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The Case for a National Emphasis on Biomass Gasification Technology



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Definitions

- ***Gasification***: The conversion of low cost solids or liquids into clean burning gases for augmentation/replacement of fossil fuels.
- ***Combined Cycle***: The use of gaseous fuel in a gas turbine followed by the production of steam, which is subsequently used in a steam turbine such that both turbines produce electric power.
- ***BGCC***: Biomass gasification combined cycle
- ***BLGCC***: Black liquor gasification combined cycle
- ***Agenda 2020***: Forest Products Industry Technology Roadmaps

Focus on Six Technology Platforms

- Positively impacting the Environment
 - Significant reduction in GHG
 - Decreased Ecological Footprint
- Advancing the Forest Bio-refinery
 - Sustainable Forest Productivity
 - Extracting Value prior to Pulping
 - New Value from Residuals & Spent Liquors
- Technologically Advanced Workforce
 - From Workforce to Knowledge Workers in 7 years

Focus on Six Technology Platforms

- Breakthrough Mfg. Technologies
 - Major Manufacturing Cost/Capital Reductions
 - Significant Enhancement in Products Properties
 - Substantial Improvement in Energy Efficiency for Existing Processes
- Next Generation Fiber Recycling and Utilization
 - Recycled Fiber Indistinguishable from Virgin Fiber
- Advancing the Wood Products Revolution
 - Improved Building Systems
 - Reduced System Costs

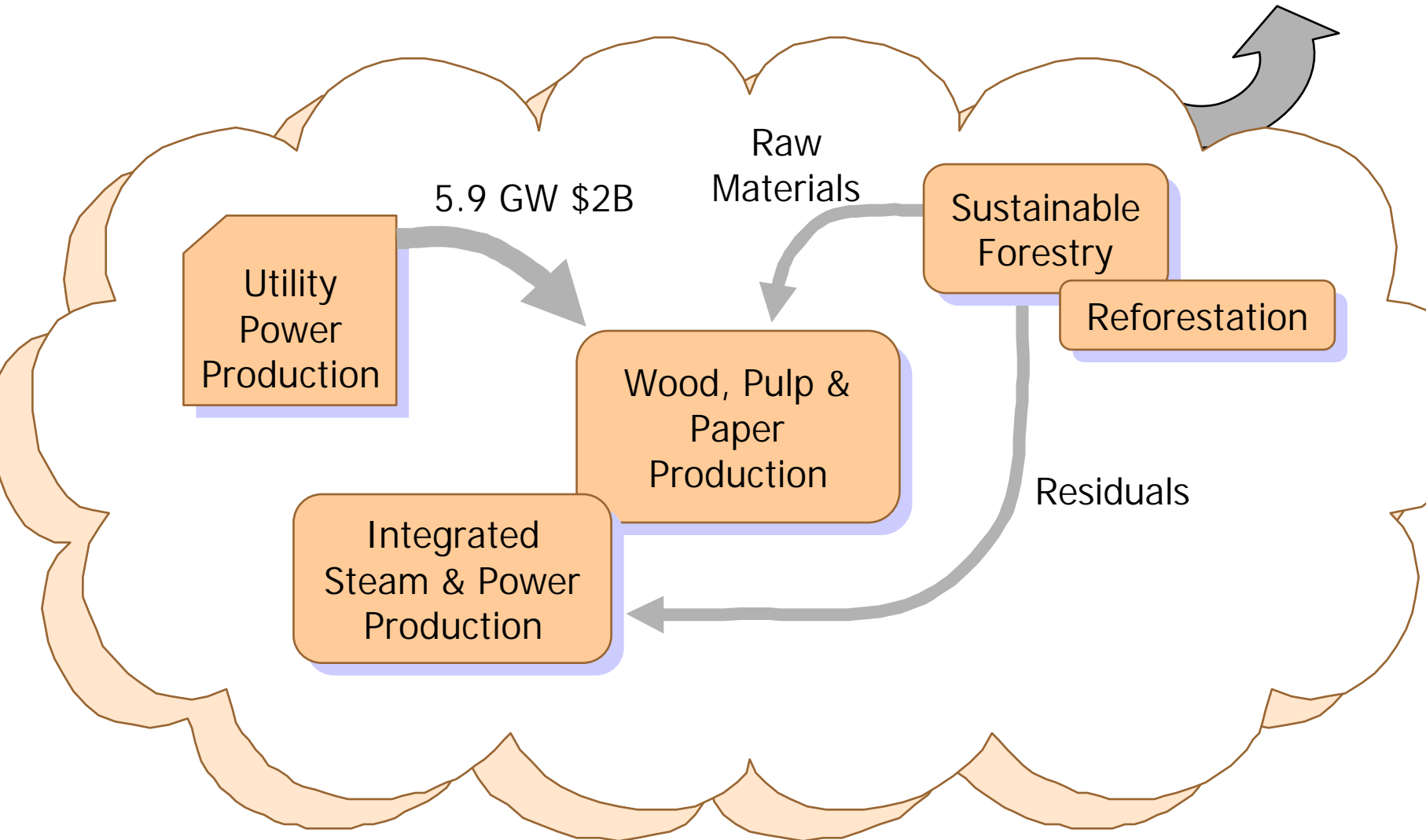
Partnership for the Forest Biorefinery

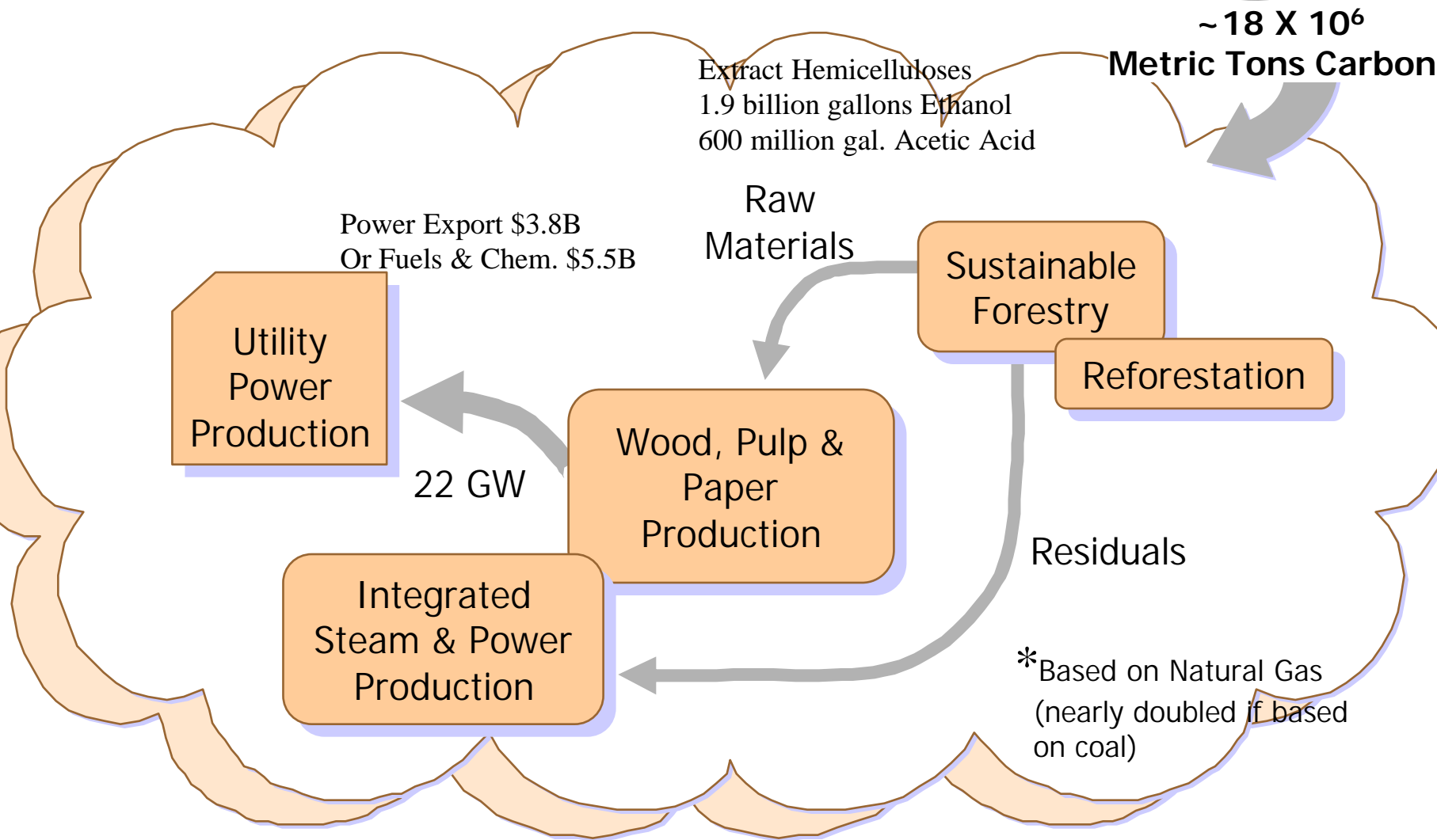
- Industry
 - International Paper
 - Weyerhaeuser
 - Georgia Pacific
 - Shell
 - Conoco-Phillips
 - Air Liquide
 - Eastman Chemicals
- Association
 - American Forest and Paper Association
- Universities/National laboratories
 - Maine
 - Institute for Paper Science and Technology
 - Auburn
 - Utah
 - National Renewable Energy Lab

Forest, Wood & Paper Industry Cycle

Today's Powerhouse Technology

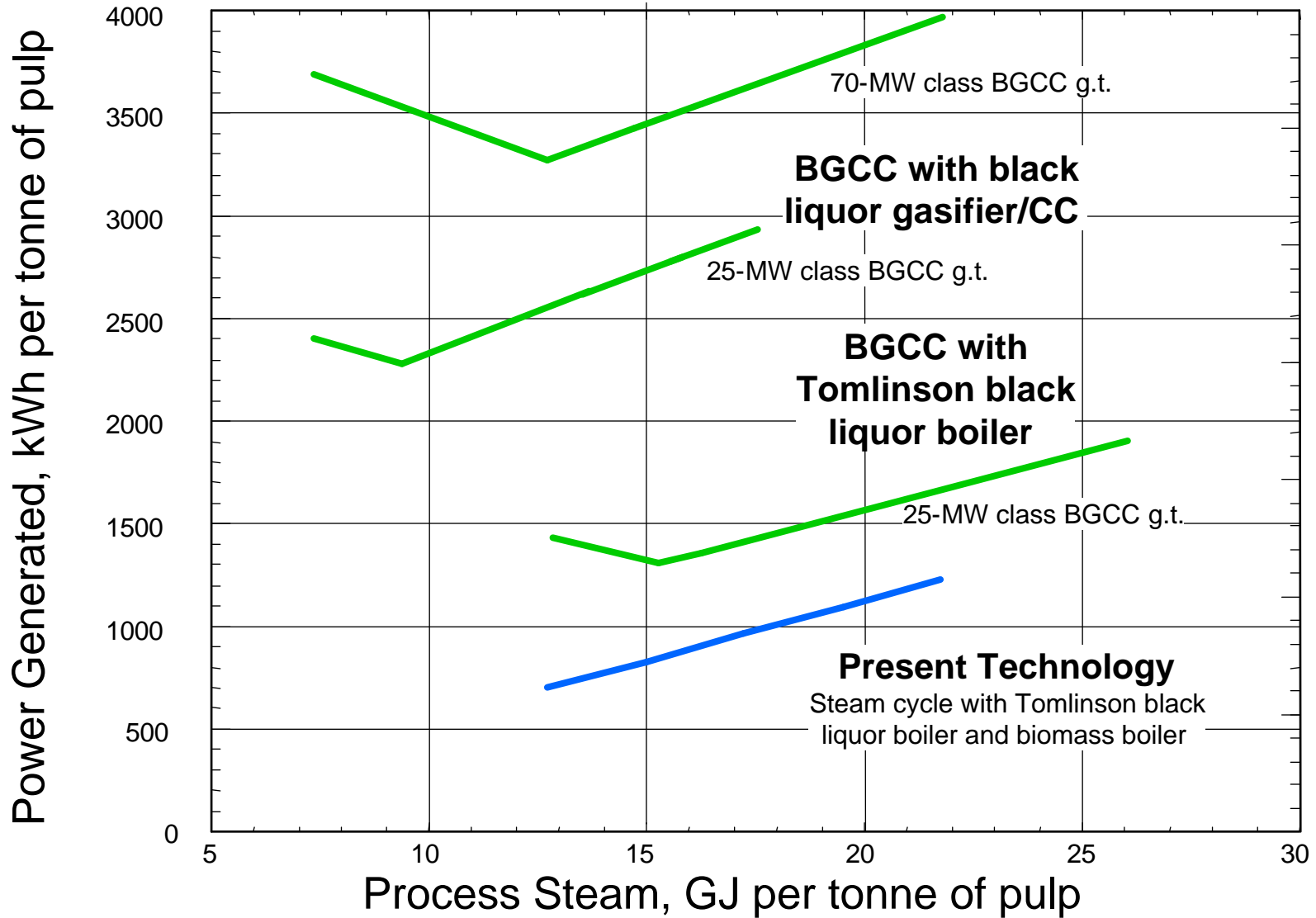
$\sim 24 \times 10^6$
Metric Tons Carbon





Forest, Wood & Paper Industry Cycle – Total Replacement with Gasification Combined Cycle Technology

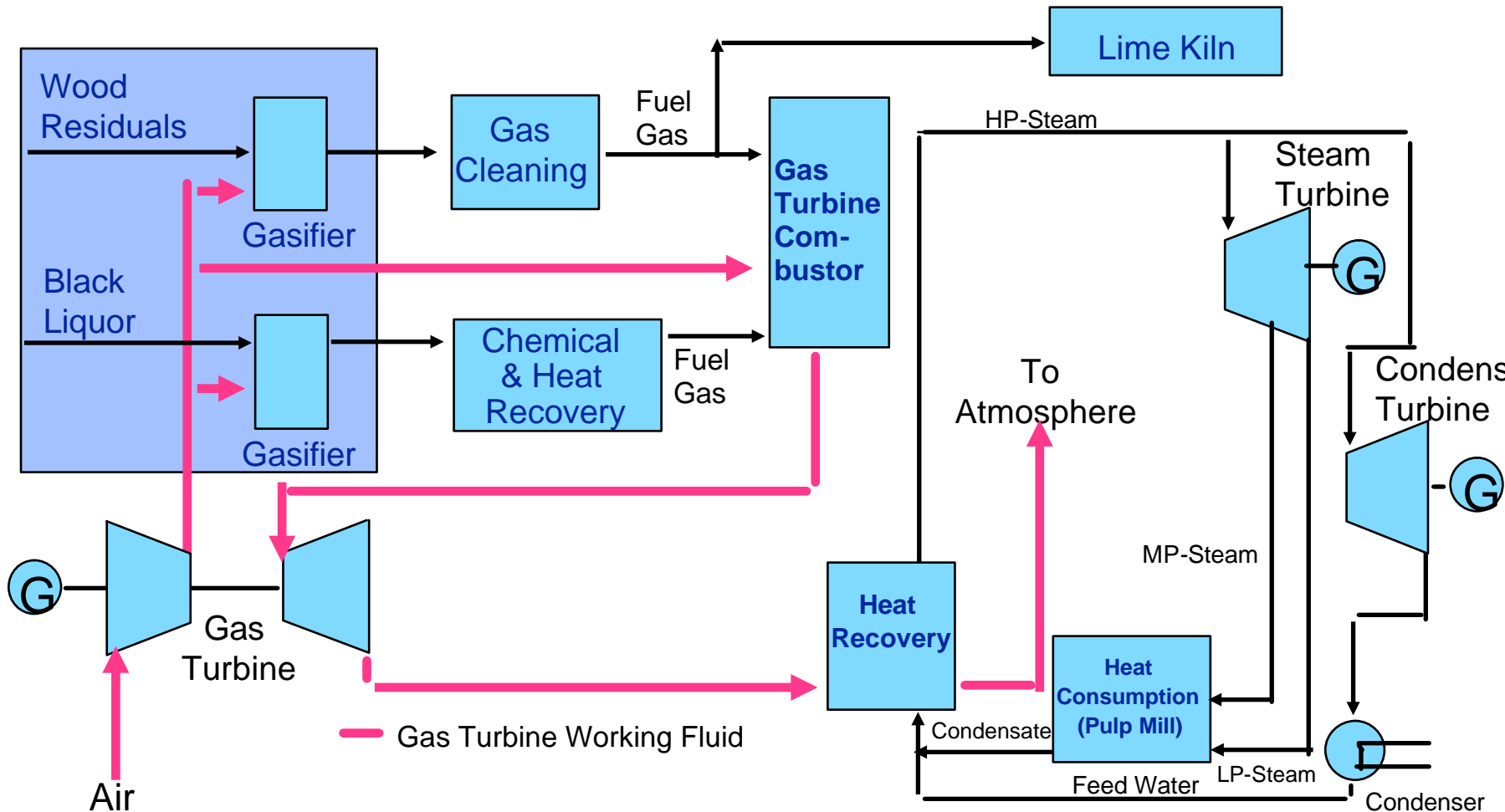
Impact of Biomass Gasification on Power Production at a Kraft Pulp Mill



Source: Eric Larson, Princeton University

Power Recovery Island of 2010

Possible Configuration



Summary

- Existing industry has the feedstock question resolved for the initial Forest Biorefinery
- Strong partnership with the chemical industry
- Mills located with natural gas supply lines in certain regions
- Large benefit in electricity capacity or fuels and chemical production
- Mill consolidations allow large scale validation of processes