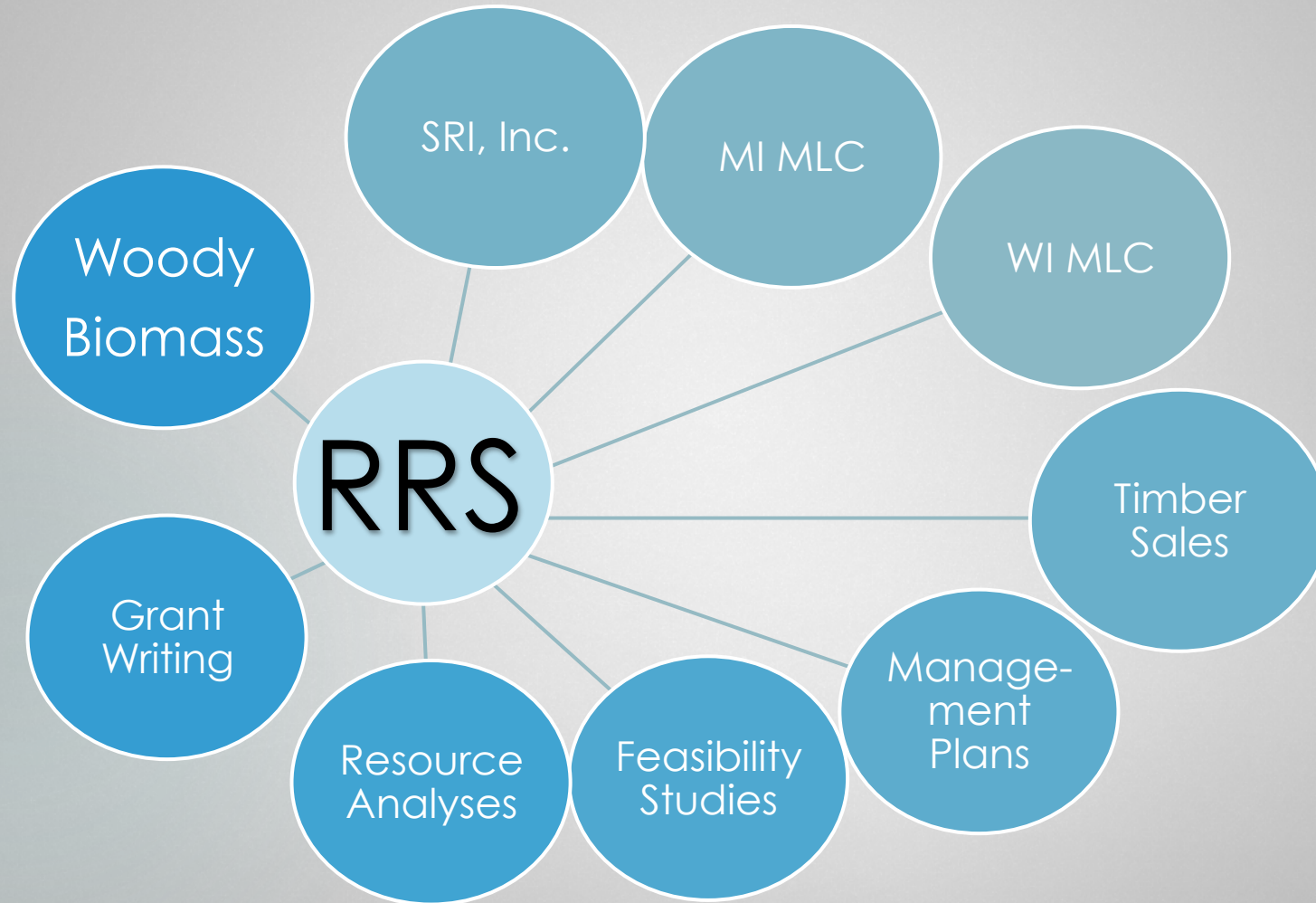




Woody Biomass: What, Where, & How Much

HEATING THE MIDWEST APRIL 2014

Renewable Resource Solutions, LLC



Upper Great Lakes Timber Resources

	Net Growth (M cubic ft)	Mortality (M cubic ft)	Harvest (M cubic ft)	Forestland (M acres)
Wisconsin	652.5	307.5	355.0	16.3
Michigan	698.4	271.8	334.8	19.5
Minnesota	391.6	365.3	220.9	16.4



Renewable Fuel Availability
Extraction, and Usage
Potential Impacts Study 2011

WI Timber Products Assessment

Plan of Work

Task 1	Survey forest industry in WI to identify the amount of wood production
Task 2	Survey WI companies/municipalities involved in tree removal
Task 3	Conduct a sampling of manufacturing companies in WI
Task 4	Survey all landfills in WI
Task 5	Identify WI timber sales by ownership, timber type, sale type, etc.
Task 6	Identify logging residue tonnage per acre annually

Total Wood Residue from all Sectors (excluding Logging)

Sector	Total Residue (Tons)
Primary wood manufacturing	692,752
Secondary wood manufacturing	944,703
Municipality	278,478
Tree Service Companies	70,744
Pallets	228,882
Dunnage	99,660
Landfill	19,438
Total	2,334,657

Primary Wood Manufacturing Industry Survey

Total Residue = 692,752 tons

Sold: 65.45% (453,389)

Given Away: 0.09% (622)

Process on Site: 8.95% (62,036)

Unknown: 25.51% (176,706)

Primary Wood Manufacturing Industry Survey (cont.)

Manufacture of fiber or composite products: 184,435

Animal bedding: 100,486

Fuel: 275,230

Mulch: 98,188

Miscellaneous uses: 18801

Not used: 15,612

Secondary Wood Manufacturing Industry Survey

Total Residue = 944,703 tons

Sold: 30% (287,963)

Given Away: 54% (510,153)

Process on Site: 5% (43,089)

Unknown: 11% (103,498)

Secondary Wood Manufacturing Industry Survey (cont.)

Manufacture of fiber or composite products: 93,468

Animal bedding: 603,543

Fuel: 85,013

Other bio-energy products: 99,591

Mulch: 61,029

Not used: 1,953

Municipalities

- ▶ **78,703 total annual green tons**
- ▶ *162 responses = 486 tons per company*
- ▶ *573 companies x 486 tons per company =*
278,478 green tons potentially available

Tree Service Companies

- ▶ **12,927 total annual green tons**
- ▶ *54 responses = 239 tons per company*
- ▶ 296 companies x 239 tons per company = **70,744 green tons potentially available**

Manufacturing (Non-Wood)

	Employee Size Class Categories						
Employee Size Class Categories	1-4	5-19	20-49	50-99	100-249	250-499	500+
Total Companies in Class	2,453	4,906	2,617	1,263	1,026	343	178
Total Surveyed	152	330	877	919	821	294	178
Survey Success	19%	18%	17%	12%	12%	10%	12%

Average Annual Tons of Pallets

Total Disposed Of	Total Utilized	Total
76,529.86	152,352.03	228,881.89

Average Annual Tons of Dunnage

Total Disposed Of	Total Utilized	Total
34,132.08	65,528.03	99,660.11

Wisconsin Landfill Survey Summary

Survey Responses: 90 In, 369 No Response (459 Total)

	Survey Totals	Extrapolated Totals
Landfilled	11,527	47,452
Recycled	43,702	179,509
Sold	4,573	19,438
Total	59,802	246,399

Green Ton Availability – Logging Residue

Ownership	Green Tons Potentially Available Annually
Federal	138,657
State	85,750
County	635,178
Private Tax-Law	773,557
Private Non-Tax Law	773,557
Total	2,406,699

Logging Residue Study

Timber Type & Harvest	Dry Tons per Acre
Northern Hardwoods (selective) (10)	8.1
Aspen (regeneration) (3)	18.7
Red Oak (regeneration) (1)	28.2
Red Oak (thinning) (2)	12.5
Red Pine Plantation (thinning) (2)	8.6
Red Maple ((regeneration) (2)	22.3
Jack Pine (regeneration) (2)	24.0

Logging Residue

Mechanized
Cut-to-Length



Biomass – Adapted Forwarder



Logging Residue

Whole Tree



Logging Residue

- ▶ Tops/branches – chipped at landing
- ▶ Fuel rods – chipped in woods or hauled to plant

Fuel Rods

- ▶ Bole wood
- ▶ Below usable length for other products
- ▶ Branches and small top is left
- ▶ No extra investment
- ▶ Nutrients not an issue
- ▶ Easy to dry

Resource Analysis For a Biomass Facility

- ▶ Potentially available
- ▶ Really available
- ▶ At what price?

Reality



- ▶ Procurement radius
- ▶ What's available in that radius?
- ▶ At what price?

WE Domtar Plant

“Rothschild biomass plant only getting 10% of fuel from forest waste”

stevenspointjournal.com

WE Domtar Plant

50 Megawatt

500,000 tons of biomass annually

WE Domtar Plant

Sources

- ▶ Wood from land cleared of trees for conversion
- ▶ Residue from saw mills & paper mills

Pellet Plants – WI & MN

Plant	City	State
AMERICAN WOOD FIBERS	SCHOFIELD	WI
DEJNO'S INC.	KENOSHA	
FIBER RECOVERY INC.	RINGLE	
GREAT LAKES RENEWABLE ENERGY	HAYWARD	
INDECK ENERGY - BIOFUEL CENTER	LADYSMITH	
MARTH PESHTIGO PELLET COMPANY	PESHTIGO	
MARTH WOOD SHAVINGS SUPPLY	MARATHON	
SUPERIOR WOOD PELLETS	NIAGARA	
THE PELLET COOP	PIERZ	MN

Pellet Plants - MI

Plant	City
KIRTLAND PRODUCTS	BOYNE CITY
MAEDER BROTHERS WOOD PELLETS	WEIDMAN
MICHIGAN TIMBER & TRUSS	FLINT
MICHIGAN WOOD FUELS	HOLLAND
VULCAN WOOD PRODUCTS	VULCAN
WOLVERINE HARDWOOD PELLETS	AU GRES
AMERICAN PELLET COMPANY	CORUNNA
EQUUSTOCK	CLARE
FIBER BY-PRODUCTS	WHITE PIGEON
ISABELLA PELLET	LAKE ISABELLA

Urban Logging

- ▶ Lower cost of removal
- ▶ High efficiency
- ▶ Marketable volumes
- ▶ Potential cost offset by marketing wood products

Oak Creek, WI

- ▶ Urban Logging Demonstration Project
- ▶ November 2010



Cutting a tree near an office



13 trees cut, processed, and ready for removal



Forwarder moving wood

Oak Creek Summary

516 Trees removed at a cost of
\$50.19/tree

Questions?

