
Customizing Syngas Specifications with E-Gas™ Technology Gasifier

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Outline



- E-Gas™ Gasifier Features
- Multi Fuel, Multi Products Gasification Technology
- Major Reactions In the E-Gas™ Gasifier
- E-Gas™ Operations Customized to the Application
- Gasifier Operational Control
- Summary

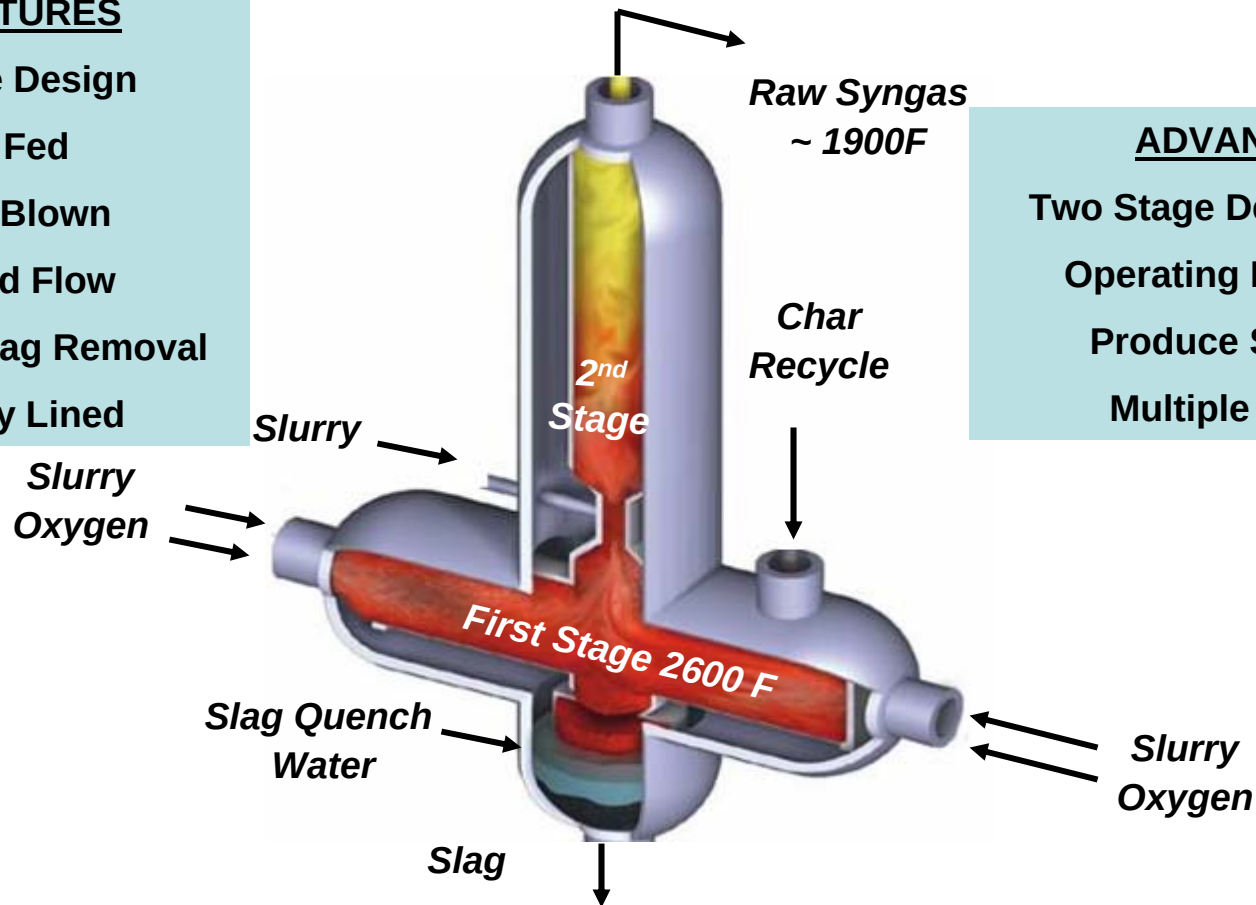
E-Gas™ Gasifier

KEY FEATURES

- Two Stage Design
- Slurry Fed
- Oxygen Blown
- Entrained Flow
- Continuous Slag Removal
- Refractory Lined

ADVANTAGES

- Two Stage Design Enables Operating Flexibility to Produce Syngas for Multiple Products

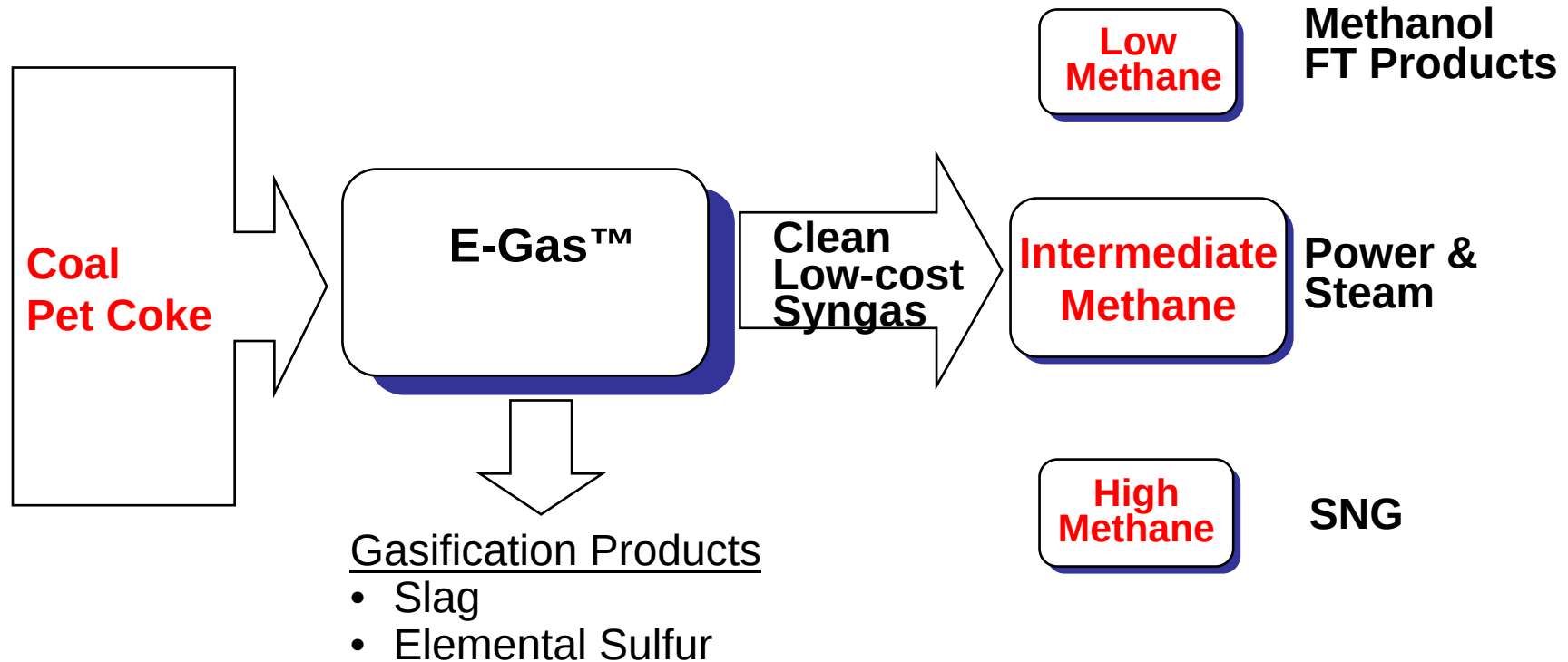


E-Gas™ two stage gasifier for carbon conversion and heat recovery

E-Gas™ Multi-Fuel, Multi-Product Gasification Technology

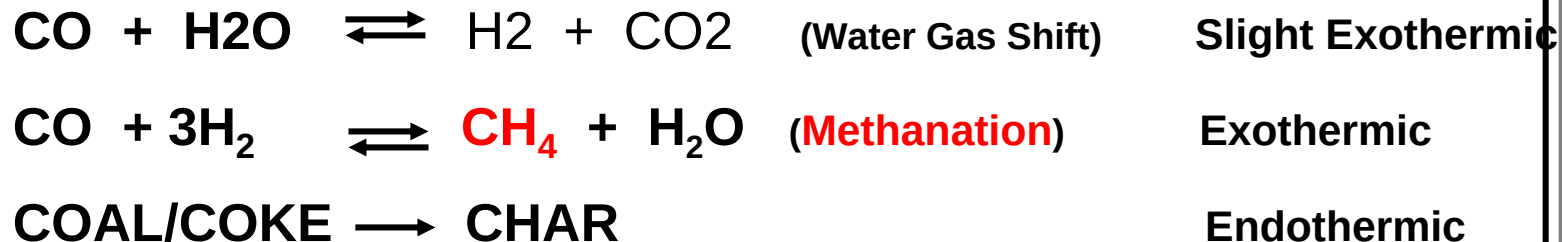
Feedstock Options

Product Options



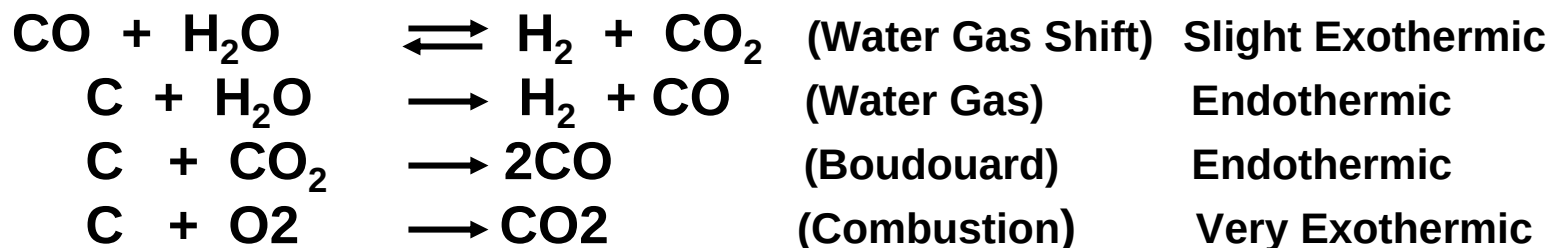
Major Reactions In the E-Gas™ Gasifier

**2nd
Stage**



Hot Gas To Be Quenched

**1st
Stage**



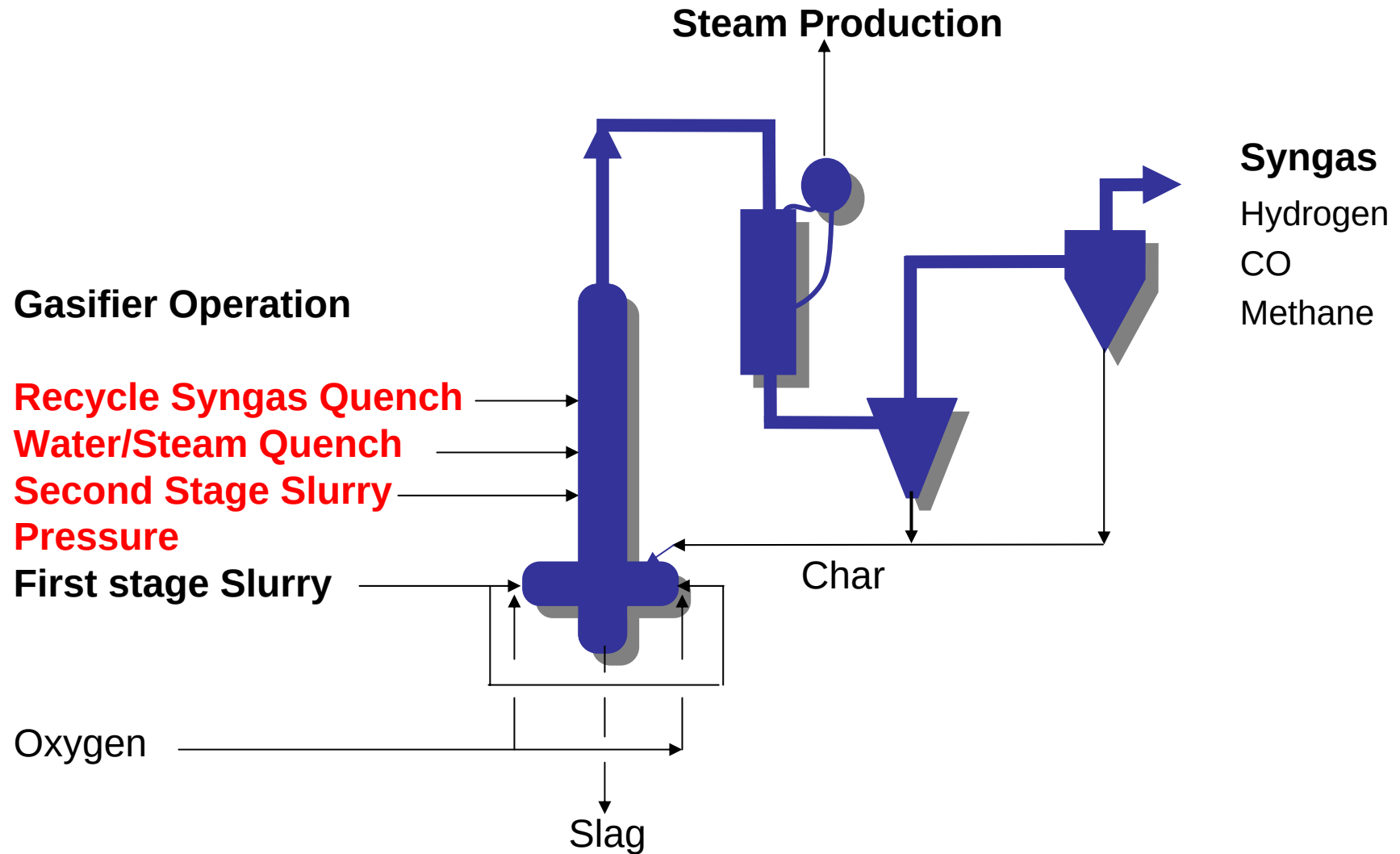
Other Constituents are: H_2S , COS , NH_3 , HCN , N_2 , Ar, Slag

E-Gas™ Operations Customized to the Application

- 2nd Stage Temperature Control
 - ❑ Quench hot gas from 1st Stage in the 2nd Stage
 - ❑ Thermal heat from 1st Stage converted to chemical energy

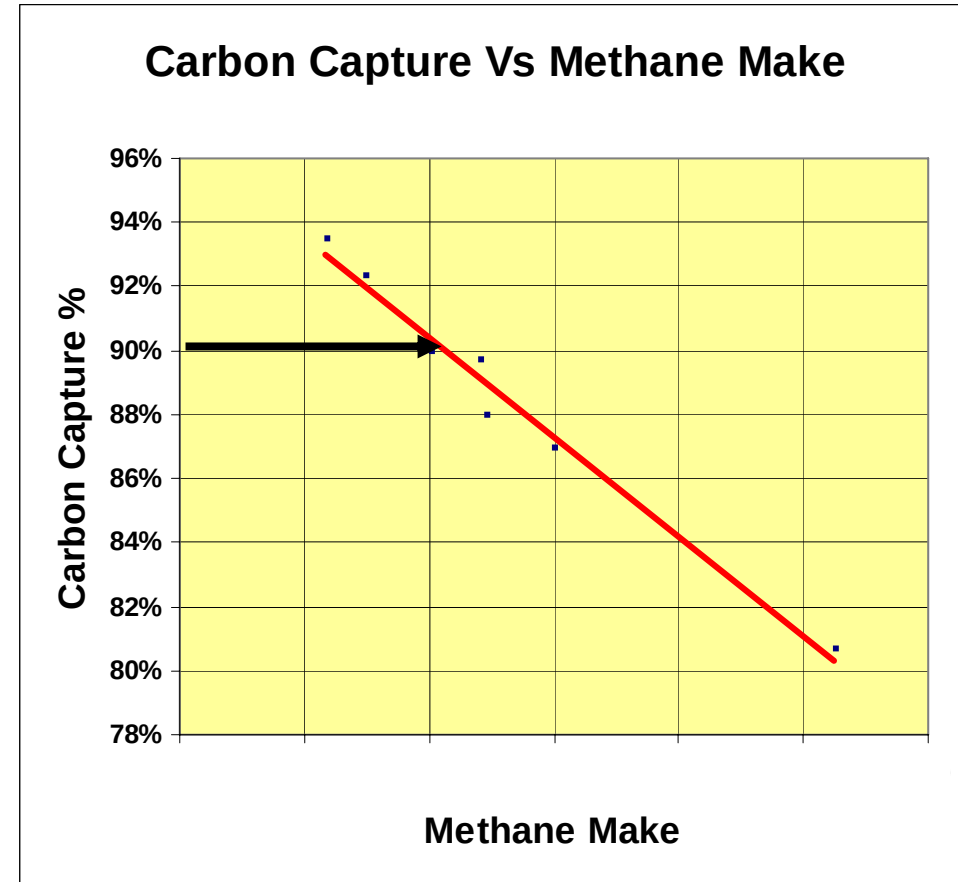
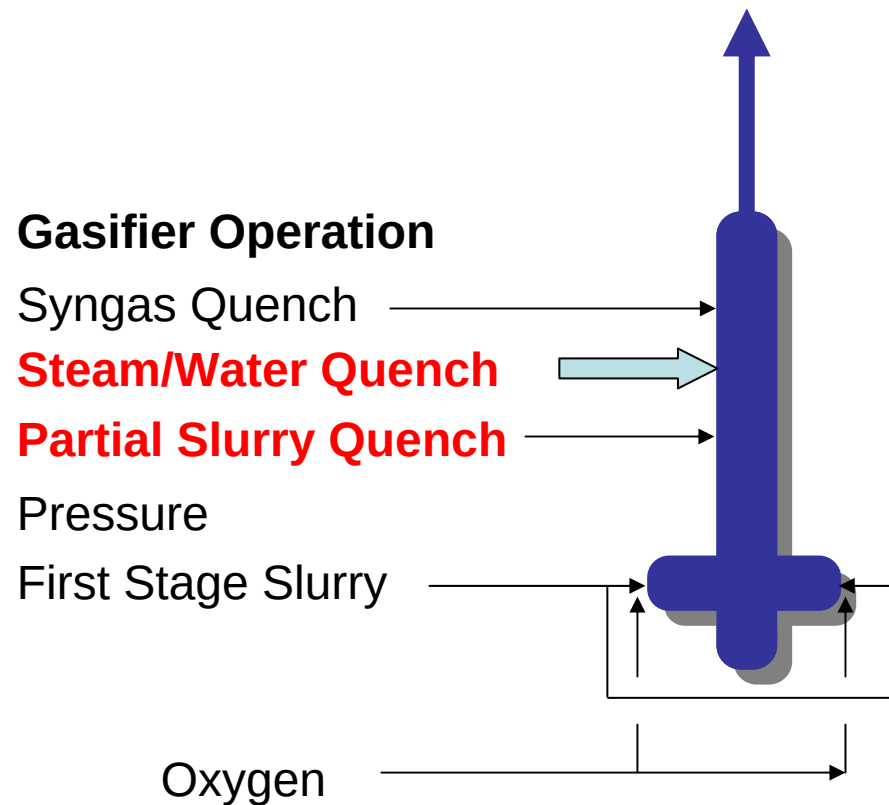
- Options
 1. Add cooled recycle gas to the 2nd Stage
 2. Add quench water to the 2nd Stage
 3. Add quench steam to the 2nd Stage
 4. Partial or full slurry quench to the 2nd stage
 5. Adjust gasifier operating pressure

Gasifier Operational Control



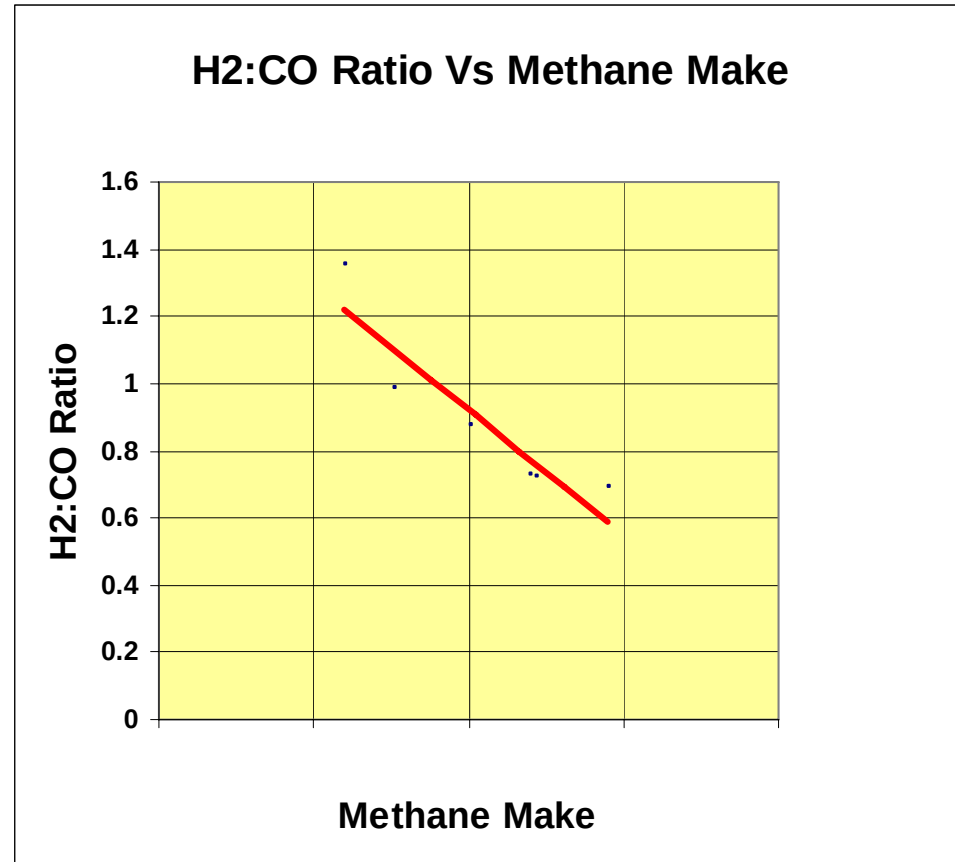
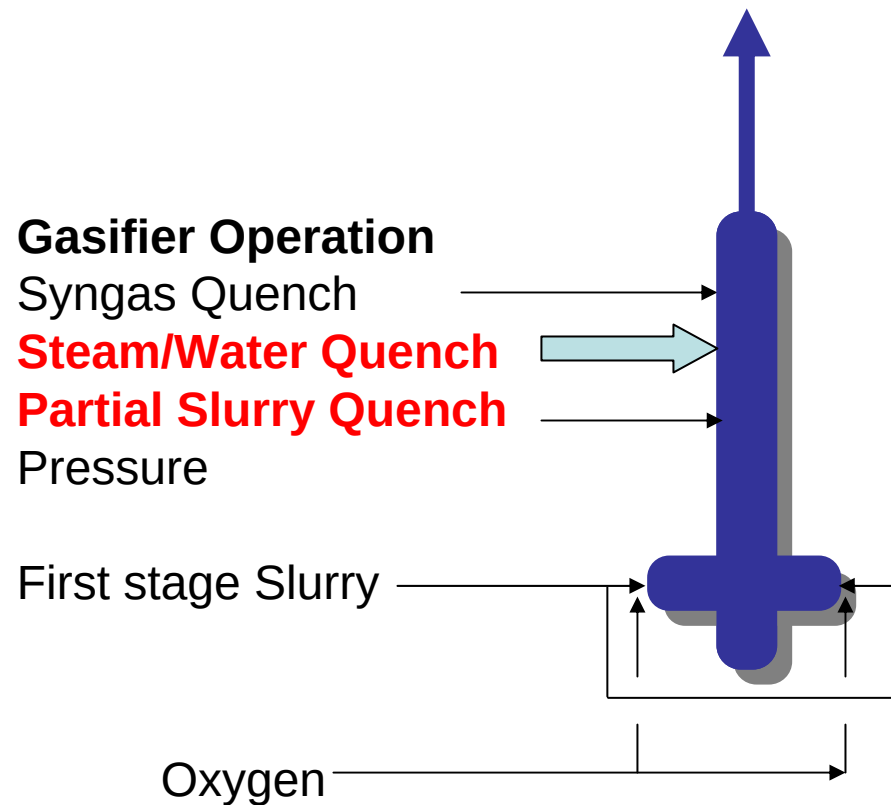
IGCC Application with Maximum Carbon Capture

(Add Just Enough Steam/Water to meet Carbon Capture Requirement)



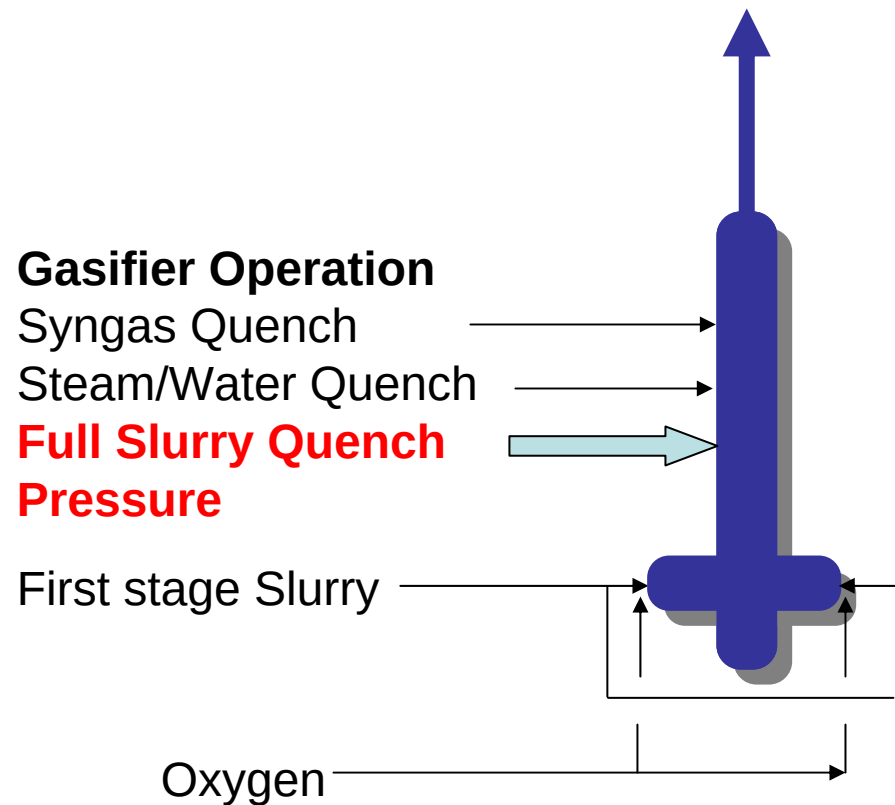
Chemical And FT Applications

(Add More Steam/Water to drive WGS to Increase H₂:CO Ratio)



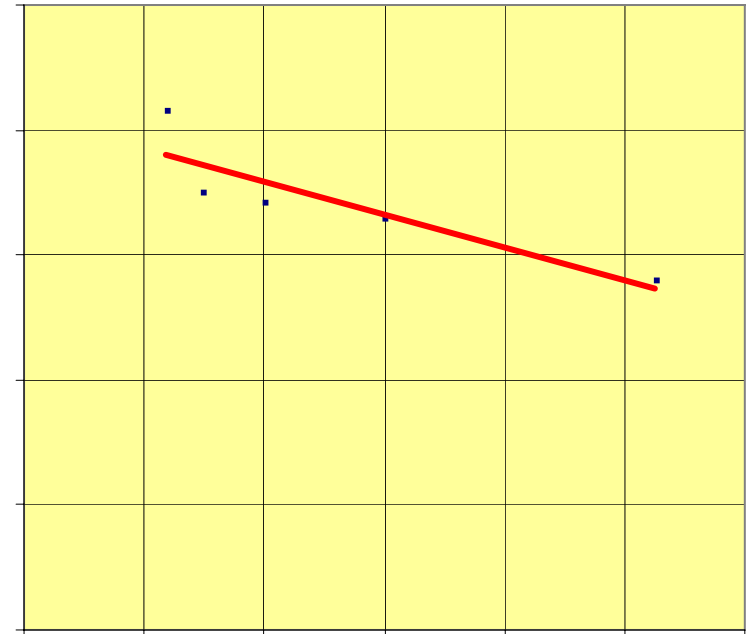
SNG Application

CH₄ Range: 2%-7%

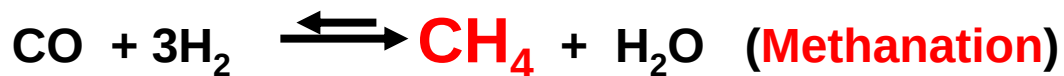


(H₂ + CO) Vs. Methane Make

H₂ + CO



Methane Make



Very Exothermic

SUMMARY

1. E-Gas™ gasifier operating flexibility

- E-Gas™ two-stage gasifier is more flexible than single stage
- 2nd stage allows customization to match the syngas application

2. E-Gas™ gasifier performance

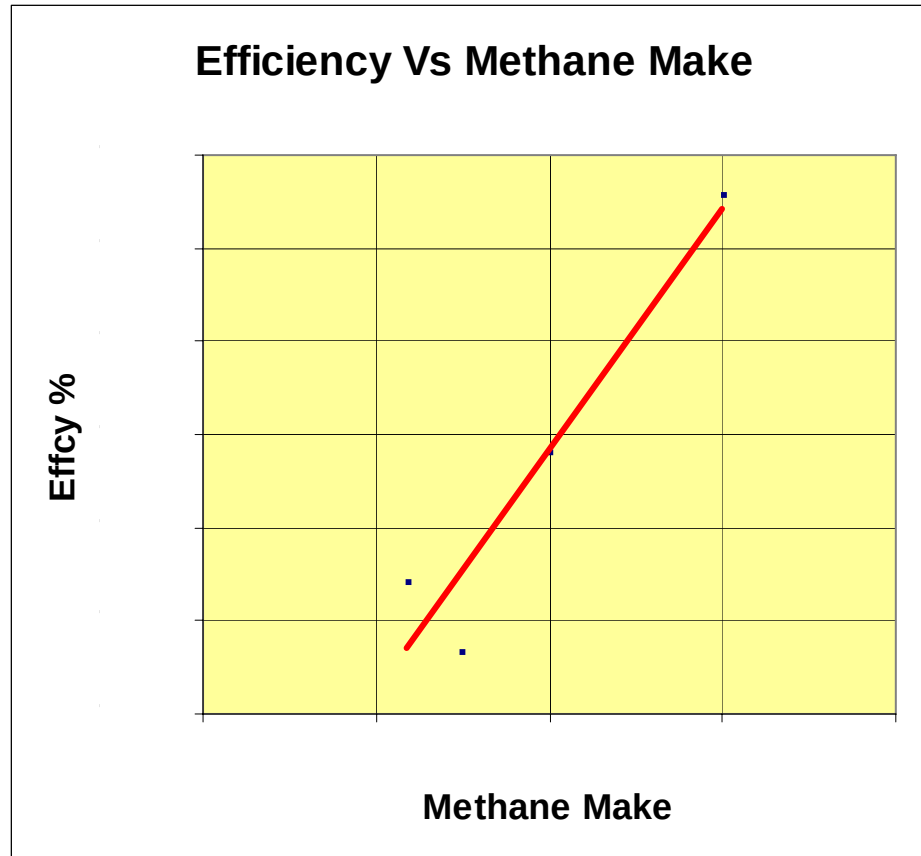
- Exceed 90% carbon capture
- Control H₂/CO ratio for CTL plants
- Increase CH₄ production in gasifier for SNG plants

3. E-Gas™ process performance modeling

- Independent study evaluations are typically incorrect
- E-Gas™ process proprietary empirical model required to accurately predict performance

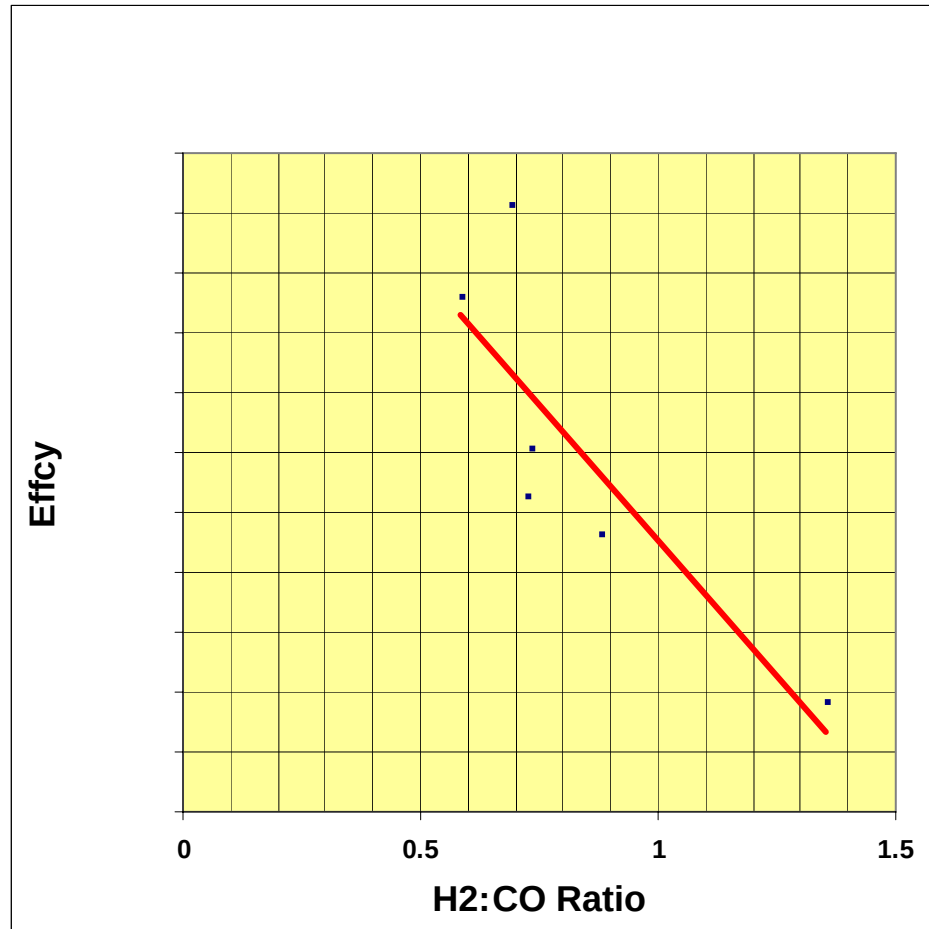
Back Up Slides

Cold Gas Efficiency Varies With Methanation

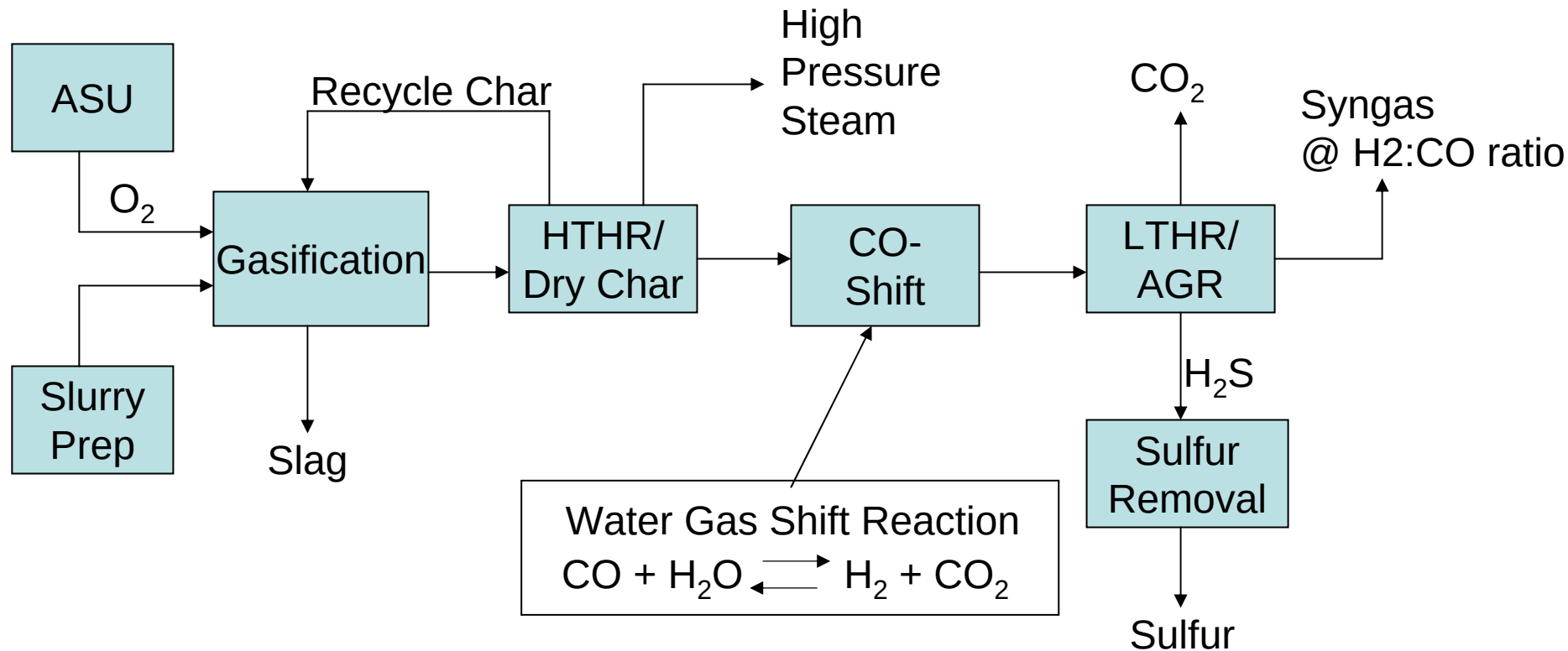


Cold Gas Efficiency Varies With H₂:CO Ratio

Cold Gas Effcy Vs H2:CO Ratio



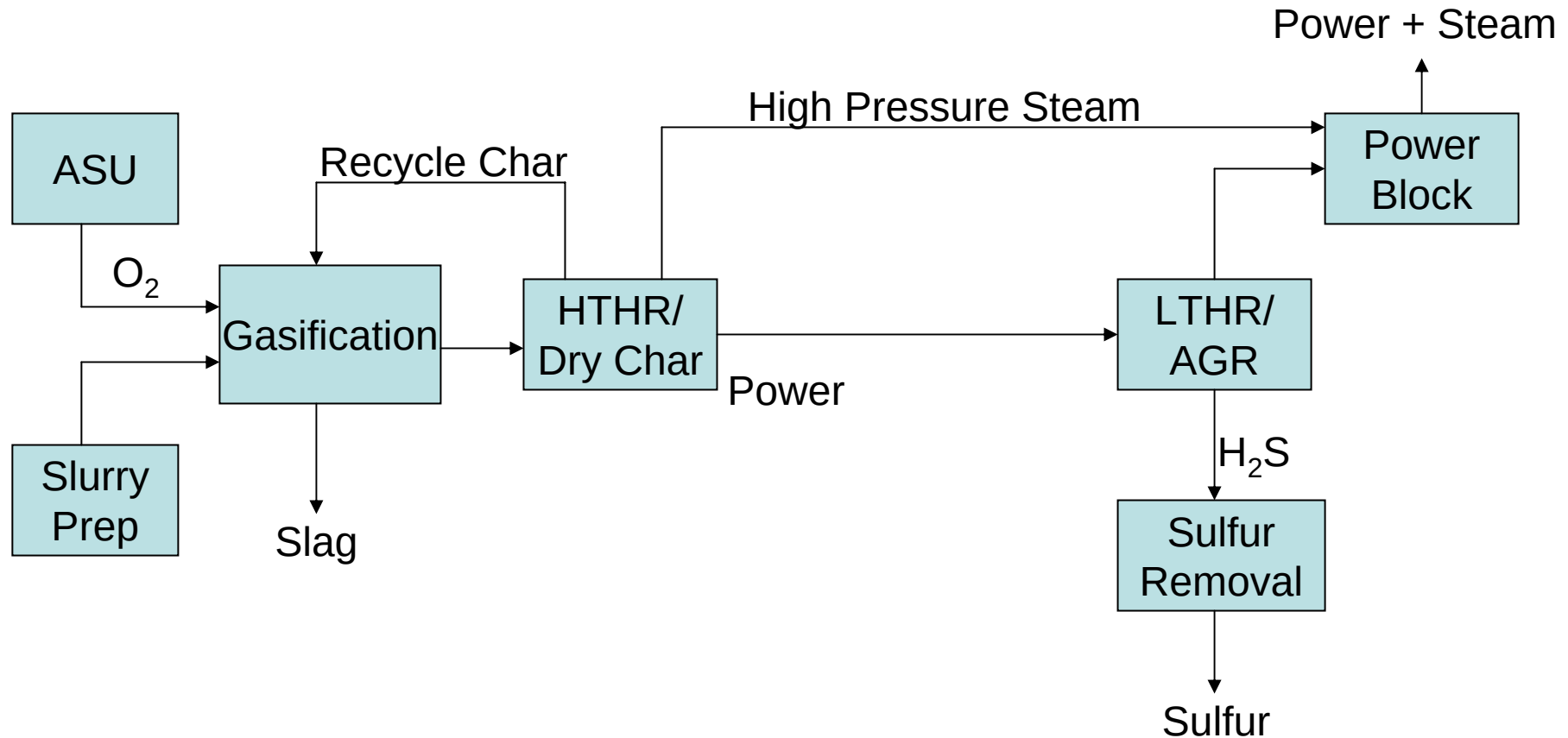
Syngas – For Chemicals Feedstock



HTHR: High Temp Heat Recovery

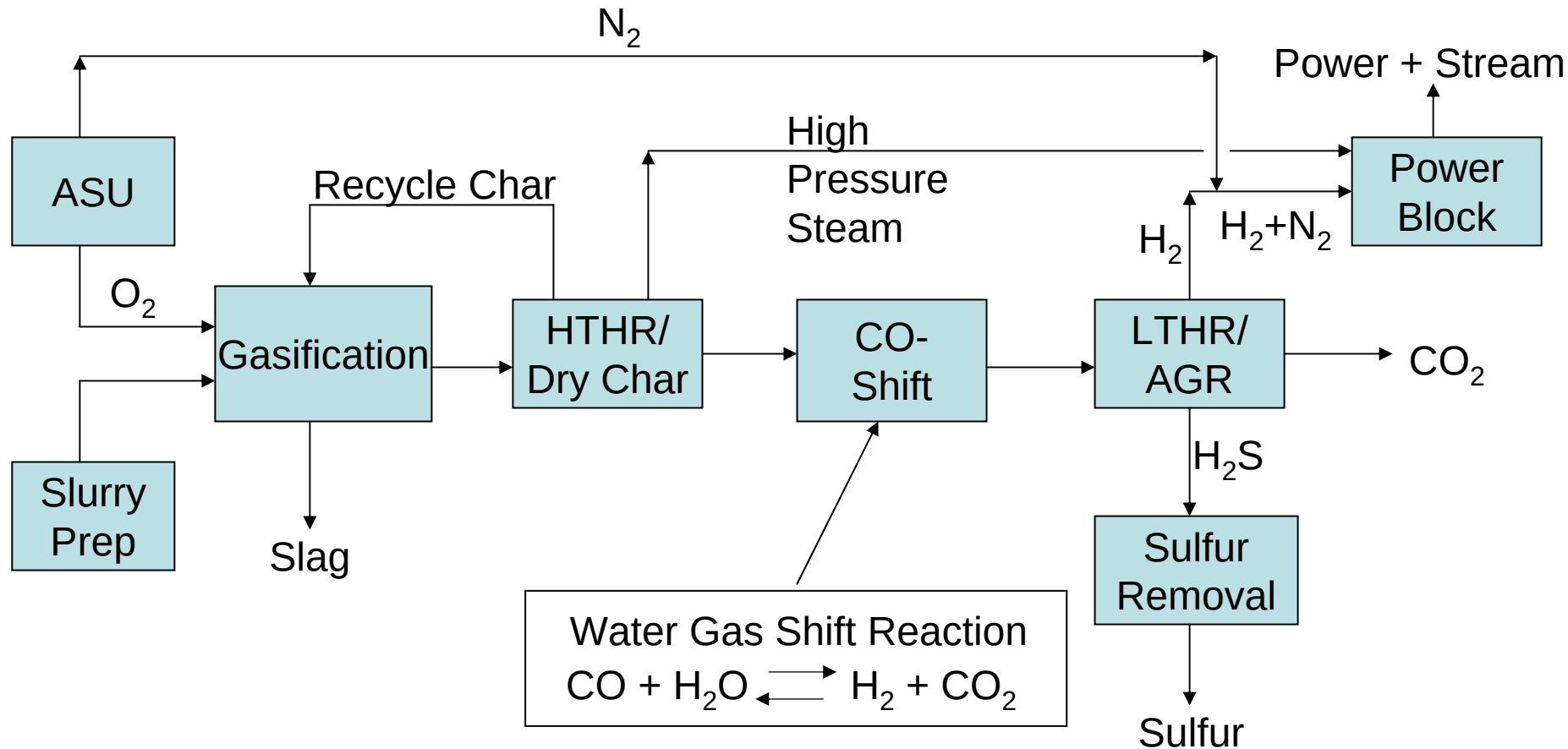
LTHR: Low Temp Heat Recovery

Syngas for IGCC – Without Carbon Capture



HTHR: High Temp Heat Recovery
LTGR: Low Temp Heat Recovery

Syngas for IGCC With Maximum Carbon Capture



HTHR: High Temp Heat Recovery
LTGR: Low Temp Heat Recovery

Syngas for Substitute Natural Gas (SNG)

