



Report

Jobs Creation in PPI and Energy Alternative
in the United States

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American Forest and Paper Association
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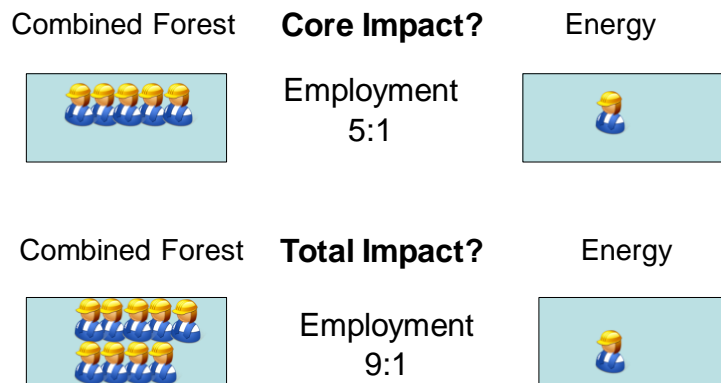
EXECUTIVE SUMMARY

AF&PA engaged RISI to assess the employment impact of the emerging bioenergy sector and compare its impact to that of the traditional forest products industry including pulp and paper and solid wood products industry. The results of this study are communicated in this report and confirm the research done in Europe and Canada showing that the traditional forest products industry creates more employment for the same amount of wood consumed than the emerging bioenergy industry. In this study bioenergy industry sector was defined as electric generation using wood biomass as primary fuel, pellets and cellulosic ethanol.

Employment impact comparisons were made between the forest products industry as a whole, and the pulp and paper and solid wood products processing industries separately. Job impact was measured at both “core level” that considered only primary production and as “total impact” that included value-added manufacturing and wood procurement operations.

The results indicate, that the U.S. combined forest product industry creates 5 times as many jobs as the alternative energy sector for the same volume of wood consumed. If the downstream and upstream employment is considered, the impact is 9 times higher for combined forest product industry. In the case of solid wood processing industry these employment impact ratios were 6:1 at core level and 11:1 total in favor of the wood processing industry. And for pulp and paper the same ratios were also favorable, 4:1 at core level and 8:1 for total impact.

Comparison of Employment Impact of U.S. Traditional Forest Products Industry and Energy Alternative



1. INTRODUCTION

AF&PA is undertaking an analysis to identify policies that would encourage the use of forest resources to maximize job creation, while ensuring environmental and commercial sustainability. As part of this study, AF&PA engaged RISI to assess the employment impact of the emerging bioenergy sector and compare its impact to that of the traditional forest products industry including pulp and paper and solid wood products industry.

We thank AF&PA for the opportunity to assist their organization in this engagement and wish that the results will be useful in promoting effective and sustainable policies.

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2. STUDY SCOPE

The study compared the employment impact of the traditional U.S. forest products industry manufacturing and the emerging bioenergy sector. The employment impact was measured in two ways:

- ▶ Core impact, which included only primary production
- ▶ Total impact, which in addition to primary production also included downstream (first order converting/value-added) and upstream industries (fiber procurement operations)

The forest products industry included both pulp and paper industry (PPI) that consumes virgin fiber and solid wood products industry. Energy alternative comprised pellet and cellulosic ethanol, and the electric utility sector.

3. METHODOLOGY

The employment impact was calculated both in absolute terms (e.g. 0.08 employees per 1000 short tons of wood) and as a multiplier (e.g. 2:1) per same amount of wood consumed by pulp and paper, solid wood products industry, combined forest products industry and three energy alternatives (pellets, electricity generation, cellulosic ethanol). The wood consumption used as the base in calculations was the actual volume consumed by the pulp and paper and solid wood processing industries in 2009.

The employment intensity of the energy alternatives varies by sector and RISI applied weights to develop a combined employment impact estimate. The weights represented share

of wood consumption accounted by each of the three energy segments in 2015, reflecting existing industry capacity in 2009 and projected growth over the next five years according to new capacity announcements. Based on this analysis, electricity generation accounted for 71% of energy alternative combined fiber demand, pellet manufacturing 25% and cellulosic ethanol 4%.

The down-stream value-added operations for pulp and paper industry included a wide range of paper and paperboard converting and for solid wood industry all but lumber manufacturing and wood treating. For alternative energy industry there was no comparable value-added processing operations other than wood procurement.

Employment in fiber procurement or logging was assumed to be the same between pulp and paper versus energy alternative and solid wood versus energy alternative for the same amount of wood consumed.

The key data sources used in the analysis included:

- U.S. pulp and paper and solid wood products industry 2009 production and wood consumption data is from RISI databases.
- The bioenergy industry sector growth and share of wood consumption was based on RISI estimates and databases on existing and new bioenergy projects.
- Wood consumption in the solid wood processing industry was calculated as the sum of log demand for the production of lumber, plywood and OSB less pulpwood chips consumed by pulp mills.
- Pulpwood chip consumption in pulp and paper industry was reported in cords, RISI made the conversion into short tons by using a multiplier of 2.35.
- The U.S. pulp and paper and solid wood products industry employment data for the primary, value-added and fiber procurement operations came from Bureau of Labor Department surveys.
- Logging includes employment for cutting timber; cutting and transporting timber or producing wood chips in the field or all of the above. BLS reports logging employment for the forest products industry as a whole, and RISI estimated the pulp and paper industry share of the logging employment based on the relative shares of total industry wood consumption
- RISI developed estimates for alternative energy sector employment utilizing published studies (USDA Forest Service study on North American pellet industry), RISI databases on new project announcements and the reported plant level employment numbers, as well as interviews with Department of Energy representatives, research universities, industry associations and other experts.

4. RESULTS

The combined U.S. forest products industry creates five times as many jobs as the alternative energy sector for the same volume of wood consumed (see Table 1 for details). If the downstream and upstream employment is considered, the impact is nine times higher for the combined forest products industry. In absolute terms, the core employment impact of the combined forest products industry is 0.64 jobs per 1000 st of wood consumed, while the alternative energy sector creates 0.13 jobs. When the total industry impact is considered, forest products industry creates 2.63 jobs per 1000 st of wood, while the alternative energy impact is only 0.28.

Table 1: Summary of Employment Impact Ratios

Employment Impact (per 1000 st of wood)

	Core	Total		Core	Total		Core	Total
Pulp and Paper	0.57	2.09	Solid Wood	0.77	3.55	Solid Wood	0.64	2.63
Bioenergy	0.13	0.25	Bioenergy	0.13	0.31	Bioenergy	0.13	0.28
Pellets	0.33	0.45	Pellets	0.33	0.5	Pellets	0.33	0.48
Biopower	0.07	0.19	Biopower	0.07	0.24	Biopower	0.07	0.22
Cellulosic ethanol	0.06	0.18	Cellulosic ethanol	0.06	0.23	Cellulosic ethanol	0.06	0.21

Impact ratios

	Core	Total		Core	Total		Core	Total
Pulp and Paper			Solid Wood			Combined Forest Prod.		
Bioenergy	4:1	8:1	Bioenergy	6:1	11:1	Bioenergy	5:1	9:1
Pellets	2:1	5:1	Pellets	2:1	7:1	Pellets	2:1	6:1
Electric Power Plants	8:1	11:1	Electric Power Plants	9:1	14:1	Electric Power Plants	9:1	12:1
Cellulosic ethanol	10:1	12:1	Cellulosic ethanol	11:1	14:1	Cellulosic ethanol	11:1	13:1

The solid wood products processing industry is particularly important in terms of its employment impact. For example, the lumber and wood treating operations create six times as many jobs as the alternative energy sector for the same amount of wood consumed (i.e. core impact). When wood-based panel, engineered wood and other value-added industry employment is also considered, the impact of solid wood industry is eleven times higher than that of energy alternative (i.e., total impact).

For pulp and paper sector, the multiplier for core impact (PPI vs. energy alternative) is 4:1 and for the total impact 8:1. As is indicated by the previous table, the jobs multipliers turn out to be even higher relative to stand-alone electricity plants. The paper industry, for instance, sustains 8 more core jobs and 11 times more total jobs for a given volume of wood consumption compared with stand-alone electricity plants.

The results of this study, undertaken by RISI, concur with other similar studies done in Europe and Canada. A study completed by The Confederation of European Paper Industries (CEPI) in 2006 (“Value Added and Employment in PPI and Energy Alternative”) concluded that the European pulp and paper industry created at core level 6 jobs for every job created by the energy alternative. When total employment creation was considered, the ratio was 13:1 in favor of the PPI alternative.

Table 2: Pulp and Paper Employment Impact

Pulp and paper industry	
	2009
Paper Production (1)	79.0 Million ST
Pulp Production (1)	54.2 Million ST
Pulp yield	3.8 Green Ton/Ton of Pulp
Wood consumption (2)	206.2 Million ST
Employment	
Pulp and paper mills (3)	116.6 Thousands
Logging (4)	24.6 Thousands
Converted paper product manufacturing (5)	290.8 Thousands
Total	432.0
Short Tons	
Core employment ratio (employment per 1000 Short Tons)	
Pulp and paper mills	0.57
Logging	0.12
Converted paper product manufacturing	1.41
All Segments	2.09

(1) RISI

(2) RISI

(3) Bureau of Labor Statistics (NAICS 3221)

(4) Bureau of Labor Statistics (NAICS 1133 adjusted for pulp and paper industry)

(5) Bureau of Labor Statistics (NAICS 3222 - Converted paper product manufacturing)

The total wood consumption in the U.S. pulp and paper industry in 2009 was 206.2 million green short tons. At this level of wood consumption, the industry created 116,600 jobs at pulp and paper mills and 290,800 in converted paper manufacturing operations. Logging created another 24,600 industry jobs. Based on this data, the total jobs impact for the sector is 2.09 per 1000 short ton of wood consumed, of which primary processing accounts for 27%, wood procurement 6% and paper & board converting for 67%.

A detailed listing of industries included under the primary and converting operations is provided in the appendices. However, as a general rule, primary processing plants included market and integrated pulp mills as well as paper and paperboard mills. Paper converting operations included plants that convert paper or paper board without making paper or paperboard, and ranged from box and bag plants to facilities making stationery and disposable diapers, food trays and dishes.

Table 4: Solid Wood Products Industry Employment Impact

Solid Wood	
	2009
Wood consumption (1)	116.5 Million Short Tons
Employment	
Sawmills and wood preservation (2)	89.8 Thousands
Veneer, plywood and engineered wood product manufacturing (3)	40.2 Thousands
Logging (4)	20.4 Thousands
Other wood product manufacturing (5)	263.2 Thousands
Total	413.7
Short Tons	
Core employment ratio (employment per 1000 Short Tons)	
Sawmills and wood preservation	0.77
Veneer, plywood and engineered wood product manufacturing	0.35
Logging	0.18
Other wood product manufacturing	2.26
All Segments	3.55

Source notes:

- (1) RISI
- (2) Bureau of Labor Statistics (NAICS 3211)
- (3) Bureau of Labor Statistics (NAICS 3212), Production only
- (4) Bureau of Labor Statistics (NAICS 3219)
- (5) Bureau of Labor Statistics (NAICS 1133 adjusted for solid wood industry)

The U.S. solid wood products industry consumed 116.5 million short tons of wood in 2009, while the total employment in the sector was 413,700. Employment in the “core” sector (the lumber and wood treating industries) was nearly 90,000. Veneer, plywood and engineered wood products manufacturing created 40,200 jobs and logging 20,400. The secondary wood processing industry that includes establishments engaged in millwork, door and window, pallet/wood container and manufactured/pre-fab home industries employed 263,200 accounting for 63% total employment in the sector, underscoring the significance of the value-added industry impact in job creation.

Based on this data, the total jobs impact for the sector is 3.55 per 1000 short ton of wood consumed, of which lumber, panel and EWP processing accounts for 32%, wood procurement 10% and other wood products manufacturing for 63%.

The results for the U.S. pulp & paper and solid wood industries combined are presented in Table 5 on the following page.

Table 5: Combined Forest Products Industry Employment Impact

	2009
Wood Consumption	
Pulp & Paper Industry	206.24 Million ST
Solid Wood Industry	116.48 Million Short Tons
Total	322.7
Weights	
Pulp & Paper Industry	0.64
Solid Wood Industry	0.36
Short Tons	
Core employment ratio (employment per 1000 Short Tons)	
Direct (Sawmills & wood preservation and paper and pulp mills)	0.64
Downstream (Converted Paper & Veneer, plywood, engineered and other wood product)	1.84
Upstream (Logging)	0.15
Total	2.63

Table 6: Bioenergy Sector Employment Impact: Energy Alternative versus Pulp and Paper Industry

Energy Alternative I (comparison to Pulp and Paper Industry)			
Bioenergy sectors	2009 Distribution (1)	2009 Wood consumption (2)	
Pellets	25% % share	52 Million Short tons	
Electric utilities	71%	146	
Cellulosic ethanol	4%	8	
Total	100%	206.2	
Employment impact estimates			
	Per 1000 st of wood (5)	Per 1000 st of wood volume weighted (6)	Employment (7) Thousands
Core employment ratio			
Pellets (3)	0.33	0.08	17.0 Pellet industry
Electric utilities (4)	0.07	0.05	10.2 Electric utilities
Cellulosic ethanol (4)	0.06	<u>0.00</u>	<u>0.5</u> Cellulosic ethanol
Sub-total		0.13	27.8 Core jobs
		<u>0.12</u>	<u>24.4</u> Logging jobs (8)
All segments (9)		0.25	52.2

Source notes:

- (1) RISI forecast, share US bioenergy sector wood consumption in 2015
- (2) 2009 US pulp and paper industry wood consumption
- (3) from USDA Forest Service pellet industry study
- (4) new project announcements
- (5) calculated sector average wood consumption per 1000 short tons of wood, utilizing data from sources (3) to (4)
- (6) volumed weighted employment impact: distribution, % x sector specific employment impact, per 1000 st of wood
- (7) calculate total employment by sector: wood consumption, million st x sector specific employment impact, per 1000 st of wood
- (8) logging jobs assumed same as from 2009 pulp and paper industry case
- (9) represents total employment impact, including core employment and logging jobs, per 1000 st of wood

Table 7: Bioenergy Sector Employment Impact: Energy Alternative versus Solid Wood Products Industry

Energy Alternative II (comparison to Solid Wood Products Industry)			
Bioenergy sectors	2009 Distribution (1)	2009 Wood consumption (2)	
Pellets	25% % share	29 Million Short tons	
Electric utilities	71%	83	
Cellulosic ethanol	4%	5	
Total	100%	116.5	
Employment impact estimates			
Core employment ratio	Per 1000 st of wood (5)	Per 1000 st of wood volume weighted (6)	Employment (7) Thousands
Pellets (3)	0.33	0.08	9.6 Pellets
Electric utilities (4)	0.07	0.05	5.8 Electric utilities
Cellulosic ethanol (4)	0.06	<u>0.00</u>	<u>0.3</u> Cellulosic ethanol
Sub-total		0.13	15.7 Core jobs
		<u>0.17</u>	<u>20.3</u> Logging jobs (8)
All segments (9)		0.31	36.0 Total

Source notes:

- (1) RISI forecast, share of US bioenergy sector wood consumption in 2015
- (2) 2009 US solid wood products industry wood consumption
- (3) from USDA Forest Service pellet industry study
- (4) new project announcements
- (5) calculated sector average wood consumption per 1000 short tons of wood, utilizing data from sources (3) to (4)
- (6) volumed weighted employment impact: distribution, % x sector specific employment impact, per 1000 st of wood
- (7) calculate total employment by sector: wood consumption, million st x sector specific employment impact, per 1000 st of wood
- (8) logging jobs assumed same as from 2009 pulp and paper industry case
- (9) represents total employment impact, including core employment and logging jobs, per 1000 st of wood

Tables 6 and 7 show the alternative energy employment impact calculations, assuming wood consumption levels similar to U.S. pulp and paper industry and solid wood products industry. Bureau of Labor Department does not report employment data in the bioenergy sector. Therefore RISI developed estimates for employment impact per 1000 st of wood utilizing available alternative industry surveys, public information on announced new plants and their wood consumption and employment levels, as well as interviews with industry players, experts and research institutions.

The absolute employment impact varies by sector, being highest for the wood pellet industry at 0.33 jobs per 1000 st of wood consumed and 0.06-0.07 for cellulosic ethanol and electric utilities. The latter industries are both large wood consumers but manufacturing requires relatively limited operating staff. These job impact estimates were volume weighted based on the projected relative wood consumption share (%) in each industry considering current and a five year growth window in wood consumption to take into account the rapid expansion in the industry driven by state and federal policies and incentives to promote investment in renewable industries in the U.S. The wood energy sector is expected to experience the fastest growth over the next five years and carries therefore the highest weight of 71%, followed by

pellets at 25%. The commercialization of cellulosic ethanol production technology is moving forward slowly and wood demand from the sector is expected to be limited in the short-term.

The total weighted core employment impact was 0.13 per 1000 short tons of wood consumed for the whole alternative energy sector. The total employment impact was developed by adding any downstream/upstream employment, which in the case of energy alternative was only logging related. In the pulp and paper comparison, the energy alternative logging employment was assumed to equal the same as in pulp and paper sector creating a total employment impact of 0.25 per 1000 short ton of wood consumption. The solid wood products industry comparison generated a total impact of 0.31 jobs per short ton of wood. Electricity, pellet or fuel wholesaling and retailing related employment was not included in the calculation to be consistent with pulp and paper and solid wood products industry estimates.

APPENDIX

I. Industry classification - pulp and paper industry: The pulp and paper industry converting operations employment data from Bureau of Labour Department used in this study defines the industry as follows:

1. Paperboard Container Manufacturing

These establishments primarily engage in converting paperboard into containers without making paperboard. The end products manufactured by this industry include boxes, corrugated sheets, pads, paper dishes, pallets, fiber drums and reels.

2. Paper Bag and Coated and Treated Paper Manufacturing

This industry engages in one or more of the following operations:

- Cutting, coating and laminating paper or paperboard
- Manufacturing bags, multiwall bags, sacks of paper and metal foil
- Surface coating paper or paperboard
- Manufacturing laminated aluminium & other converted metal foils from purchased foil

3. Stationery Product Manufacturing

This industry includes establishments which convert paper or paperboard into products used for writing, filing, artwork, and similar applications. This industry consist of die-cut paper and paperboard office supply manufacturing, envelope manufacturing, notebooks, pads and stationary tablets.

4. Other Converted Paper Product Manufacturing

This industry consists of firms that convert pulp into pulp products, such as disposable diapers, or molded pulp egg cartons, food trays and dishes. This category also includes establishments converting paper and paperboard into products, which are not, counted in category 1, 2 and 3.

II. Industry classification - solid wood products industry: The solid wood products industry employment data from Bureau of Labour Department used in this study defines the industry as follows:

Sawmills and Wood Preservation industry engages in sawing sawing dimension lumber, boards, beams, timber, poles, ties, shingles, shakes, siding and wood chips from log and bolts. They also plane rough lumber to achieve uniformity and smoothness.

Veneer, plywood and engineered wood product manufacturing industry includes establishments that engage in manufacturing veneer or plywood (from veneer), manufacturing engineered wood member and reconstituted wood products. The primary categories include:

- Fabricated structural wood members manufacturing
- Plywood manufacturing
- Laminated structural wood members manufacturing
- Reconstituted wood sheets and boards manufacturing
- Medium density fiberboard (MDF) manufacturing

- Roof trusses wood manufacturing (fabricated or laminated wood roof or floor trusses)
- Oriented strand board (OSB) manufacturing
- Veneer mills
- Particleboard manufacturing
- Wafer board manufacturing

Other wood product manufacturing includes all the establishments engaged in producing wood products excluding first two categories.

- Wood window and door manufacturing
- Cut stock, resawing lumber, and planing
- Other millwork including flooring
- Wood container and pallet manufacturing
- Manufactured home and prefabricated wood building manufacturing
- All other miscellaneous wood products manufacturing