Black Liquor Gasification
The Compelling Case

Park City, Utah
May 13, 2003

Bioenergy and Biobased Products Vision

✦ The U.S. is approaching a biobased revolution
✦ Currently importing 11 barrels of oil for every 10 produced domestically
✦ National Energy Policy:
  – diversity of domestic resources
  – reduced dependence on imported oil
✦ Biomass technologies will supply energy, chemicals and materials
✦ Bioenergy and biobased products hold great promise for our economy
President’s Committee of Advisors on Science and Technology (PCAST) Recommended in 1997

“Accelerate core R&D on advanced enzymatic hydrolysis technology for making ethanol from cellulosic feedstocks, with the goal that, between 2010 and 2015, ethanol produced from energy crops would be fully competitive with gasoline…..”

“Coordinate this development with the biopower program so as to co-optimize the production of ethanol with the carbohydrate fractions of the biomass and electricity from the lignin using advanced biopower technology”

National Research Council Review* of the BLG program

“[Black Liquor Gasification] technology…yields benefits in the options and knowledge categories. Substantial options benefits accrue in the environmental category… Potential economic and environmental benefits would then accrue due to the increased efficiency of biomass electricity production and its displacement of fossil-fuel-generated electricity.”

# National Research Council
## Goals for 2020
- Twenty-five percent of our chemicals from biomass feedstocks
- Ten percent of our domestic fuels from biomass feedstocks

## Goals of the “Energy Future Coalition”
- Accelerate commercialization of biomass conversion to fuels, chemicals, electricity and other products
- Build commercial plants to determine best technologies, support bringing them to acceptable risk levels and facilitate their deployment
- Increase and broaden Federal funding of R&D
- Gradual replacement of subsidies for food crops (especially export) with subsidies for energy crops
- Regulatory tools to increase the use of bio-derived products and reflect their societal benefits
- Engage the resources of the Department of Defense and Homeland Security
Recommendations of the “Energy Future Coalition”

✦ Triple the current level of bioenergy R&D funding to $500 million per year
  – Reflect the problems and opportunities addressed by this technology
  – Allow alternative paths to be pursued in parallel
  – Allow innovation-focused research, commercialization-focused activities and elucidation of applied fundamentals to be aggressively pursued in parallel

Recommendations of the “Energy Future Coalition” (continued)

✦ Maximize the impact of R&D spending
  – Increase the importance of technical considerations in allocating R&D funds
  – Allocate funds to technology areas that have a large potential for R&D driven impacts
  – Increase the representation of applied fundamentals in the biomass R&D portfolio
President Bush -
2003 State of the Union Address

✦ Promote energy efficiency and conservation
✦ Develop cleaner technology
✦ Produce more energy at home
✦ Significantly reduce air pollution from power plants
✦ Move the automobile industry toward cars powered by fuel cells

Decision Criteria from OMB

✦ Supports a priority identified by the President
✦ Has market barriers for the private sector
✦ Offers a clear public benefit
✦ Helps achieve Federal policy goals
✦ Builds on existing technology, compliments other R&D activities and is technically feasible
✦ Incorporates industry involvement
✦ Incorporates performance indicators
✦ Incorporates “off-ramps” and a clear end point
✦ Is the result of a competitive process and subject to external review
✦ Has a significant degree of technology risk
Compelling Factors Connecting Gasification and Pulp Manufacturing

- Raw material is indigenous, renewable and sustainable
- 278 million dry tons of wood are processed yearly by the forest products industry
- There is likely an additional 100 million tons per year accessible to mills at competitive cost
- Mills have existing infrastructure to receive, store and handle woody biomass material
- About half or less of received wood results in conventional fiber products

Compelling Factors Connecting Gasification and Pulp Manufacturing (continued)

- There is a growing interest in the “biorefinery” concept at the Federal level
- Intensely managed woody crops are 10 to 20 times as energy efficient as corn to ethanol
- Bio-refinery technologies will give our industry real choices:
  - Production of more than twice the electric power currently made
  - Syngas or oils for further processing to liquid fuels
  - Chemical and carbon products
  - New, innovative composite products
Compelling Factors Connecting Gasification and Pulp Manufacturing (continued)

- Application of “bio-refinery” concepts offer the promise of new value added streams for pulp and paper mills
- Jobs at risk from mill closure as a result of consolidation can potentially be saved
- New jobs to operate new processing lines can be created

*Gasification technology is fundamental to achieving most of the above*

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Compelling Factors Connecting Gasification and Pulp Manufacturing (continued)

- Large scale adoption of gasification would achieve significant social goals
  - Applied to power production
    - Greater than 20 gigawatts of electricity
    - Reduction of over 20 million metric tons of CO₂ per year as well as reduction of other GHG
  - Applied to liquid fuel production
    - Displacement of over 280 million barrels of oil per year
    - This represents over 7% of U.S. oil imports
Compelling Factors Connecting Gasification and Pulp Manufacturing (continued)

✦ Application of the technology on a broad scale would serve the homeland security goals of:
  – Diminished dependence on oil imports
  – Distributed manufacturing and power production

Given all of this, what was the OMB recommendation for funding the “Forest Products Gasification Initiative” in FY ‘04?

$0.00
Primary OMB Reasoning

Role of Federal Investment when introducing a product/concept to the marketplace:

✦ Must not discourage or displace industry investment that would otherwise occur.
✦ Cannot be an activity that industry is capable of doing on its own.

What Has Been and Is the Commitment

✦ DOE investment 1987–2000:
  – $14.9 million
✦ Forest Product investment 1987–2000:
  – $2.2 million
✦ DOE investment 2000–2003:
  – $41 million
✦ Forest Products investment 2000–2003:
  – $45 million
✦ We have come so far and are currently very committed—without the continued partnership, we cannot succeed
Industry Position

- The industry is struggling with poor profitability
- Increasing environmental pressures
- An aging infrastructure
- It is increasingly difficult to attract the best
  - People, Technologies and Tools
- There needs to be more focus on growing the industry as opposed to defending the industry
- Capital intensity remains a critical issue limiting the ability of U.S. companies to make new investments

The industry needs breakthrough technologies, the will to use them, and the skills to practice them. Gasification is such a technology, but it will not happen without a continued partnership with government.

What the Industry Is Doing to Save and Strengthen the Partnership

- Working with DOE and other agencies to support restoration of funding
- Seeking support from allies
  - Suppliers
  - Universities and colleges
  - States
  - Lobbying groups
  - Individual companies
What the Industry Is Doing to Save and Strengthen the Partnership

✦ Attempting to convince OMB that the gasification initiative is a perfect fit with their own criteria and should be fully funded
✦ Working with key members of Congress and their staffs to restore full funding
✦ Developing a compelling business case for the industry and for the Nation

The Industry’s Minimum Goals

✦ Continue essential technology support projects for both high and low temperature technologies
✦ Add projects recommended by CTO Committee but not funded
✦ Continue cooperation with the European community through the IEA and other appropriate ways
✦ Successfully complete the Big Island project
✦ Successfully complete the Spotswood project
✦ Utilize the New Bern project in cooperation with ChemRec to advance the high temperature technology
What the Technical Community Can Do

- We will be successful only if we understand and respect the fundamentals—keep us focused on the fundamentals
- Don’t lose faith—the industry needs you to realize our vision of the future
- Help us to see our vision—don’t hesitate to expand our thinking and challenge us
- Continue to discuss, debate and collaborate—the limited funds and resources available will have to be used wisely and effectively
- Believe that the industry, and I suspect the government, sincerely thanks you for your efforts

I thank you for your efforts and the opportunity to be here today