

PA Biomass Energy Association October Conference



Evaluation Guidelines for Commercial Application of Biomass Thermal Energy Systems

March 2, 2015

Slide # 2

Paul Lewandowski

Sales Director

AFS Energy Systems

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Slide # 3

What is Biomass?

All organic matter is known as biomass and the energy released from biomass when it is burnt or converted into fuels is called biomass energy



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Slide # 4

Where is Biomass?

Biomass is obtained from any plant or animal- derived organic matter including wood from trees, Agricultural crops & forest products industry waste.



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Slide # 5

Why Biomass? >

Biomass provides a clean, renewable energy source that dramatically improves our environment and reduces the use of foreign fuel.



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Slide # 6

Why Biomass?

Unlike combustion of fossil fuels, any carbon dioxide released by biomass is balanced by carbon dioxide captured in the recent growth of the biomass. >



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Slide # 7



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Slide # 8

Biomass Reduces Cost\$

Energy from wood residue
biomass costs less than
all other fuels



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Biomass Pay\$

Compare wood chips at \$40 / ton:

Wood Chips \$ 6.56 / MM BTU

No 2 Oil \$21.47 / MM BTU

Propane \$38.36 / MM BTU

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Slide # 10

Biomass Fuel Types



Pellets



Sawmill Chips



**Roadside
Trimmings**



**Whole Tree
Chips**



Yard Waste



Hogged

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Biomass Fuel Sources

- **Saw Mills**
- **Tree Trimming Companies**
- **Fuel Brokers**
- **Fast Growing Tree Farms**

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Slide # 12

Boiler Rooms



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Slide # 13

Boiler Rooms



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Slide # 14

System Components > Fuel Storage > Fuel Bunker



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Slide # 15

System Components > Fuel Storage > Fuel Bunker



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Slide # 16

System Components > Fuel Storage > Fuel Bunker



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Slide # 17

System Components > Material Handling



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Slide # 18

System Components > Material Handling



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Slide # 19

System Components > Material Handling



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Slide # 20

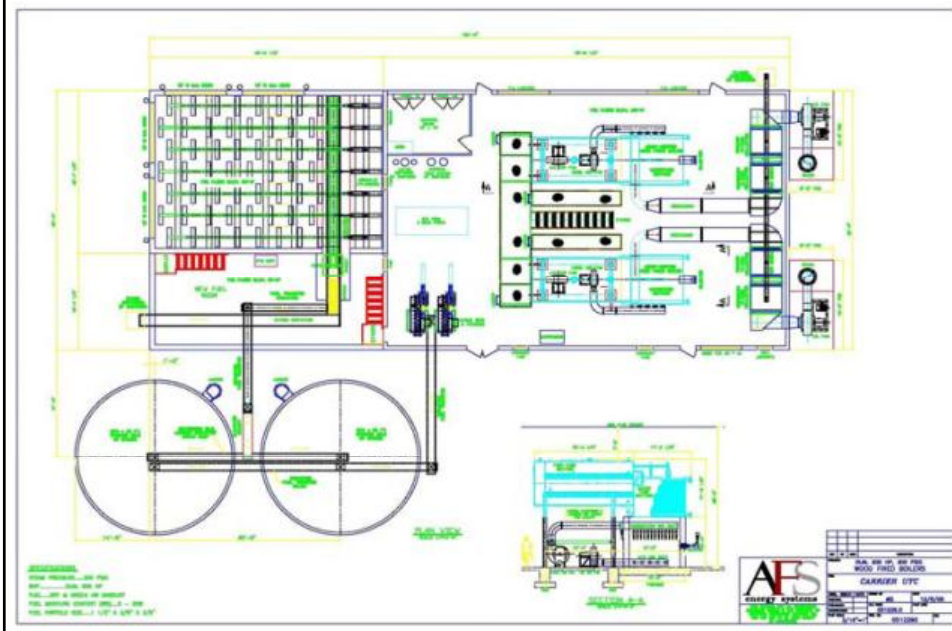
System Components > Metering Bin



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Slide # 21

System Components > Fuel Storage > Silo





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Slide # 23

System Components > Stoker System

AFS Pneumatic Stoker



AFS Overfed Stoker

AFS Underfed Stoker



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Slide # 24

Boiler Systems Basics >

AFS High Pressure Boiler
(150, 300, 450 psig)



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AFS Low Pressure Boiler
(0-15 psig)



Slide # 25

System Components > Firebox & Boiler



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Slide # 26

System Components > Firebox & Boiler



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Slide # 27

System Components > Firebox & Boiler



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Slide # 28

System Components > Emission Control > Fly Ash Collectors



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Slide # 29

System Components > Emission Control > Bag House



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Slide # 30

System Components > Emission Control > E.S.P.



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Slide # 31

System Components > Control System



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Slide # 32

Is my facility a good candidate for a biomass thermal system?

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Slide # 33

(1) Is your present boiler system using coal, oil or propane as the primary fuel?*

**** Yes answers to any of these questions are reason enough to pursue further.**

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Slide # 34

(2) Does your present facility have an existing central plant?

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Slide # 35

(3) Is your facility over 50,000 SF in size?

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(4) Does your facility have thermal loads throughout the year (Steam, HW, CW)? **

**** Yes answers to any of these questions are reason enough to pursue further.**

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Slide # 37

(5) Would you like to control the future impact of rising energy prices?

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(6) Is your present system older than 25 years old? **

**** Yes answers to any of these questions are reason enough to pursue further.**

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Slide # 39

(7) Do you expect to replace, upgrade or retrofit within the next 3-5 years?

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(8) Is it important to your organization to reduce your impact on the environment?

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Slide # 41

(9) Does your present system operate for more than 5000 hours/year?

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(10) Have you implemented energy savings measures and high energy costs remain?

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(11) Do you pay more than
\$.08/kWh total for electricity? **
\$ 3.00/gal for fuel oil? **
\$ 170/ton for coal? **
\$ 1.75/gal for propane? **

**** Yes answers to any of these questions are reason enough to pursue further.**

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Slide # 44

(12) Are ROI payback periods of 5-10 years considered reasonable for you? **

**** Yes answers to any of these questions are reason enough to pursue further.**

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(13) Do you know if you have ready access to wood biomass resources?

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**(14) Have you ever considered a
CHP system for your facility?**

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**(15) Is your facility in a
deregulated electricity market?**

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Slide # 48

(16) Are unscheduled power outages an issue for you?

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Slide # 49

IF YOU ANSWERED YES TO 5 OR MORE OF THESE QUESTIONS an initial preliminary savings analysis is recommended.

Detailed energy cost billings for three previous years with specifics on your existing boiler system size and loads will be required.

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Biomass Applications

Addressing America's Energy Challenges

- **Biomass to Biopower**
- **Combined Heat and Power**
- **Highly Efficient yet Forgotten**
- **80-90% CHCP Systems are Viable!**
- **Results in Reduction of GHG Emissions & Fossil Fuel Dependence + Stronger Local Economy & Energy Security**

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Slide # 51

Biomass to Biopower

- **Promotes Sustainable Forestry Practices**
- **Utilizes Waste Streams:**
 - **Wood, AGM Crops, Forest Residue, Yard Waste, Processed Wood Waste, Municipal Solid Waste & more**
- **Must be Robust & Flexible**

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Slide # 52

System Components > Steam Turbines

The Right Mix...

- **Predictable Demand for Steam**
- **Constant Electrical Load**
- **Alternating Demand for Heating and Cooling**

Good Candidates...

- **Universities, Corporate Campuses, Hospitals & Correctional Facilities**

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Slide # 53

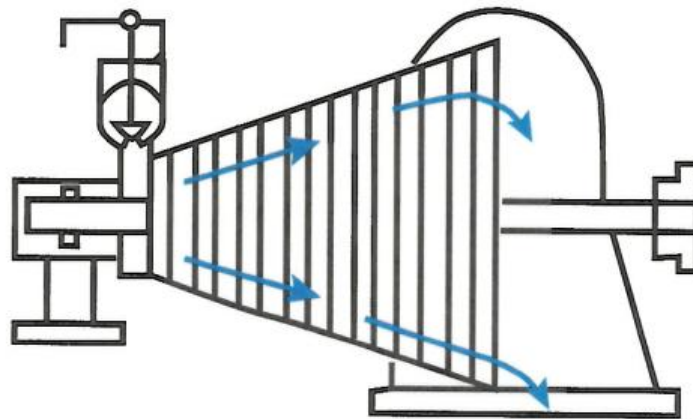
System Components > Steam Turbines

Other Good Candidates...

- **Municipal Waste to Energy**
- **Pulp, Paper & Wood**
- **Oil & Gas Refining**
- **Chemical, Pharmaceutical & Biotech**
- **Alternative Fuels**
- **Industrial Manufacturing**
- **Biomass to Energy**

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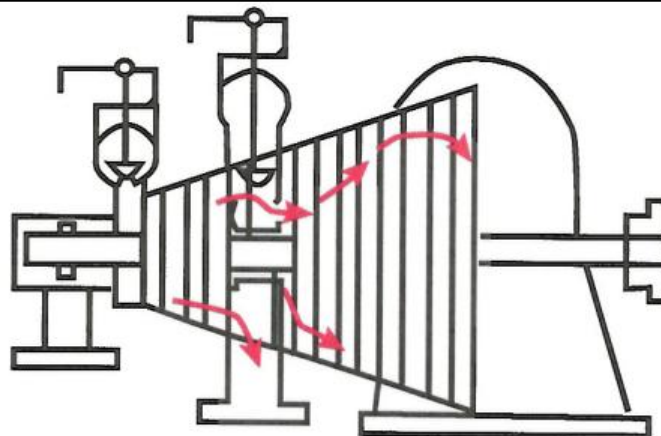
Slide # 54



SINGLE-FLOW CONDENSING are highly economical and require the least steam for a given horsepower. Typically they are direct connected to a high speed compressor.

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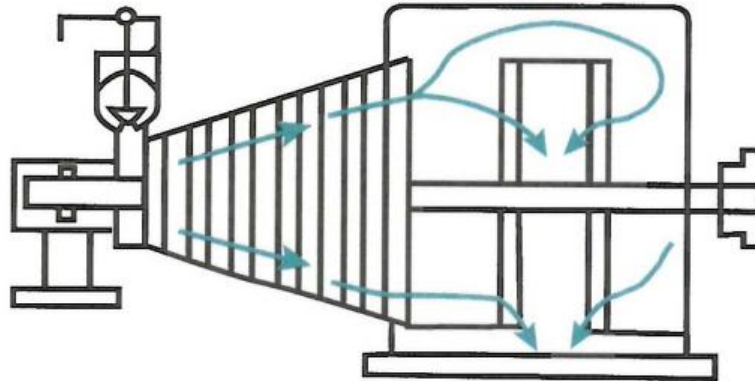
Slide # 55



AUTOMATIC EXTRACTION and/or induction allows for controlled power and process steam pressure by automatically regulating the extraction/induction steam flows.

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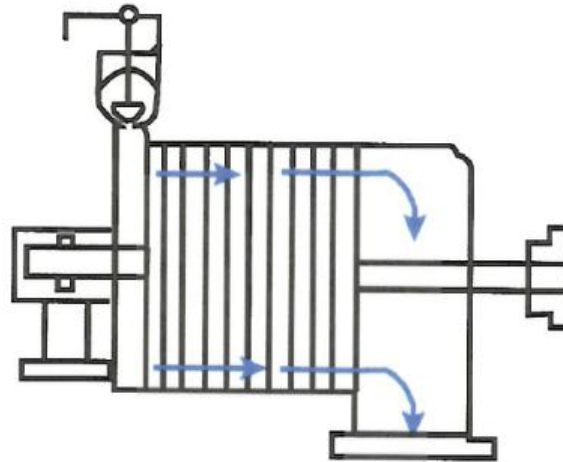
Slide # 56



DOUBLE-FLOW CONDENSING
 accommodates high capacity steam flow for higher speed applications. The exhaust flow is split between two (2) duplicate rows of blades.

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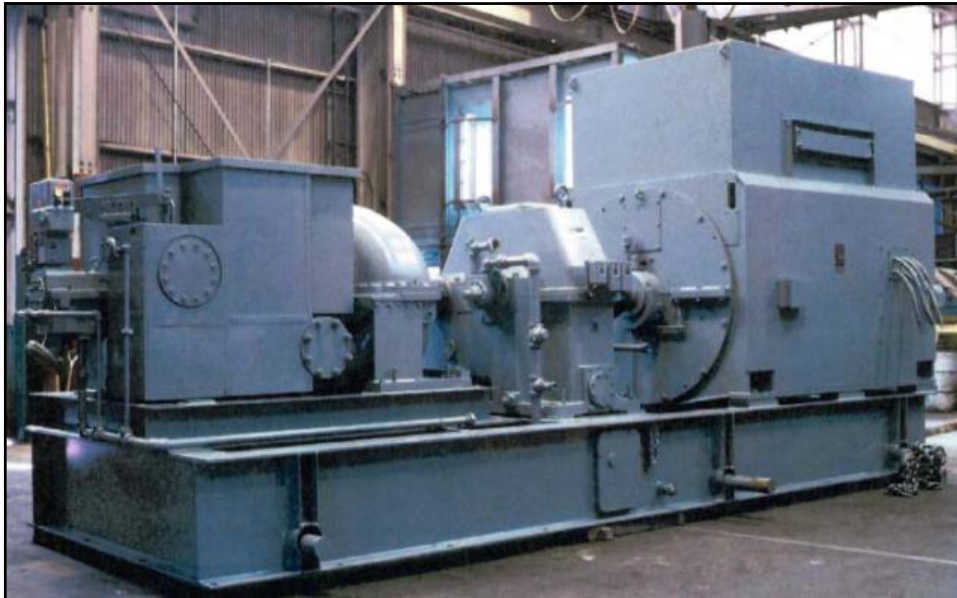
Slide # 57



NON CONDENSING or BACK PRESSURE
 allow further use of the energy in the exhaust steam for process heat or other services.

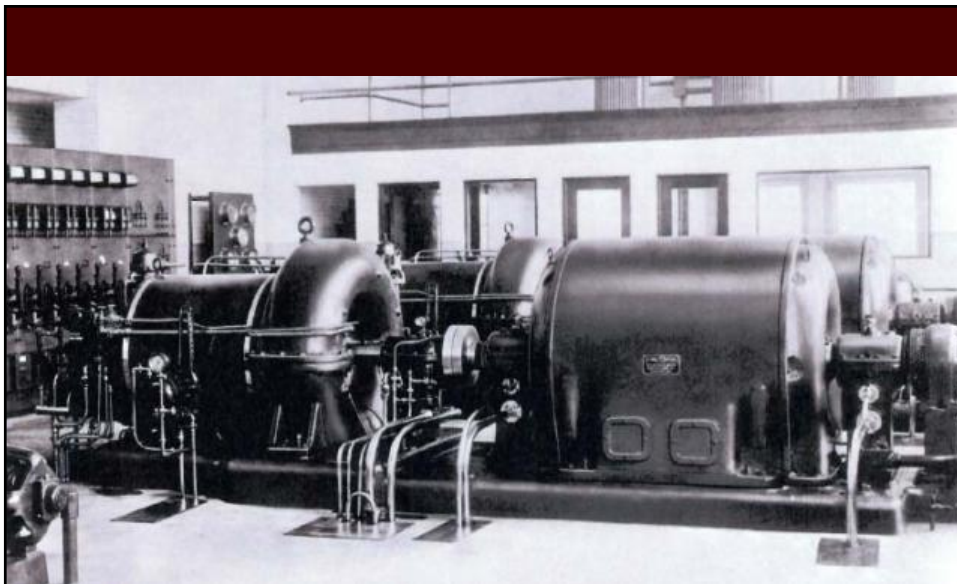
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Slide # 58



March 2, 2015

Slide # 59



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Slide # 60

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Member of DARTMOUTH-HITCHCOCK ALLIANCE

GAINESVILLE
R-V SCHOOL DISTRICT

pennsylvania
DEPARTMENT OF PUBLIC WELFARE

pennsylvania
DEPARTMENT OF CORRECTIONS

Northern Michigan University

EVANGELICAL
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UNIVERSITY

BLOOMSBURG
UNIVERSITY

Johnson Controls

SIEMENS

MEISTER
DAIRY

Sullivan County School District

Bennington College

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Slide # 61

Thank You!

Questions?

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energy systems