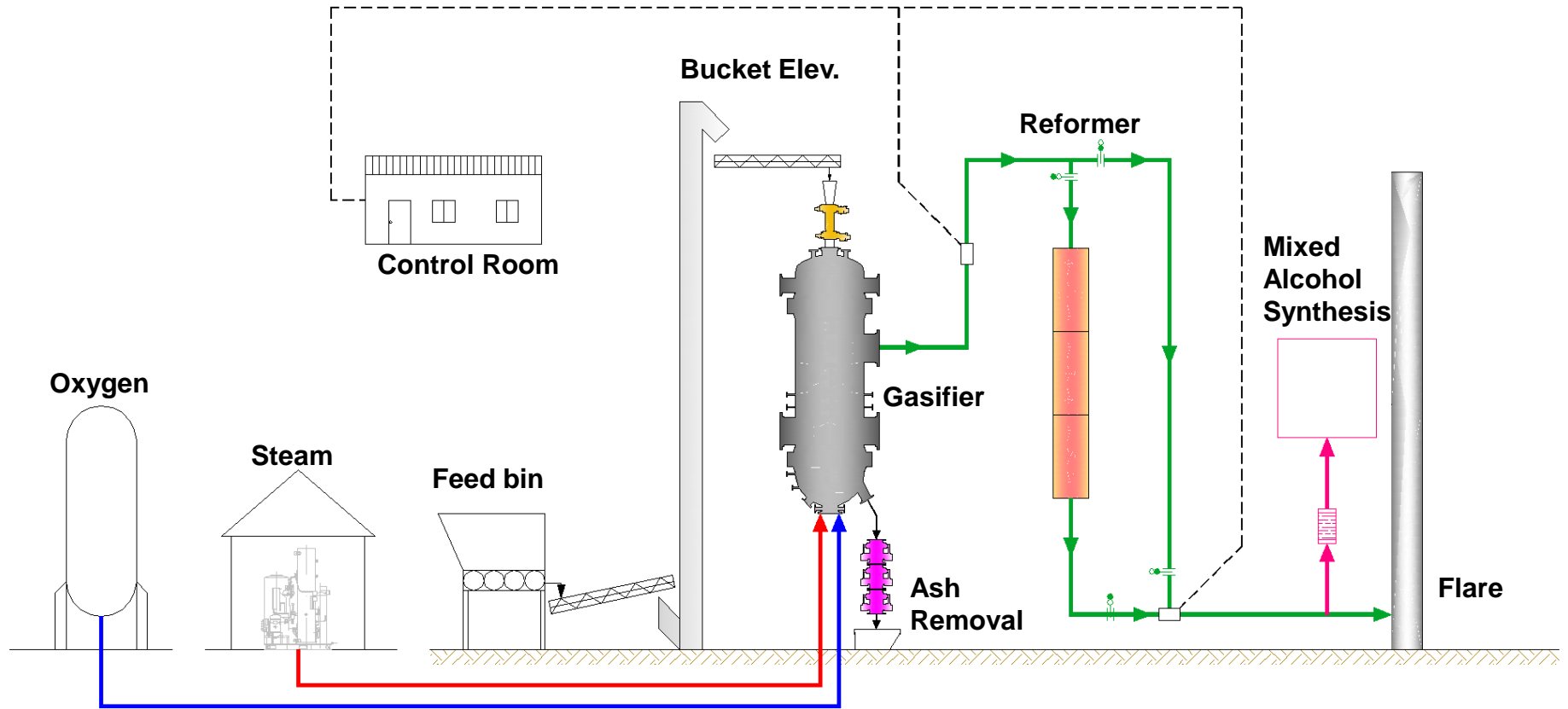
Simplified Process Flow



Tar Reforming & Guard Bed



Mixed-Alcohol Synthesis



PRB Coal Testing

Funding provided by:



State of Wyoming
Clean Coal Fund



Western Research Inst.
(DOE / NETL)

Phase I Test objectives:

- 1) Demonstrate lump coal gasification (~25 mm particles) and dry ash removal
- 2) Achieve steady-state gasifier conditions
- 3) Demonstrate low tar content in raw gas (1 to 2 g/NM³)
- 4) Achieve 400 hours of total testing

Phase II Test objectives:

- 1) 1200 hours operations
- 2) Co-feeding woody biomass
- 3) Potential co-feeding of coal fines
- 4) Use results in ASPEN Plus Simulations to predict scaled up commercial plant configurations for power, fuels and chemicals for PRB Coals

Wood Biomass Testing

Funding provided by:



U.S. Dept. of Energy / EERE
(Biomass Program)

Phase I Test objectives:

- 1) Demonstrate woody biomass gasification
- 2) Achieve steady-state gasifier conditions
- 3) Demonstrate low tar content in raw gas (1 to 2 g/NM³)
- 4) Demonstrate ultra-low tar (<0.05g/NM³) content in clean gas (ahead of catalysis unit)
- 5) Obtain Heat/Mass balance data
- 6) Obtain trended syngas composition pre and post reformer
- 7) Accrue ~400 hours of testing

Phase II Test objectives:

- 1) Send slip stream of syngas to Mixed-Alcohols reactor (Western Research)
- 2) Accrue >500 hours of operation and simultaneous fuels production
- 3) Analyze catalyst degradation, selectivity and yield from Mixed-Alcohols reactor system

Pilot Gasifier Configuration

- 10 tpd
- 125 psig (ASME code pressure vessel), planned operations at ~20 psig
- 5' Outside Diameter (3.5' effective I.D.)
- Dry Ash removal w/ flanged bottom for optional slagging configuration in future



Plant Construction



Plant Construction



Plant Construction



Project Status

- 90 % Mechanically Complete
- Plant Commissioning Expected Q1 2011
- PRB Coal Testing followed by Wood
- Complete contractual testing for DOE Biomass Program and State of Wyoming Clean Coal program by mid-2012.



Planned Future Activities

Seeking funding for additional test activities including:

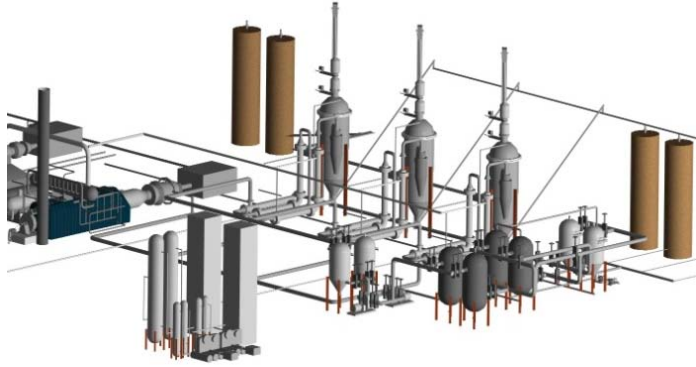
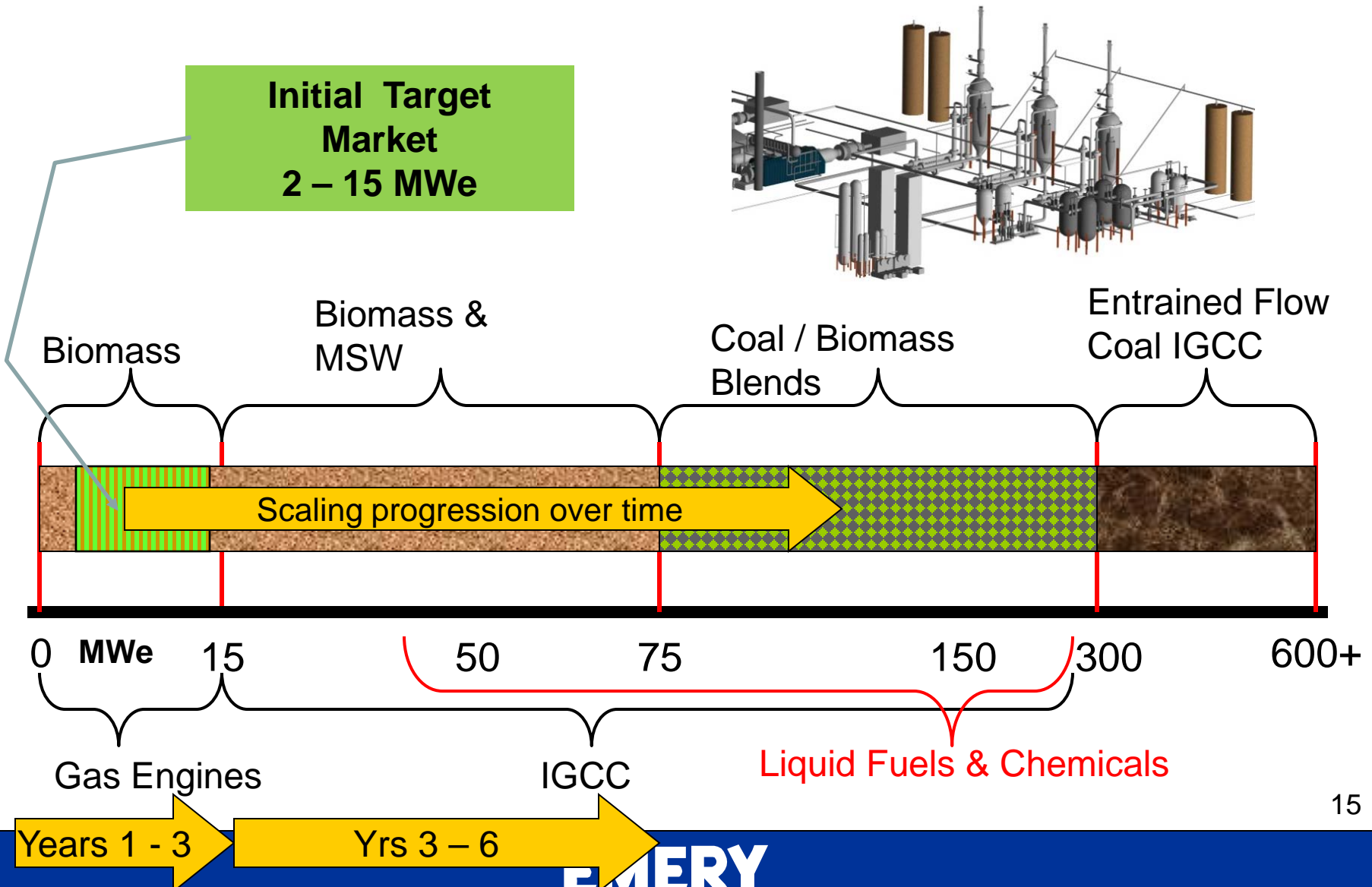
- Lignite gasification tests
- Various coal/biomass blend tests
- Biomass torrefaction
- Coal drying / upgrading
(Lignite & Sub-bituminous)

Emery is seeking strategic partners and technology licensees to support future testing for various *'fields of use'* including:

- biomass/waste > biofuels (alcohols, FT Diesel, etc.)
- low-rank coals > IGCC
- low-rank coals > urea/ammonia



Technology Scale Up & Commercialization



Commercial Activities / Biomass

Radian BioEnergy, is our newly created d.b.a. for commercial sales of biomass power systems



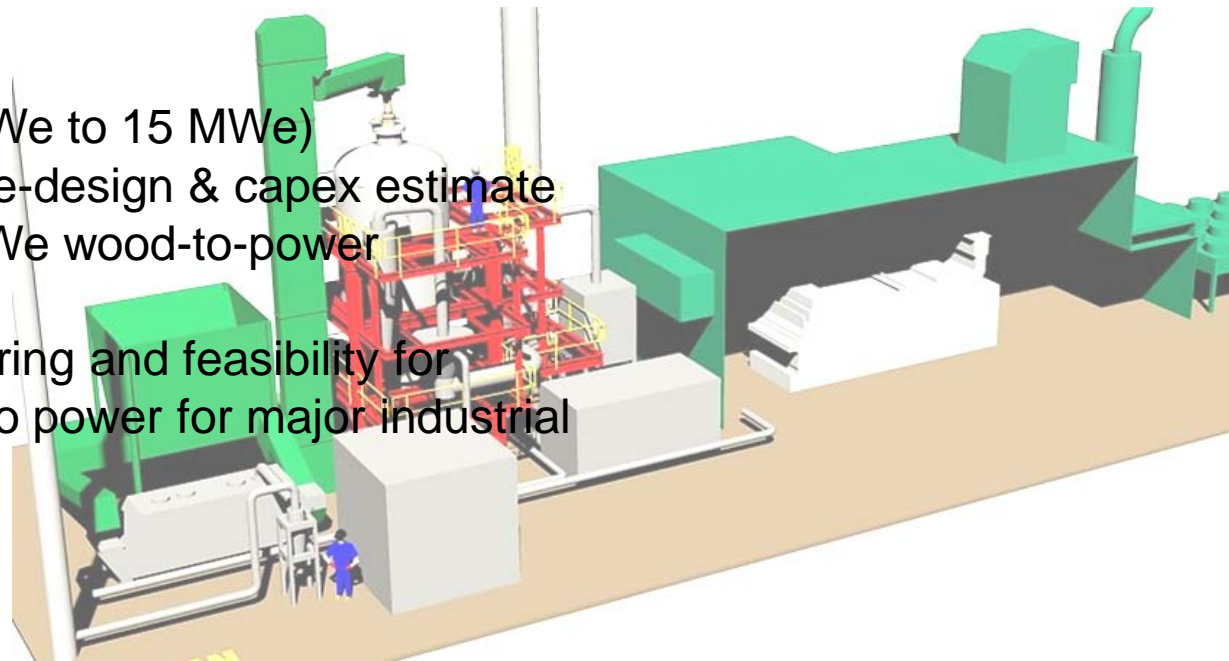
Small Modular Power (200 kWe to 800 kWe)

- ❖ Modular / skidded systems for distributed power applications

Industrial Power (1 MWe to 15 MWe)

- ❖ Recently completed pre-design & capex estimate for XCEL Energy for 2 MWe wood-to-power

- ❖ Actively in pre-engineering and feasibility for 10 MWe biomass/waste to power for major industrial client in California



Thank you! / Contact Information



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