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Biomass 2011

A Forest Products Industry Member's View of Bioenergy Integration

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July 26th, 2011

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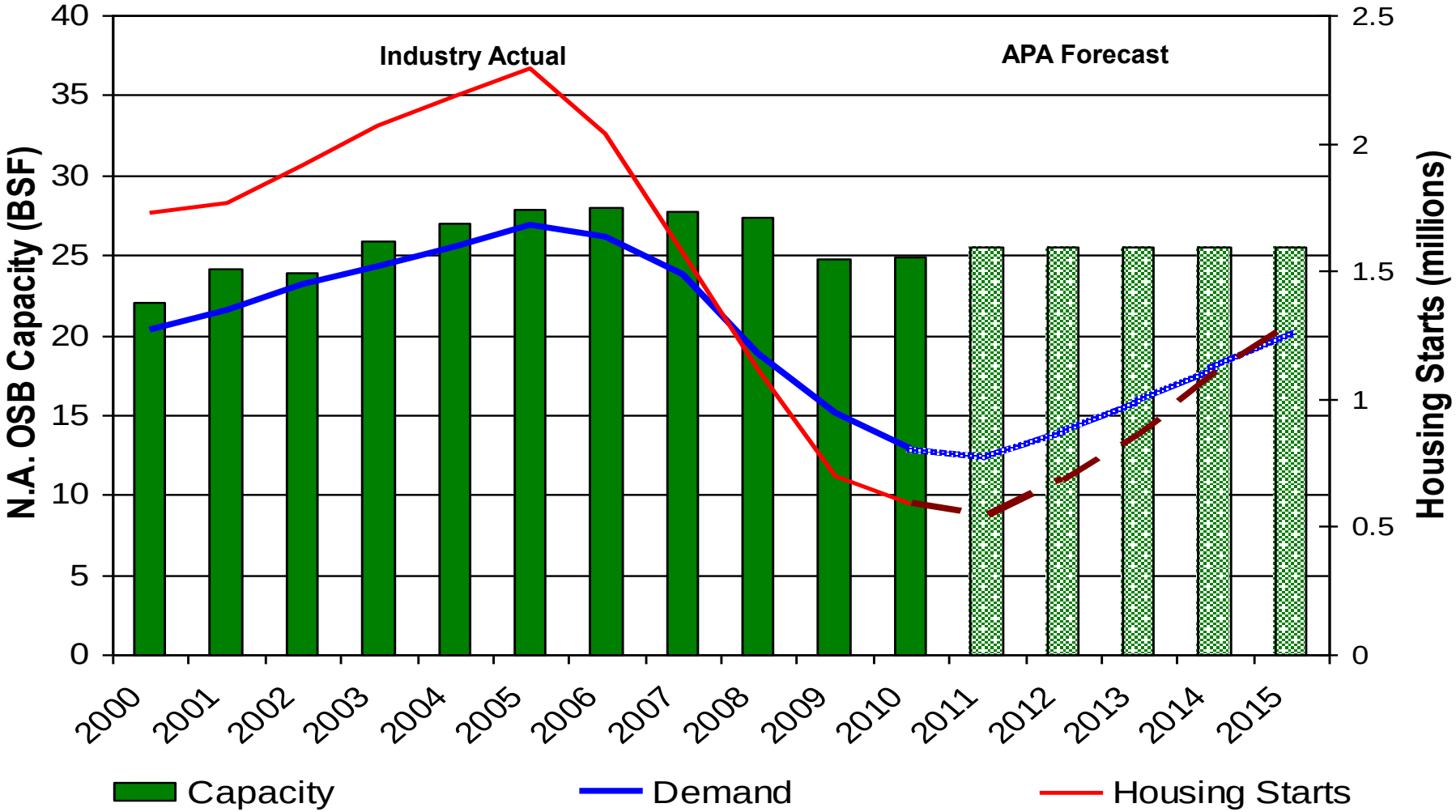
Constrained Supply? – Supply / Demand



Constrained Supply? – Potential Source

North American OSB Capacity
MMSF, 3/8-Inch Basis

Company	Facilities	Operating	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total OSB Facilities (bsf)	74	53	27.8	27.4	24.8	24.8	25.5	25.5	25.5	25.5	25.5
US	47	36	17.0	17.7	16.1	16.1	16.4	16.4	16.4	16.4	16.4
CA	27	17	10.8	9.7	8.7	8.8	9.1	9.1	9.1	9.1	9.1
US % Capacity	64%	68%	61%	65%	65%	65%	64%	64%	64%	64%	64%
Fiber Required to Support Capacity (MDT/Yr)			23.9	23.6	21.3	21.4	22.0	22.0	22.0	22.0	22.0
Sub-Optimal Material (MDT/Yr)			**7.2**	**7.1**	**6.4**	**6.4**	**6.6**	**6.6**	**6.6**	**6.6**	**6.6**
OSB N.A. Demand (bsf)			23.8	18.9	15.1	12.9	12.4	13.0	15.8	18.0	20.1
Supply / Demand Delta (bsf)			4.0	8.6	9.8	12.0	13.1	12.5	9.7	7.5	5.4
Surplus Fiber (MDT/Yr)			**3.4**	**7.4**	**8.4**	**10.3**	**11.3**	**10.8**	**8.4**	**6.5**	**4.6**
Total **Potential Feedstock** from N.A. OSB (MDT/Yr)			**10.6**	**14.4**	**14.8**	**16.7**	**17.9**	**17.3**	**15.0**	**13.1**	**11.2**

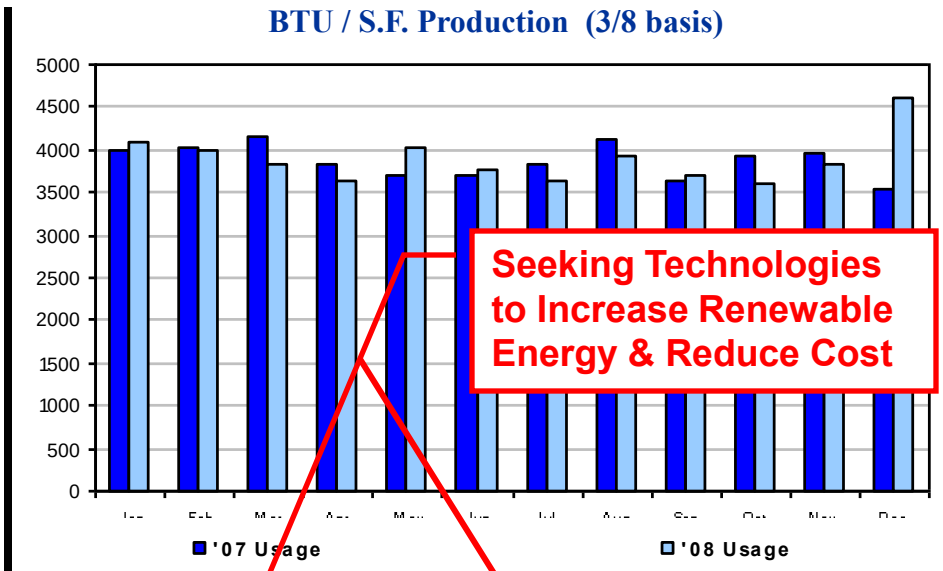
OSB Facility Information: RISI, Inc.

Industry Capacity Forecast: APA

Bioenergy Integration – Energy Consumed

Baseline Context

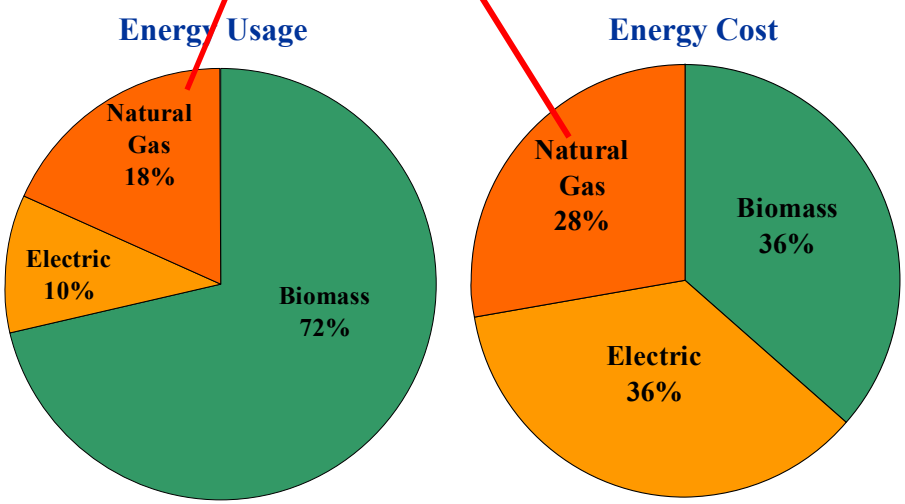
- 2007 Production Volume = 482mmsf
- 2008 Production Volume = 382mmsf
- Utility Usage From 2007 & 2008 Monthly Invoices
- Biomass Values From Plant's Fuel Usage Report
- Feed Rate: Bark @ 673lb/Stroke, Dry Fuel @ 5.8lbs/Turm
- Wet Fuel Mix: Bark@54%, GrnWhite@18%, Purchased@28%
- Biomass Conversion Rates: Wet @ 5120btu/lb, Dry@8500btu/lb
- Electric Converted @ 3414 btu/kw, Gas As Billed
- Exclusive of Propane & Fuel Oil.



Source	Energy (MBTU)	Value (MBTU)	Value (millions)
Biomass	1,318,820	$	
Electric	191,480	$	
Natural Gas	338,668	$	
Propane	0		
Fuel Oil	0		
Total	1,848,967		

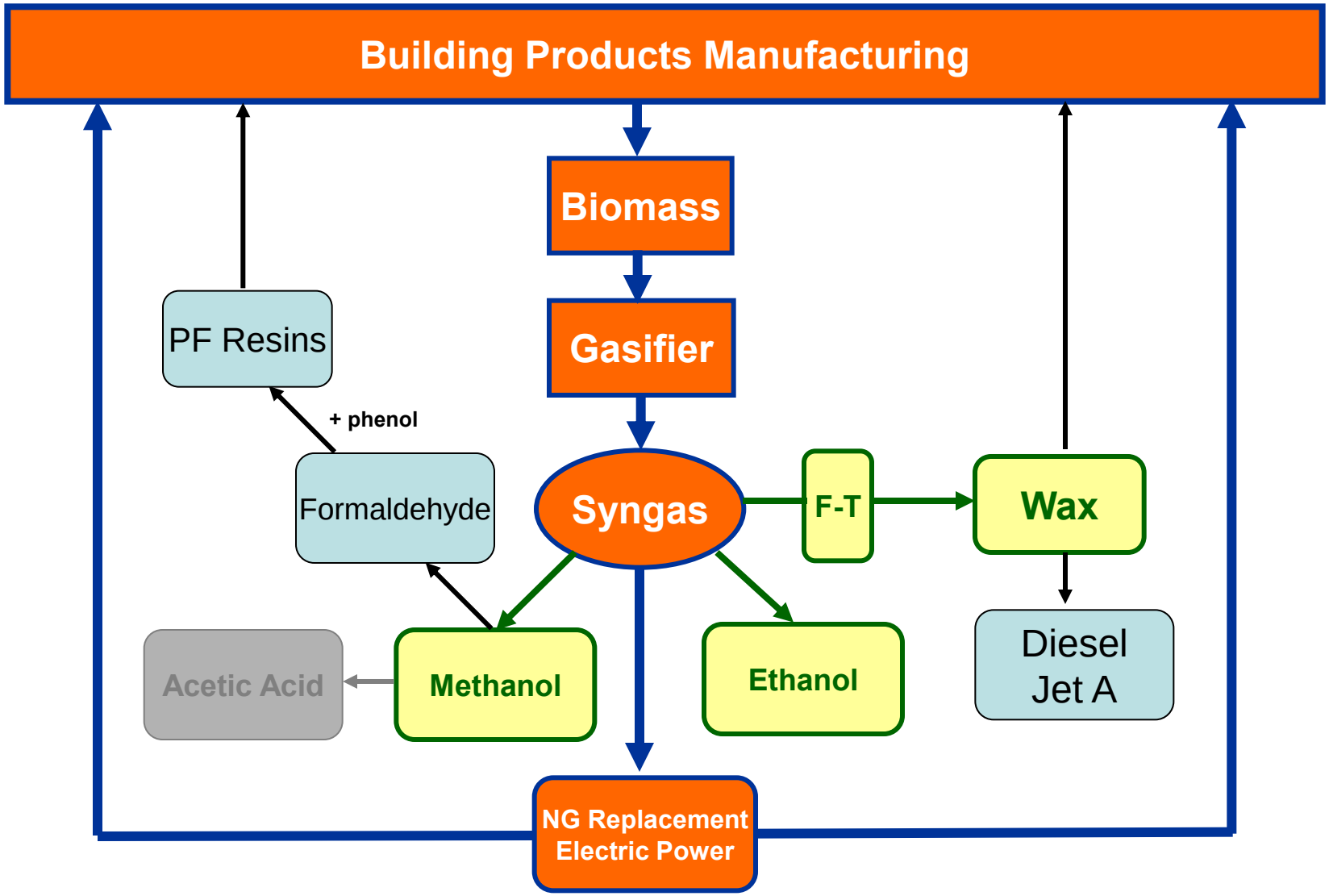
Self Generated

95% for RTOs

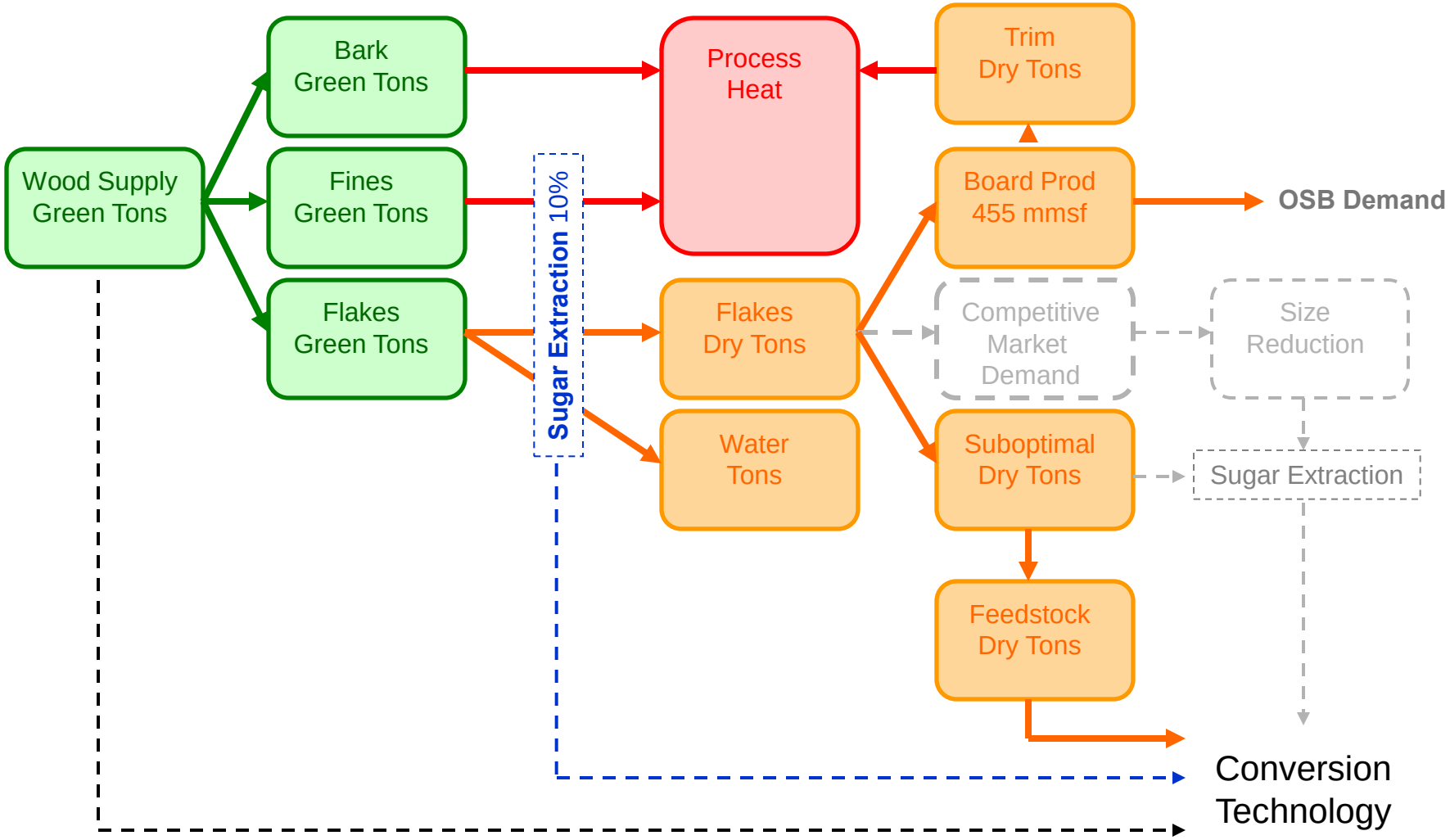


** Green Color Indicates Renewable Energy

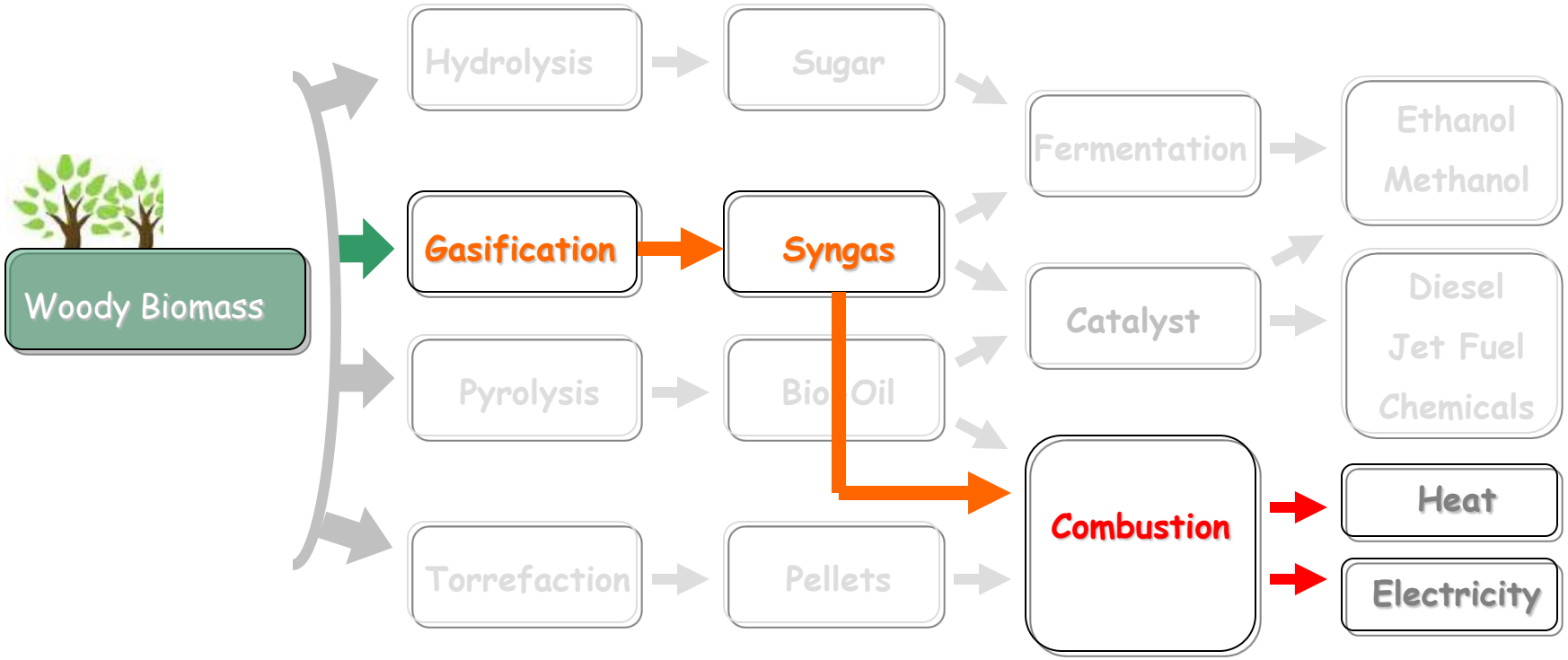
OSB Mfg / Bioenergy Synergy



Integration of Biobased Technologies



Gasification Pathway



Biochemical Conversion - Biomass is broken down to sugars using either enzymatic or chemical processes and then converted to ethanol via fermentation.

Thermochemical Conversion - Biomass is broken down to intermediates using heat and upgraded to fuels using a combination of heat and pressure in the presence of catalysts.

Reference: DOE Multiyear Plan -2010

Gasifier Impact – Incentives Needed

Operational Scenario	
Biomass Feed Rate (ODT / Day)	250
Operational Hours	8,400
Syngas Production (Mbtu/Hr)	201
Reformer Load (Mbtu/Hr)	(60)
RTO Load (Mbtu/Hr)	(40)
Syngas for Power Gen. (Mbtu/Hr)	101
Power Gen – GTG (KW/Hr)	10,500
Power Gen – STG (KW/Hr)	6,500
Net Power Generation (MWH)	142,800
Power Sales / KWH	0.06
Power Sales Revenue (x $1000)	$ 8,568
NG Savings – Ave S.E. (x $1000)	$ 1,295
Adjusted Ave. Electrical Cost	$ (2,905)
Net Revenue	**$ 6,958**

Economics	
Equipment	35,000
Treasury Grant	(10,500)
Investment	24,500
Basic Return	~ 4 Years

Risks / Challenges	
Capital Cost	Too High
Commercial Scale Equipment	Beta Site
Environmental Permitting	Extensive
Electrical Sales	Need Varies
Material Availability	Long Term Solution Needed

Key Points

- The definition of wood fractionation has changed
- Forest Products / Bio-conversion are complementary
- Material is available through existing channels
- Substantial feedstock capacity currently in place
- Situational – One technology does not fit all applications
- Integration provides the best chance of success