Governor’s Energy Summit
Renewable Energy
A Realistic View

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The Energy Issues

• Renewable versus Conventional

• Independence and Security

• Carbon Constraints
Growth in Renewables in Quadrillion Btu
(Source EIA)

Total and Major Sources, 1973-2006

*Conventional hydroelectric power.
*See Table 10.1 for definition.
*Geothermal, solar/PV, and wind.
Renewable Energy Consumption in Quadrillion Btu
(Source EIA)

By Source, 2006

- Hydroelectric Power: 2.9
- Wood: 2.1
- Biomass: 0.6
- Waste: 0.4
- Geothermal: 0.5
- Wind: 0.3
- Solar: 0.1

By Sector, 2006

- Residential: 0.5
- Commercial: 0.1
- Industrial: 2.5
- Transportation: 0.5
- Electric Power: 3.0

Compared With Other Resources, 1973-2006

- Fossil Fuels
- Renewable Energy
- Nuclear Electric Power

Compared With Other Resources, 2006

- Fossil Fuels: 84.7
- Nuclear Electric Power: 3.2
- Renewable Energy: 6.9

*Conventional hydroelectric power.
^See Table 10.1 for definition.
#Geothermal, solar/HPV, and wind.
Power Generation and Renewables
Corporate Conscience
Wind

- Spatial requirement per NEI to match annual nuclear energy production – THE AREA OF WEST VIRGINIA
  - 1,000 mw plant nuclear = 2.35 sq miles
  - 1,000 mw plant solar = 235 sq miles

- Cost per MW of installed capacity ($1.5 mm to $1.7mm)

- Load Balancing

- Turbine availability
Solar

- Spatial requirement per NEI to match annual nuclear energy production – THE AREA OF NEW JERSEY

- Cost per MW of installed capacity (approx. $6mm for Photovoltaic technology)

- Load Balancing
Hydro

• Environmental Issues

• Cultural and dislocation issues

• Limited site availabilities

• Cost per MW of installed capacity ($1.6 mm to $2.3 mm)
Transportation and Renewables

• Biodiesel
  – Relatively new but will likely be key in our country’s long-term energy program
  – Europe is currently largest producer and user of this fuel
  – About 10% lower carbon emissions than conventional diesel
  – Relatively simple pressing process
    • Palm Oil is the most prevalent feedstock
    • Indonesia and Malaysia
      ➢ Burning off of rain forest - 1.4 billion tons of carbon
      ➢ Cultivation of plots - 600 million tons of carbon
      ➢ 2 billion tons of carbon - 8% of total fossil fuels emissions
Transportation and Renewables (cont)

• Ethanol
  – Consumption of Ethanol is predicted to increase by 100% in next 5-6 years
  – Max sustainable – 17%
  – Most prevalent feedstock corn
    • Current market negative margins
      ➢ High Corn Prices
      ➢ Low Gasoline Prices
      ➢ Social Unrest in Mexico

• Problems
  – Phase separation
  – Affinity for moisture
  – Solvent
The Reality

- Focus on renewables is fine
- But a realistic energy program has to also consider coal gasification and liquefaction
  - Electricity Generation
    - Syn Gas
  - Transportation Fuels
    - FT 1931
    - WW II Germany
    - Sasol South Africa
      - Products - Diesel, Gasoline, and Jet Fuel
Collar arrangement – Federal government support warranted

- Negotiated Ceiling Price
- Determined Floor Price, covering (i) O&M; (ii) DS; (iii) low teen return to investor
- Price below floor triggers subsidy from DOE
- Upside Sharing
Nuclear Facts

• America’s 103 nuclear power reactors provide emission-free electricity for one in five homes and businesses.

• The uranium fuel they use is so efficient that just **ONE** fuel pellet provides as much energy as:
  - 17,000 cubic feet of natural gas
  - 149 gallons of oil
  - 1 Ton of Coal

• **FIVE** fuel pellets meet a household’s electricity needs for an entire year.
Summary

• Coal (Independence and Security)
  – Base load electricity
  – Transportation

• Nuclear (Carbon Footprint)
  – Electricity power generation
  – Nuclear allows for utilization of coal to meet both objectives

• Last Year’s Assessment
  – Wealth transfer from developed to developing superpowers
  – 1991 vs. 1992
  – 2007 update – carbon factor
    • Continuation and acceleration of wealth transfer
    • China position on carbon emissions
QUESTIONS???????????
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APPENDIX

The Volume of CO$_2$

1 million metric tons of CO$_2$ is close to the volume of the Empire State building in New York city.

US emits roughly 6 billion tons of CO$_2$ per year.

Stabilization through year 2100 under an EIA reference scenario would fill lake Erie twice (equals 5% of contiguous US land mass).
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