BIOMASS POWER PLANTS

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Agenda

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1. Scope of Paper
2. Fuel and Technology
3. Insurance Risks
4. Conclusion

What is Biomass?

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"All organic matter from plants and animals"

Biomass Categories and Conversion Processes

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Scope of Paper

Combustion of solid biomass:

- **80% of installed global capacity**
- **94% of projects financed in 2013**

Biomass Categories

- Fibrous solids from agricultural and wood processing
- Municipal solid waste & Landfill gas
- Animal waste
- Biogas and liquid biofuels

- Conversion Processes
  - Combustion
  - Gasification
  - Pyrolysis
  - Anaerobic digestion

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Fuel and Technology

Biomass Fuel

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Biomass vs. Conventional Fuel

and contaminants

Examples of Solid Biomass Fuels

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- Sugarcane bagasse
- Straw
- Rice hulls

Examples of Solid Biomass Fuels

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- Switchgrass
- Corn stalks/stover
- Fruit and nut hulls and pits

Variability Within Fuel Types

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Wood Chips

Wood Pellets

Wood Chips

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- High moisture content, compacts easily
- Low energy density
- Large storage area required (often not weather protected)
- Heavy equipment used to move fuel to the boiler
- Higher risk of contamination
- May require additional processing on site before boiler feed

Wood Pellets

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- Low moisture content and free flowing
- Degrades and absorbs moisture easily
- Requires weather proof storage and dust mitigation
- Reclaim should be designed for “first-in, first-out”
- Often pulverized and burned in suspension

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Stoker (Fixed bed) Fired System

- Combustion
  - Fixed bed firing
  - Fluidized bed
    - Bubbling
    - Circulating
- Air Quality
  - Carbon Monoxide
  - NOx emissions
  - Particulate
    - ESPs
    - Baghouses

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Insurance Risks

Construction Risks

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The known and unknown?

- Paper does not cover general construction risks in details
- Typically unique design for a given fuel type and volume
- Does retrofitting biomass make an operational coal fired boiler prototypical?
- Testing and commissioning issues

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How did bacteria ruin my profitability?

- Different fuel types involve individual risk characteristics
- NFPA850 is an important standard for these plants
- Are these power plants or waste management plants and how are they run?

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It’s only a bit of dust.....

- Are the operators of this power plant competent?
- Is the fuel supplied of a standard quality?
- Housekeeping standards matter

Delay in Start Up and Business Interruption

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Where is the income?

- Underwriters need to understand the complexity of the income stream
- Is power generation the key driver for the revenue?
- How much daily income depends on a small steam turbine?
- Fuel costs vs. fuel income?

Conclusions

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Engineering makes a difference

- Biomass is increasingly being used to replace or supplement fossil fuel
- The unique properties of the fuel will have a significant impact on the design, operation and performance of the power plant
- Due to the wide variety of fuel types and usage, every plant is unique and full engineering analysis is needed to properly assess and underwrite each risk

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IMIA Conference 22th to 24th September 2014, Cannes-Mandelieu

Thank you very much for your attention

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