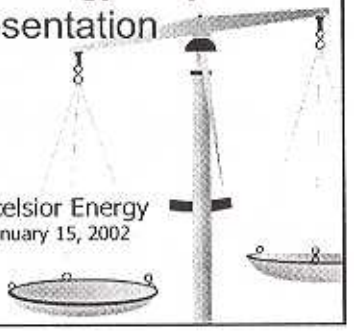
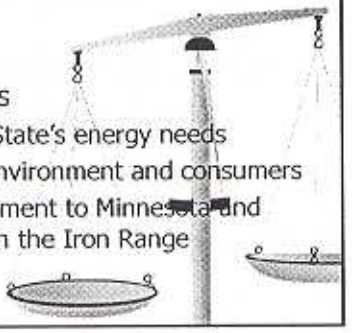
# Mesaba Energy Project Presentation



Excelsior Energy
January 15, 2002

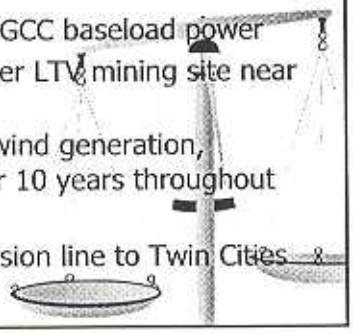
## Excelsior Energy

- Our Team
- Our Objectives
  - Address the State's energy needs
  - Protect the environment and consumers
  - Attract investment to Minnesota and create jobs on the Iron Range



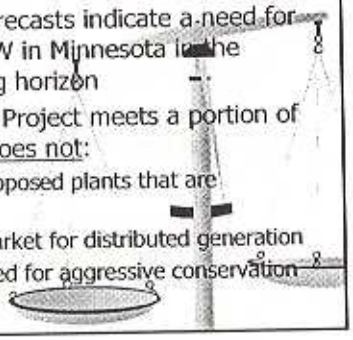
## Components of Mesaba Proposal

- 2000 MW of IGCC baseload power
- Sited on former LTV mining site near Hoyt Lakes
- 1000 MW of wind generation, deployed over 10 years throughout the state
- New transmission line to Twin Cities



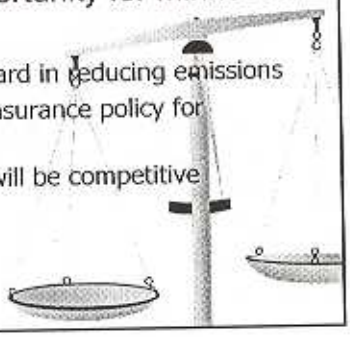
## Urgent Need for Power

- Conservative forecasts indicate a need for 3300 – 6000 MW in Minnesota in the current planning horizon
- Mesaba Energy Project meets a portion of the need, but does not:
  - Derail other proposed plants that are underway
  - Replace the market for distributed generation
  - Reduce the need for aggressive conservation



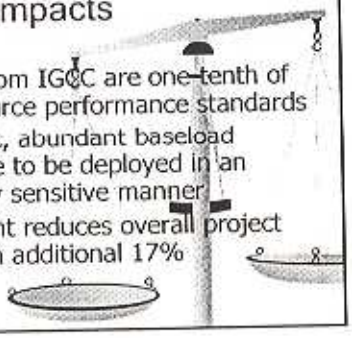
## Strategic Opportunity for Minnesota

- Giant step forward in reducing emissions
- Cost effective insurance policy for consumers
- Cost of power will be competitive



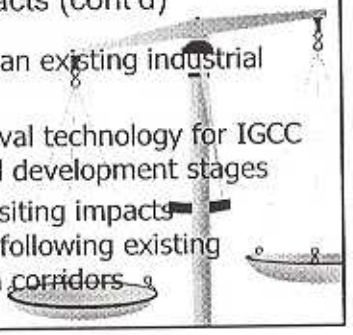
## Reducing Environmental Impacts

- Air emissions from IGCC are one-tenth of federal new source performance standards
- Allows domestic, abundant baseload energy resource to be deployed in an environmentally sensitive manner
- Wind component reduces overall project emissions by an additional 17%



## Reducing Environmental Impacts (cont'd)

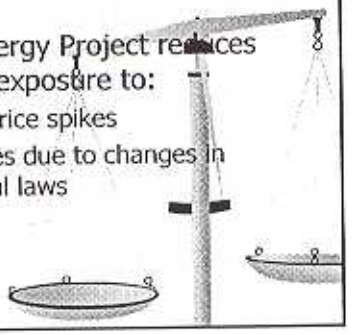
- Project site is an existing industrial site
- Mercury removal technology for IGCC is in advanced development stages
- Transmission siting impacts minimized by following existing transportation corridors



## Insurance Policy for Consumers

The Mesaba Energy Project reduces Minnesotans' exposure to:

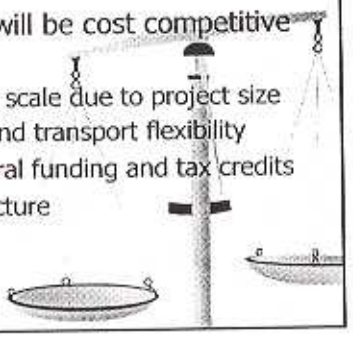
- Natural gas price spikes
- Price increases due to changes in environmental laws



## Cost Competitive Power

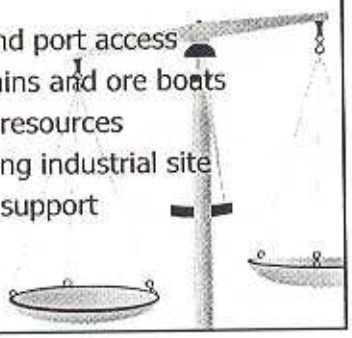
Mesaba power will be cost competitive due to:

- Economies of scale due to project size
- Fuel source and transport flexibility
- Possible federal funding and tax credits
- Site infrastructure



## Site Advantages

- Existing rail and port access
- Empty unit trains and ore boats
- Private water resources
- Isolated existing industrial site
- Strong public support

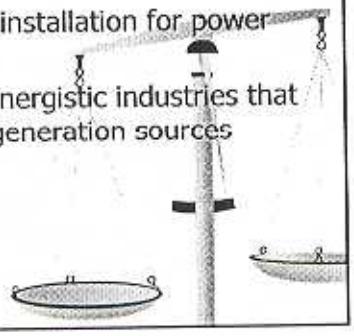


## Investment and Job Creation

- Over $3 billion of investment in Minnesota
- Construction of IGCC plant, wind turbines and transmission lines will create over 1080 jobs during a 10+ year construction phase
- Operation of IGCC plants and wind turbine manufacturing, assembly and operation will create approximately 1000 direct, permanent jobs
- 2000 – 4000 additional indirect jobs

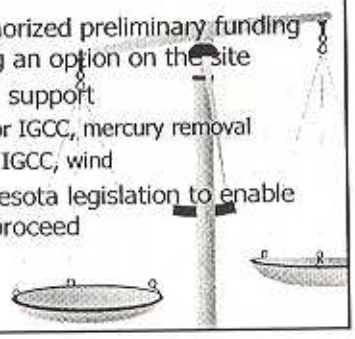
## "First-Mover" Advantage

- Largest IGCC installation for power generation
- Will attract synergistic industries that other power generation sources cannot



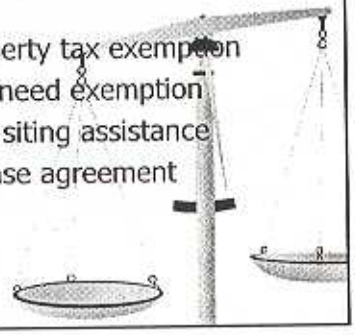
## Project Status

- IRRRB has authorized preliminary funding and is providing an option on the site
- Seeking federal support
  - DOE funding for IGCC, mercury removal
  - Tax credits for IGCC, wind
- Preparing Minnesota legislation to enable the project to proceed



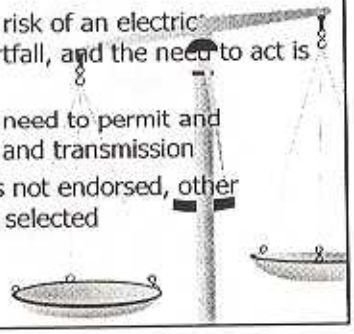
## Legislation

- Personal property tax exemption
- Certificate of need exemption
- Transmission siting assistance
- Power purchase agreement



## Why 2002?

- Minnesota is at risk of an electric generation shortfall, and the need to act is urgent
- Long lead-time need to permit and construct plant and transmission
- If this project is not endorsed, other projects will be selected



*Preliminary Analysis*

# Assessment of Coal Fired IGCC in Northern Minnesota

Prepared for: Excelsior Energy

Prepared by: ICF Consulting

January 2002

Julian Boyd
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*Strategic Advantage.*
**Compelling Results.**



## Overview of ICF Consulting

- Global energy and environmental consulting firm (Washington D.C., California, London offices); 500 plus employees
- 30 years of electricity industry consulting
- Integrated analysis of electric, fuel, transmission and environmental markets
- ICF proprietary wholesale power, natural gas, coal and environmental allowance models
- 100 plus power market and valuation studies each year including numerous due diligence projects
- Currently supporting financing of several billion in power plant assets – close bank and rating agency interfacing
- Wholesale reliability, stranded cost, and bankruptcy testimony
- Main consultant to Federal Government on generation sector analysis, particularly on environmental issues
- Most accurate track record of power price forecasting and allowance market forecasting for both $SO_2$ and $NO_X$
- Environmental compliance planning
- Gas and coal market forecasting.
- Energy Conservation

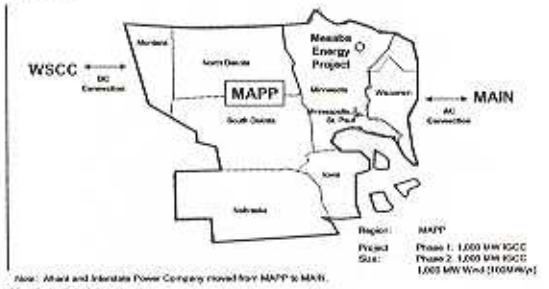
*Strategic Advantage ...*
*Compelling Results*



## Overview of IPM®

*Strategic Advantage ...*
*Compelling Results*

## Proposed Project Summary




Note: Alliant and Interstate Power Company moved from MAPP to MAIN.

*Strategic Advantage ...*

*Compelling Results*

## MAPP is a Decided Laggard in Firm Power Plant Capacity Additions

| Region in Descending Rank | Firm Additions (MW) (On-line 1999-2001 plus currently under construction) | % of 2001 Regional Peak Load |
|---|---|---|
| ERCOT | 21,049 | 37 |
| MAIN | 14,784 | 28 |
| SPP | 7,178 | 18 |
| SERC | 46,204 | 28 |
| FRCC | 7,763 | 20 |
| NPCC | 7,976 | 34 |
| ECAR | 16,931 | 16 |
| MAAC | 8,801 | 16 |
| WSCC | 25,606 | 21 |
| MAPP | 1,936 | 6 |
| U.S. Total | 160,735 | 22 |

Source: ICF data collection.

*Strategic Advantage ...*

*Compelling Results*

## ICF Forecast of MAPP Capacity Deficit by 2004 is Greater Than any Other Region

| Regions in Descending Rank | Non-Firm Build Requirements as Percent of Peak (%) |
|---|---|
| MAPP | 12 |
| SERC | 9 |
| SPP | 7 |
| MAAC | 7 |
| WSCC | 4 |
| NPCC | 2 |
| MAIN | 2 |
| ECAR | 0 |
| ERCOT | 0 |
| FRCC | 0 |
| U.S. Total | 5 |

Source: ICF data collection. U.S. Total weighted average; weighted average base.

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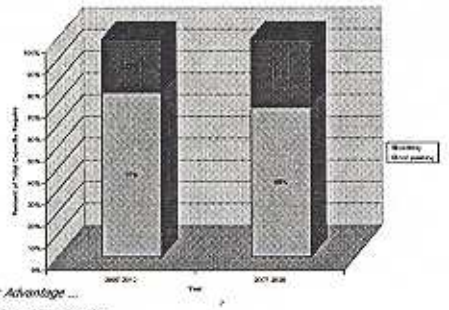
## MAPP Baseload Needs are Significant



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## Average Cost of New Power Plants Including Transmission (2000 cents/kWh)

| New Plant | Base Case | High Gas Price[1] |
|---|---|---|
| Twin Cities - Gas Combined Cycle | 3.2 | 4.2 |
| Mesaba IGCC Coal | 3.7 | 3.7 |
| Difference | +0.5 | -0.5 |

[1] Natural gas prices at the benchmark Henry Hub, Louisiana location roughly equal 2000 and 2001 average levels.

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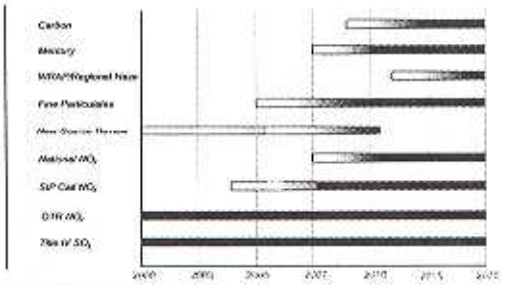
*Compelling Results*

## New Air Regulation Very Likely




*Strategic Advantage ...*
*Compelling Results*

## New Environmental Regulations are Very Likely by 2010

| Pollutant | New Regulation | ICF Assessed Probability (%) |
|---|---|---|
| $SO_2$ | 50% National Reduction | 90 |
| $NO_x$ | National 0.15 lb $NO_x$/MMBtu Limit – Annual | 90 |
| Mercury | 75% Reduction | 90 |
| $CO_2$ | Mild Control With Trading | 75 |

*Strategic Advantage ...*
*Compelling Results*

## IGCC is Very Clean Among Coal Plants

| Pollutant | Units | Representative Ranges | | |
|---|---|---|---|---|
| | | Existing Coal Plant | New Coal Plant | IGCC |
| $SO_2$ | lbs $SO_2$/MMBtu | 0.3 – 5.0 | 0.3 – 0.05 | 0.017 |
| $NO_x$ | lbs $NO_x$/MMBtu | 0.3 – 1.5 | 0.03 - 0.15 | 0.024 |
| $CO_2$ | lbs $CO_2$/kWh | 2.1 – 2.2 | 2.1 – 2.2 | 1.3[1] – 1.5 |
| Mercury | lbs Mercury/$10^3$ MWH | 0.05[2] | 0.006 | 0[3] |

*Strategic Advantage ...*
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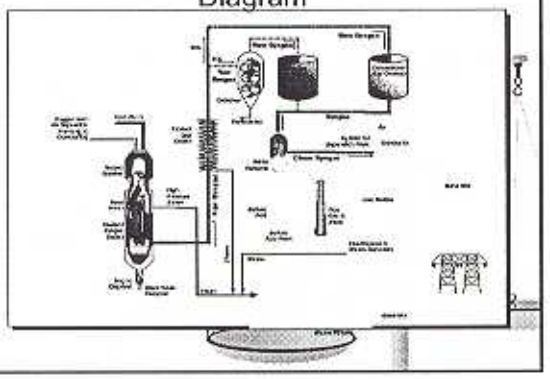
## Example IGCC Process Flow Diagram



## How IGCC Works - Four Basic Steps

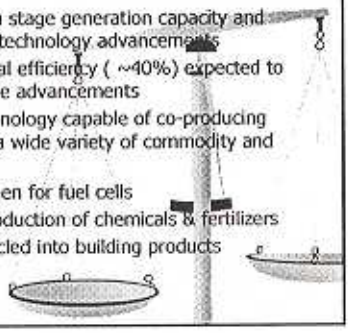
- Coal is injected with high temperature steam and oxygen/air into a gasifier to generate fuel gas
- Fuel gas then passed to hot gas cleanup system to remove particulates, sulfur and nitrogen compounds
- Clean fuel gas then combusted in a gas turbine to produce electricity
- Heat from hot gas then used to produce steam for use in a steam turbine to generate additional electricity

## IGCC Background

- Coal gasification technology has been around since 19th century
  - From early 19th century to 1940's most fuel gas distributed for residential or commercial use in US was produced from gasification of coal/coke
  - Replaced by low cost natural gas beginning in 1940's
- Renewed interest in coal gasification due to rising natural gas prices/limited supply around the world
- Currently 130 gasification plants operating or under construction representing 43,000 MWth
  - Annual gasification growth rate of about 3000 MWth/year
- Significant investment in coal gasification technology by US Department of Energy
  - 5 IGCC demonstration plants in US
  - Concluded that IGCC systems are among the cleanest and most efficient of the emerging clean coal production technologies

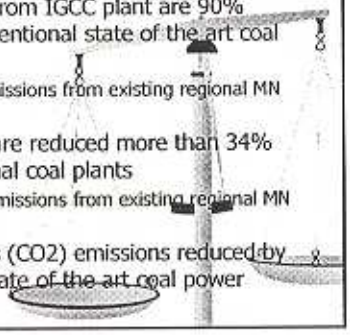
## IGCC Advantages - Technical

- Modular design, can stage generation capacity and incorporate further technology advancements
- Existing high thermal efficiency ( ~40%) expected to increase with turbine advancements
- Only advanced technology capable of co-producing electric power and a wide variety of commodity and premium products
  - source of hydrogen for fuel cells
  - feedstock for production of chemicals & fertilizers
  - slag can be recycled into building products



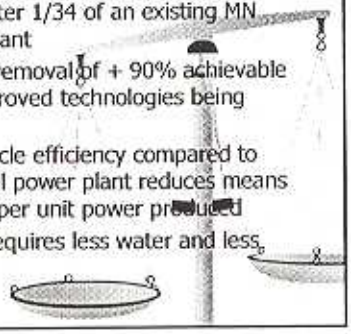
## IGCC Advantages - Environmental

- NOx emissions from IGCC plant are 90% lower than conventional state of the art coal power plant
  - 1/65 of NOx emissions from existing regional MN coal plant
- SO2 emissions are reduced more than 34% from conventional coal plants
  - 1/127 of SO2 emissions from existing regional MN coal plant
- Greenhouse gas (CO2) emissions reduced by 30-35% from state of the art coal power plant



## IGCC Advantages - Environmental Con't

- Particulate Matter 1/34 of an existing MN regional coal plant
- IGCC Mercury removal of + 90% achievable today with improved technologies being demonstrated
- IGCC higher cycle efficiency compared to state of art coal power plant reduces means less emissions per unit power produced
- IGCC system requires less water and less space



## Conclusion

- With legislative support, this project will:
  - Address the state's energy needs and enhance reliability
  - Protect our natural environment
  - Create good jobs on the Iron Range
  - Hedge against environmental costs
- Likely Alternative:
  - MN imports power and emissions
  - MN loses investment, jobs, reliability and environmental control
  - Ratepayers exposed to environmental costs