

**Introduction to Biomass Energy
Technologies and Applications
Tribal Energy Workshop
Milwaukee, WI
August 7-9, 2012**

Randy Hunsberger
National Renewable Energy Lab

Are there biomass energy projects
that make sense for you?

- Think about:
 - Your resources
 - Your energy use and cost

Government

- negative
- + positive

\$ Money \$

- negative
- + positive

Feedstocks

Wood

- Logs
- Chips
- Pellets
- Sawdust

Agricultural

- Residues
- Closed loop
- Algae

Waste

- MSW
- Tires
- Landfill gas

Anaerobic digestion

- Food waste, human or animal waste

Energy, water, chemicals, people, etc.

Process

Pellet stove or wood stove
Combustor/boiler
+steam turbine
Gasifier
+gas turbine or gas engine
Pelletizer + bagger, etc.

Air emissions,
Liquid emissions,
Solid emissions (ash)

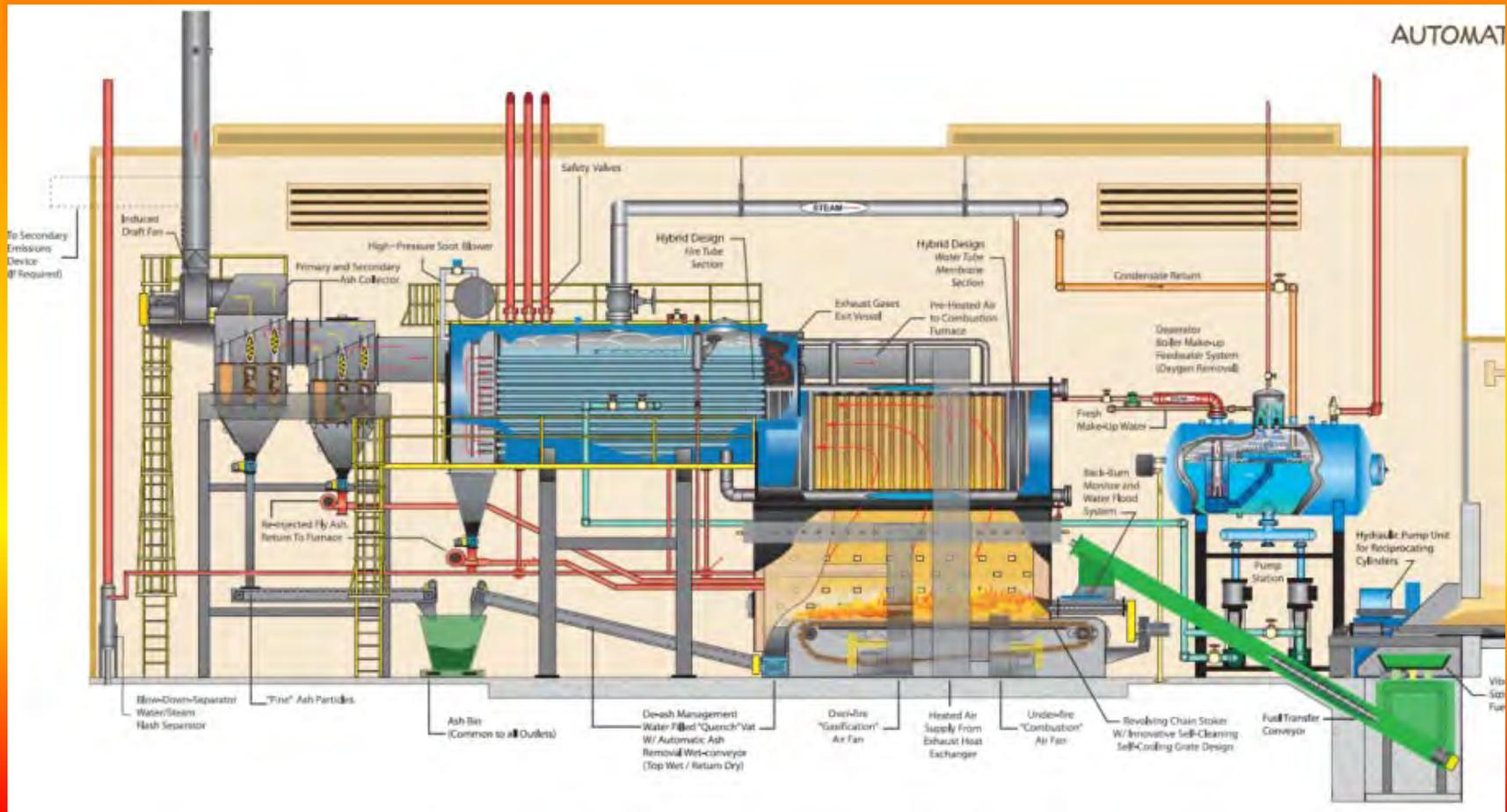
Product /output

Heat
Electricity
Liquid fuels
Gaseous fuels (syngas)
Chips
Sawdust
Pellets

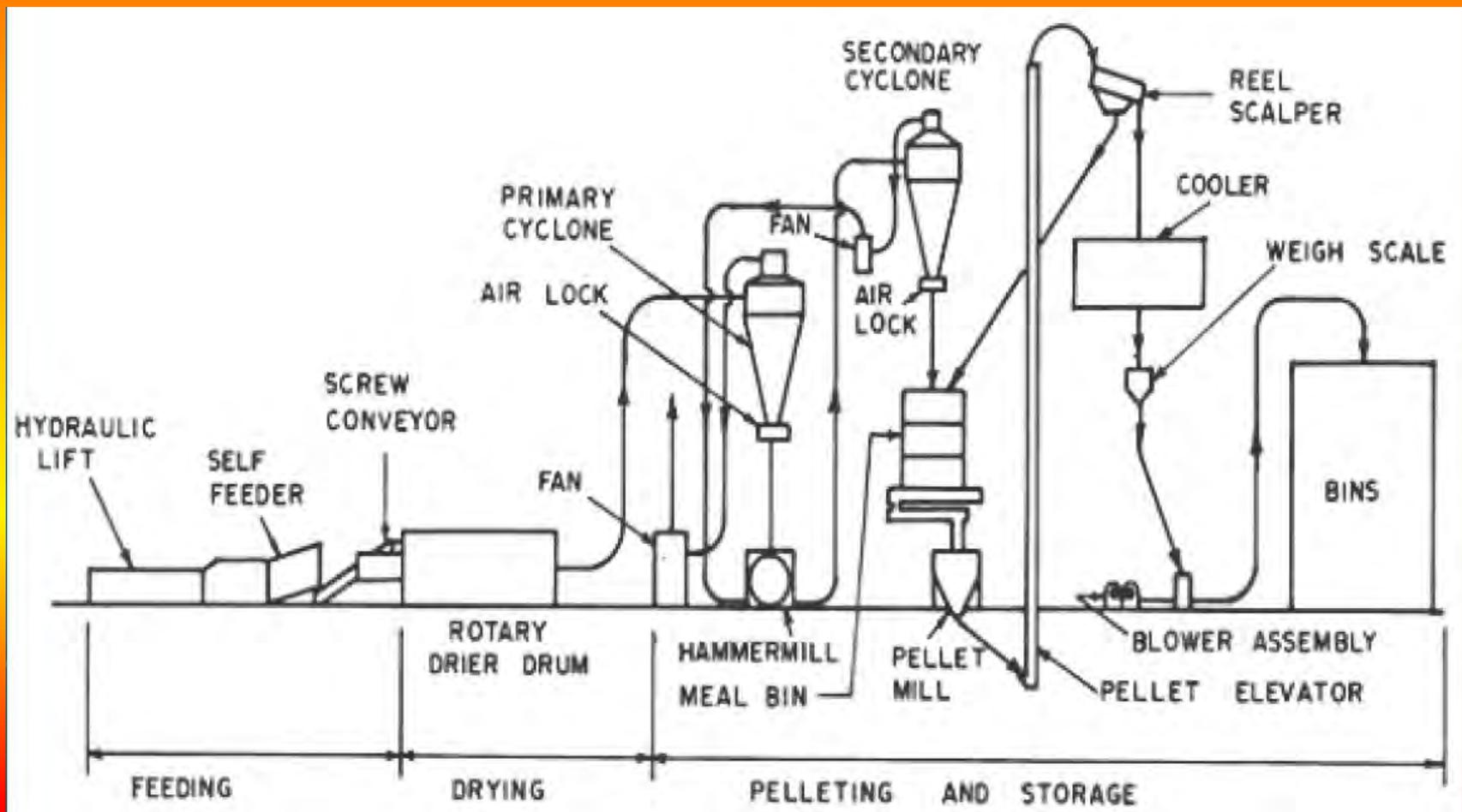
(co-products)

Market

Large-scale biomass heating



Pellet plant production equipment



Pellet cooler inside this enclosure

Dry material (?) just before final hammermill and then off to pellet mill

Wet chips go in here

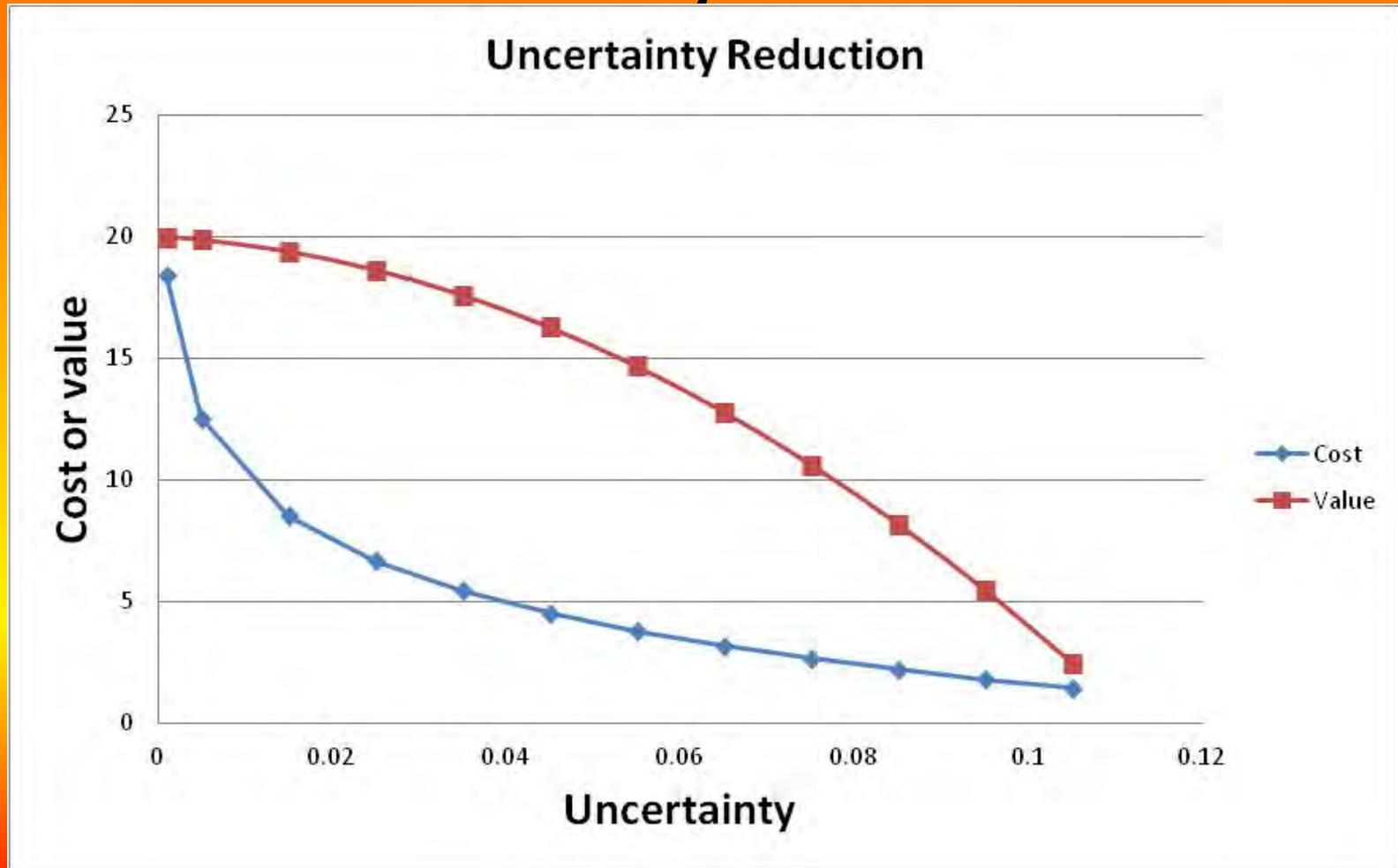
Wet chips from hammermill, chips go to dryer from here



Projects?

- Existing projects
- Planned projects
- Possible projects

Uncertainty Reduction



Contact Information

- **Randy Hunsberger**
- **National Renewable Energy Lab**
- **randolph.hunsberger@nrel.gov**
- **303-275-3214**