

Biofuels in the Global Energy Market

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Two Energy Challenges: Sources and Storage

- Sources: From Where is Energy Captured?
 - fossil fuel
 - nuclear reactions
 - sunlight, wind, waves, deep-earth heat
- What are Efficient Storage Technologies?
 - refined petroleum products
 - synthetic fuels from coal, natural gas, etc
 - hydro-electric storage
 - batteries
 - hydrogen

Fossil Fuel Markets Today

- Oil – world market, rapid demand growth
 - Short-run tightness, long-run scarcity
 - Much higher prices than late 1990s
 - Causing fundamental wealth transfers
- Coal – plenty of supply, expanding uses
 - Coal-to-liquids: solving what problem?
- Natural Gas – localized for now
 - Rising U.S. prices will induce LNG
 - Large untapped worldwide supplies

Three Energy Source Challenges

- 1. Cost-efficient supply
 - oil is still cheap (coal too)
- 2. Environmental effects
 - particularly greenhouse gases
- 3. Geopolitical ramifications
 - recognition of the extent of the market
- Environmental and Geopolitical challenges are VERY different
- The triple dividend of energy efficiency

Cost-Efficient Supply

- If we ignore environmental and geopolitical costs, fossil fuels are likely to be cheap for a long time
- Renewables will get cheaper, but so will energy capture and storage from fossil fuels
 - Eg, oil sands and synthetic liquid fuels

Environmental Valuation

- What value will we put on reducing GhGs and local pollutants?
- Experience from local pollutants is encouraging
 - Tradeable permits for NO_x, SO₂, mercury
 - Renewable Portfolio Standards
- But GhGs are a much greater political and economic challenge
 - Global effect of pollution requires multinational agreements
 - Similar to CFCs, but much greater economic impact

Geopolitical Effects

- Geopolitics of oil argue for pursuing alternative fuels
 - But in world oil market, all demand growth enriches all sellers, so incremental effects
 - Critical to understand the extent of market
- Still, geopolitics alone favor alternative fossil fuels not renewables

Downstream Challenges

- Refining/Distilling
 - Ethanol plant boom (bubble?)
 - Oil refining capacity shortage
 - BUT worldwide expansion – eg, India, Saudi Arabia
 - High refining margins are not long-run equilibrium
- Transportation
 - Significant penalty of truck/rail versus pipeline
- Marketing/Retailing
 - High efficiency, low margins in gasoline retail
 - Easiest component to transfer to biofuels

The Challenge for Biofuels

- Fossil fuels will remain an inexpensive source of transportation energy
- High downstream costs of gasoline refining likely to be transitory
- Four possible biofuels futures
 - GhG cost recognition leads to healthy growth
 - Ad hoc standards *possibly* do the same
 - Liquid fuel storage preempted by batteries
 - “cheap gasoline” carries the day

Final Policy/Political Issue: Mitigation versus Adaptation

- Adaptation is nearly the default
- Adaptation can be done locally
- Mitigation requires global cooperation and coordination
- Adaptation addresses the most tangible effects, the ones voters may focus on
- Ethics meets Politics