Some Considerations

- Dynamic landscape of policies and requirements at the federal, state, and local levels related to:
  - What biomass can be used
  - Air quality considerations, upfront and on-going
  - Federal and State energy policies
  - New federal climate change policies

- Know where siting facilities may be precluded given existing policies and environmental conditions

- Know availability of woody biomass and other forms of biomass

- Consider how other industries/uses will influence markets and prices (i.e., supply and demand)
Challenges

- Availability of Woody Biomass and Competing Uses
- EISA Renewable Biomass Definition vs. Farm Bill Definition of Renewable Biomass
- Air Quality Regulations and Policies Relevant to Bioenergy Facilities
- Renewable Energy Standard
Federal Legislative Definitions of Renewable Biomass Vary

- **EPAct 2005**
  - no mention of whether biomass can be removed from Federal lands
  - six varying definitions of biomass, but essentially treats biomass either as:
    - a “waste material” of sorts
    - “any organic matter” in other definitions

- **EISA – Energy Independence and Security Act 2007**
  - Title II, Sec. 201(I)(i), Renewable Fuel Standard:
    - Woody biomass that is allowed to be used for purposes of the RFS program:
      - Slash and pre-commercial thinnings that are from non-Federal forestlands…but not forests or forestlands that are old-growth or ecologically sensitive forests
      - Biomass obtained from immediate vicinity of buildings or infrastructure in areas at risk of wildfire
      - Planted trees and tree residue from actively managed tree plantations on non-federal lands cleared any time prior to 12/19/2007
  - Title XII, Sec. 1201 and Sec. 1203(e)(z)(4)(A), Small Business Energy Programs:
    - Trees grown for energy production
    - Wood waste and wood residues

- **Tax Code**
  - From Title 26, Subtitle A, Chapter I, Subchapter A, Part IV, Subpart D, Sec. 45
    - ‘closed-loop biomass’ – any organic material planted exclusively for purposes of being used at a qualified facility to produce electricity
    - ‘open-loop biomass’ – any lignin material which is segregated from other waste materials and which is derived from forest-related resources: mill and harvesting residues, pre-commerical thinnings, slash, and brush
  - From Title 26, Subtitle A, Chapter I, Subchapter A, Part IV, Subpart E, Sec. 48
    - Biomass means (iii) other products of forest maintenance

- **2008 Farm Act, Title IX, Sec. 9001(12)**
  - Allows biomass removal from Federal lands as feedstock and allows the removal and development of woody biomass on Federal lands
  - Renewable Biomass
    - Materials, pre-commercial thinnings, or invasive species from National Forest System land and public lands…that are
      - By-products of preventive treatments
      - Would not otherwise by used for higher-value products
      - Are harvested in accordance with … applicable law
      - Any renewable organic matter (including wood waste and wood residue) from non-Federal lands or Indian lands

- **ARRA** explicitly allocates $50 Million in funding to promote increased utilization of biomass from Federal, State, and private lands
Increased Demand for WBM Utilization

- Biomass has surpassed hydropower as largest domestic source of renewable energy & provides >3% of total energy consumed in US
- Expanded focus of wood-fuel industry from residential to commercial and institutional applications
- National Fire Plan & Ten-Year Comprehensive Strategy
- Healthy Forest Restoration Act
- State Renewable Energy Portfolios & Legislative Initiatives
Wood burning: complex mix of gases/particles including criteria pollutants PM$_{10}$, PM$_{2.5}$, SO$_2$, NO$_2$ and CO, and HAPs, including metals, PAHs, benzene, mercury and dioxins
Air Quality and Health

- Epidemiologic studies conducted in several cities showed an association between daily changes in concentration of ambient particulate matter (PM) and daily mortality counts.”¹

- ↑Air pollution, (PM 2.5, HAPs, other air toxics) = ↑ Asthma, ↑ Heart attacks, ↑ mortality, ↑ morbidity, ↑ hospitalizations, ↑ cancer risk²

- Short term exposure: asthma attacks, acute bronchitis, respiratory infection, heart attack, stroke³

- Long term exposure: reduced lung function, chronic bronchitis, premature death³

- U.S. Asthma prevalence: 12.9% of adults (2007); 8.3% of children (2004).⁴ Asthma rates increased 75% from 1980-1994, and rates in children under five increased 160% during the same time.⁵

- Biomass burning in developing countries is a known cause of acute respiratory infections (ARI). Acute respiratory infections account for more than 6% of global burden of disease.⁶

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⁶ Ezzati, M., Kammer, D.M. Quantifying the Effects of Exposure to Indoor Air Pollution from Biomass Combustion on Acute Respiratory Infections in Developing Countries. Environmental Health Perspectives, 2001.
Section 112(k) of CAA lists area source categories that emit HAPs, including industrial boilers and institutional/commercial boilers.

Section 112(c)(6) list of categories accounting for 90% of emissions of 7 listed HAPs includes industrial boilers and institutional/commercial boilers.

Different approaches for new vs. existing sources:
- New source standards reflect what is achieved by the best controlled similar source.
- Existing sources reflect what is achieved by the average of the best 12% of existing sources.

Different approaches for large (major) vs. smaller (area) sources.

EPA is directed by court order to propose rules by April 15, 2010 and take final action by December 16, 2010.
- Requires new NESHAPs for new and existing major and area sources of toxic air pollutants.
- It will be effective on the date it is proposed.

Both air toxic pollutant rules:
- require limits based on “maximum achievable control technology” with later evaluations of remaining risk and stricter standards if needed (MACT).
- Will use information on boilers and incinerators and emissions testing, including 37 biomass units.

National Emission Standards for Hazardous Air Pollutants (NESHAPs)
## Size Matters
### Major vs. Area Source

<table>
<thead>
<tr>
<th>Major Source</th>
<th>HAPs (Section 112 CAA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Emits 10 TPY of a single hazardous air pollutant (HAP) or 25 TPY of total HAPs</td>
<td>- Formaldehyde (known to occur from WBM)</td>
</tr>
<tr>
<td>Area Sources</td>
<td>- Hg</td>
</tr>
<tr>
<td>- Emit &lt; 10 TPY of a single HAP or &lt; 25 TPY of total HAPs</td>
<td>- Polycyclic Organic Matter</td>
</tr>
<tr>
<td>Under Section 112 (c)(6) source categories, MACT for both major and area sources applies to both industrial boiler and institutional/commercial boilers for</td>
<td>- Dioxins</td>
</tr>
<tr>
<td>- Mercury</td>
<td>- Acetaldehyde</td>
</tr>
<tr>
<td>- POM</td>
<td>- Polycyclic Aromatic Hydrocarbons (PAH)</td>
</tr>
<tr>
<td>- Alkylated lead</td>
<td>- Benzene</td>
</tr>
<tr>
<td>- Hexachlorobenzene</td>
<td>- Metals</td>
</tr>
<tr>
<td>- Polychlorinated biphenyls</td>
<td>Other Criteria Pollutants (Title I CAA)</td>
</tr>
<tr>
<td>- 2,2,7, 8 tetrachlorodibenzofurans</td>
<td>- CO</td>
</tr>
<tr>
<td>- 2,3,7,8 tetrachlorodibenzo-p-dioxin</td>
<td>- PM 2.5 and 10</td>
</tr>
<tr>
<td></td>
<td>- NOx</td>
</tr>
<tr>
<td></td>
<td>- SOx</td>
</tr>
</tbody>
</table>
Type of Woody Biomass Feedstock Matters

- **Clean wood**: Subject to Boiler MACT Standard
- **Discarded Wood**: Subject to Commercial & Industrial Solid Waste Incinerator MACT Standard
- **WMB Co-fired with Coal**: Subject to Utility MACT Standard
Type of Conversion Technology Matters

<table>
<thead>
<tr>
<th>Boilers</th>
<th>Major sources</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Standards must be set for all emitted toxic air pollutants based on Maximum Achievable Control Technologies (MACT)</td>
</tr>
<tr>
<td></td>
<td>• Smaller sources may be regulated based on less stringent “generally achievable control technology” (GACT) (includes management practices)</td>
</tr>
<tr>
<td></td>
<td>• However, emission limits for mercury and polycyclic organic matter (POM) based on MACT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CISWI</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>• Standards must be set for 9 specific pollutants, not all of which are “air toxics”</td>
</tr>
<tr>
<td></td>
<td>• No provision for GACT for smaller sources</td>
</tr>
</tbody>
</table>
Environmental Conditions at Location of Facilities Matters

- **Attainment vs. Non-attainment**
  - **Attainment area** – a geographic area that meets or does better than the national ambient air quality standards
  - **Non-attainment area** – geographic areas where air pollution levels persistently exceed NAAQS
    - Generate maps at: [http://www.epa.gov/air/data/geosel.html](http://www.epa.gov/air/data/geosel.html)

- **Pollutants include:**
  - 1 and 8 hour Ozone
  - Carbon Monoxide
  - Nitrogen Dioxide
  - Sulfur Dioxide
  - Particulate Matter PM – 10 and 2.5
  - Lead
  - All Criteria Pollutants
Size and Amount of Emissions Matter

- Permitting mainly by State/Local agencies, except Tribal & Territories
- Construction Permits Required for new major or minor sources and modifications on existing sources
- Major Sources in Attainment Areas
  - Defined as emitting ≥ 250 TPY of a regulated pollutant
  - ≥ 100 TPY for listed 28 source categories (including industrial/institutional/commercial boilers)
  - Construction requires Prevention of Significant Deterioration (PSD) permit
    - Best Available Control Technology and Air modeling impacts
    - Significant levels for NOx and SOx are 40 TPY
    - Significant levels for CO are 100 TPY
- New or modified Major Sources in Non-attainment Areas
  - Defined as emitting ≥ 100 TPY of the non-attainment pollutant
  - Construction requires Non-attainment New Source Review (NNSR) permit,
    - Lowest Achievable Emissions Rate (LAER)
    - Offset provisions (often 2:1)
- Operating Permits – Title V, CAA
  - Sources emitting 100 TPY of any regulated air pollutant
  - 10 TPY of any hazardous air pollutant (HAP)
  - 25 TPY of combined HAPs
Control Technologies Are Advantageous for Long-term WBM Use

- Area sources w/o control technologies can lead to non-attainment areas
- Non-attainment triggers States to develop required State Implementation Plans (SIPs) for achieving National Air Quality Standards (NAAQS)
- States and EPA carefully look at NSR permits
- Difficulty in siting large facilities;
  - Offset provisions hard to get
  - Offset emissions in a 2:1 ratio
- Maximizing technology efficiencies contributes to better short- and long-term air quality
- For more info on effective area source control technologies see: [http://www.4cleanair.org/](http://www.4cleanair.org/)
Renewable Energy Standards

- Various RES/RPSs in 29 States + DC
- Variations in:
  - Definitions of eligible renewables
    - varies by State based on locally available cost-effective resources, economic development goals, etc.
  - Fuel diversity State goals for use of RE technologies (e.g., wind, solar, biomass, geothermal)
  - Pricing structures
  - In-state, in-region generation requirements vary
- Pros and Cons of a Federal RES
  - Pros:
    - Could increase minimum goals in states with a low RES if the Federal RES goals are aggressive
    - Encourage reliance on existing regional and state REC tracking systems
  - Cons:
    - Could Create Federal RECs distinct from state RECs for same MWh
    - Could create uncertainty about ownership of Federal RECs in existing contracts
    - Could create possible double-counting for alternative compliance payments

Source: Matt Clouse, Program Director, Green Power Partnership, Office of Air & Radiation, US EPA
Renewable Portfolio Standards

www.dsireusa.org / November 2009

29 states & DC have an RPS
6 states also have goals

State renewable portfolio standard
State renewable portfolio goal
Solar water heating eligible

Solar or customer-sited requirement
Extra credit for solar or customer-sited renewables
Includes non-renewable alternative resources
More RPS-Driven Resource Diversity Is Apparent in Some Regions than in Others

Note: The RED dots go with the right vertical axis
Lots of Considerations

- Availability and type of feedstock, including other demands for that particular resource
- Type of Conversion Technology Used
- Location – attainment / non-attainment
- Amount of btu input and State/local standards
- State/local Amounts and types of emissions
- State and local Renewable Energy Standards