

Bioenergy Options & Opportunities

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overview

- ❖ some basic realities
- ❖ liquid biofuels
- ❖ biopower
- ❖ Commercial deployment

some basic realities

- ❖ Biomass = vine-ripened atmospheric-carbon-derived solar energy
 - the only renewable with solid, liquid, gaseous fuel options (& electric)
- ❖ Bioenergy will be an important piece of our energy future.
- ❖ There are no silver bullets.
- ❖ There are no zero-risk options.
- ❖ There are no zero-impact options.
- ❖ The devil is in the detail.

liquid biofuels

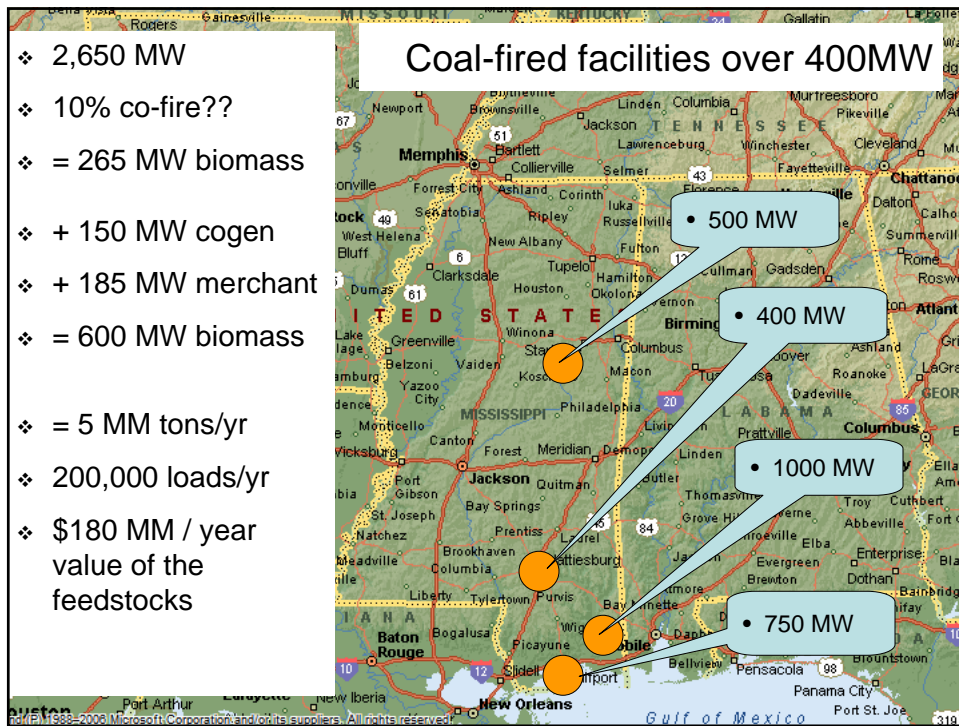
- ❖ which liquid fuels make the most sense?
 - ethanol? methanol? butanol? drop-in fuels?
- ❖ perhaps we can shift our passenger fleet to electric...
 - but agri & construction will need diesel for a long time to come
- ❖ what economic conditions must come together for feasibility?
 - under what condition can we not rely on subsidies?
- ❖ but look out...we are potentially feedstock limited

biopower

- ❖ basic options
 - co-firing
 - co-gen
 - stand-alone
- ❖ renewable power
 - base-load
 - distributed generation
 - comply with RPS/RES requirements
- ❖ economic benefits
 - locally-sourced fuels
- ❖ environmental benefits
 - fossil fuel displacement
 - low-carbon systems
 - and potentially carbon-negative when using biochar

Co-firing

- ❖ Displacement of fossil fuel (typically coal) by biomass
 - a portion of the energy generated is from biomass
 - typical range: 2% ~ 35%, energy basis
 - but depends on many factors that are site-specific
- ❖ Potential benefits
 - co-fire @ existing facilities (with minimal additional permitting)
 - minimal capital investment
 - can be large-scale option for meeting RPS/RES requirements
 - emissions benefits
- ❖ Potential concerns
 - changes in boiler & ash chemistry
 - depends on biomass fuel characteristics & boiler design
- ❖ each potential site requires its own co-firing assessment



Commercial deployment...what will it take?

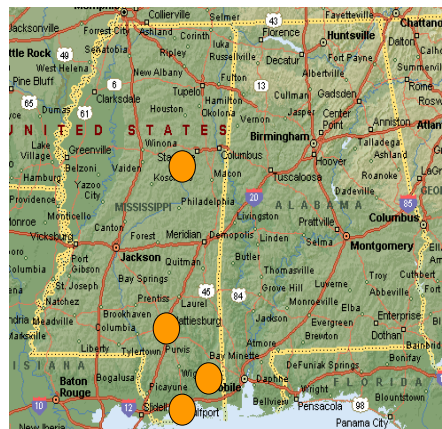
- ❖ bioenergy systems cannot economically compete with fossil fuels
 - attractiveness is contingent on:
 - changes in supply-demand-pricing of traditional energy sources
 - subsidies
 - required production (RPS)
 - value of carbon
- ❖ no project can be established without financing
 - financing requires attractive returns and tolerable risks
 - the bottom line for any project is the bottom line
- ❖ What do we need to do to attract biopower operations?
 - What is the State looking for?
 - What are ratepayers / commercial sector looking for?
 - What are utilities (including municipalities) looking for?
 - What are private developers/investors looking for?
 - What are crop producers looking for?

Aspects we're looking for...

- ❖ renewable
- ❖ environmental benefits
- ❖ jobs and economic development
- ❖ long-term fuel supplies
 - reliable
 - assurances from suppliers
- ❖ minimal technical risks
 - feedstock quality concerns
 - commercially proven
- ❖ attractive economics
 - to feedstock producers / landowners / suppliers
 - to processors, utilities, consumers
 - to investors

Recommendations

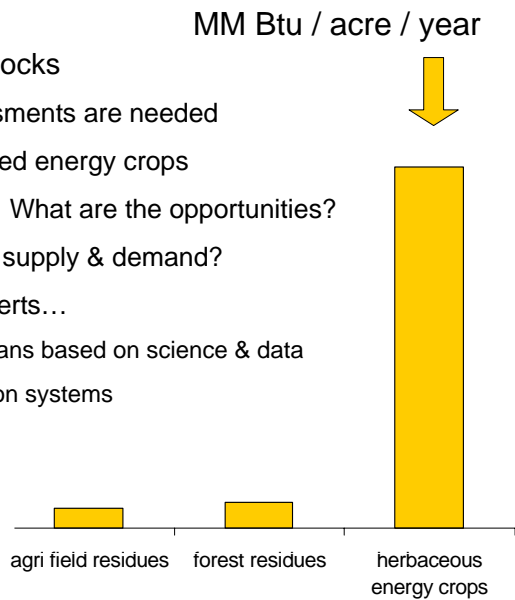
1. Undertake a statewide co-firing assessment
 - What is the scope of the potential opportunity in Arkansas?
 - What would be the required feedstocks?
 - and what are the associated feedstock supply options?
 - What would be the estimated costs & benefits?



Recommendations

2. Understand biomass feedstocks

- Biomass resources assessments are needed
- Seriously consider dedicated energy crops
 - What are the options? What are the opportunities?
 - How can we match us supply & demand?
 - Bring together the experts...
 - √ commercialization plans based on science & data
 - √ sustainable production systems
 - √ carbon benefits?



Recommendations

3. Facilitate private project financing

- Help developers pursue federal grants & guarantees
 - e.g., USDA renewable energy grants & loans
 - e.g., DOE loan guarantees
- Meet with financiers (equity, debt providers)
 - help them understand bioenergy options & opportunities in AR
- Provide grant support for feasibility studies
 - no project can move towards deployment without one

Thank You!

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