PROVIDING INCENTIVES FOR BIOENERGY WHILE PROTECTING ESTABLISHED BIOMASS-BASED INDUSTRIES

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Introduction

Current and proposed climate and energy policies, including bioenergy incentives, have the potential to negatively impact established biomass-based industries. These industries may also be adversely affected by market pressures on global petroleum supplies. Higher costs of energy and energy-intensive or petroleum-derived raw materials, as well as increased competition for biomass resources are among developments likely to result from energy- and climate-focused policy initiatives.

This report condenses the findings of a recent study [1,2] that assessed short- and long-term impacts (both positive and negative) of state and federal climate and bioenergy policies and incentives on the domestic forestry/wood products sector. Long-term implications of rising energy prices – whether resulting from market forces or public policy – for the domestic wood products industry are assessed in the full report through a number of scenarios based on various petroleum price levels. That report concludes with a number of observations about how policies and incentive programs and their development might be improved. This summary conveys the major findings of the study including background on U.S. policies, comparisons of petroleum and alternative energy costs, examination of key forest product sectors, and a summary of policy considerations. The full report is available at the Dovetail Partners website.[2]

Bioenergy and the Forest Sector

The potential for domestic manufacture of biomass-derived transportation fuels drew the attention of Congress in the 1970s following the second oil embargo of the decade. Agricultural interests contributed to passage of the Energy Tax Act of 1978, which exempted 10 percent ethanol-blended gasoline from the federal gasoline excise tax. The Energy Security Act of 1980 also contained incentives for domestic energy production. More recently, a host of federal measures, including the Energy Policy Act of 2005, the Energy Independence and Security Act of 2007, the 2008 Farm Bill, and the American Reinvestment and Recovery Act of 2009, have focused on ethanol and biodiesel production. Most states have also enacted laws to promote the development and use of biomass energy.

While a number of factors might be identified as having brought biomass to the attention of policy-makers, one of the most important was a report produced jointly by two federal agencies: the Departments of Energy and Agriculture. The publication, commonly referred to as the *One Billion Ton Report* (Perlack et al. 2005), indicated annual availability of over 1.3 billion dry tons of biomass beyond that needed for food, livestock feed, fiber, and soil conservation. Included in the 1.3 billion dry ton estimate was 368 million dry tons of woody biomass of which 159 million tons were industrial wood wastes.

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[1] The work upon which this publication is based was funded in whole or in part through a grant awarded by the Wood Education and Resource Center, Northeastern Area State and Private Forestry, U.S. Department of Agriculture-Forest Service.

[2] Bowyer, J. 2011. Potential Impacts of Climate and Energy Policy on Forest Sector Industries: Providing Incentives for Bioenergy While Protecting Established Biomass-Based Industries. Dovetail Partners, Inc. (http://www.dovetailinc.org/files/DovetailBiomassWERCProjectReport.pdf)

Subsequent to that report, the Biomass Research and Development Board (BRDB 2008) reevaluated biomass availability, subtracting from Perlack et al.'s numbers the volumes already being used for production of wood and paper products and energy. Over 95 percent of the 159 million dry tons of industrial wood wastes identified in the One Billion Ton report fell into this category. Also subtracted were volumes of wood in small diameter trees and forest residues judged to be non-economical to recover. The net result of these revisions was that the earlier estimated annual availability of 368 million dry tons was revised downward to 45 million tons, or to only 12.2 percent of the original estimate.

The BRDB report projects that woody biomass in bioenergy-dedicated plantations, along with perennial grasses, is likely to play a major role in the cellulosic biofuel mix. Woody material would come from short-rotation tree plantations established on cropland, grasslands, timberland, or other non-croplands. Under the revised estimate, wood from bioenergy plantations would constitute a significant part of projected production of 145 to 236 million dry tons per year of woody biomass by 2022.

Rising Costs of Energy and the Forest Products Sector

Evaluation of a number of scenarios based on various prices of energy shows that energy intensive industries would be challenged to adapt to the new reality under every scenario of continued high and increasing energy prices.Within the forest products sector, the paper industry would continue to face significant pressure to accelerate energy efficiency improvements, including capture of a greater portion of the energy value of biomass. At the same time, composite products industries would experience substantial difficulty with respect to costs of biomass and energy-intensive petroleum-based resins.

One thing that is abundantly clear is that from this point forward, the price of wood in any form must at least reflect its energy value, in addition to the costs of growing, harvesting, transporting, and processing.

Current petroleum prices (~$100/bbl) create market conditions that support the production of many forms of bioenergy without subsidy. Analysis shows that the current petroleum price is higher than equivalent prices based on energy content of most other products across the spectrum of energy sources, including wood (Table 1). These conditions create potential problems for the forest products industry even in the absence of federal, state, or regional bioenergy initiatives. The pulp and paper, particleboard, and Chip-N-Saw southern softwood sawmill industries in particular will face price pressures. Should energy prices rise further, either as a result of market forces, climate or energy policy, or other factors, upward pressure on biomass materials will result, impacting even low grade hardwood sawbolt and sawlog markets.

As lumber and plywood markets and production begin to gain steam, which a panel of experts recently predicted would rebound spectacularly between 2012 and 2013 (Random Lengths 2011), sawdust and shavings production will increase. At the same time, demand for sawdust and shavings from pellet, medium density fiberboard, particleboard, and pulp industries is likely to increase as these industries rebound. How quickly and to what extent will the pellet industry grow? Will the forest industry seek to expand consumption of residues for energy, releasing lesser volumes for use by other industries? Will new sources of demand for wood residues develop, such as for cellulose biofuels? The answers to these questions will have major implications for future raw material availability and costs.

Potential Impacts of Energy and Climate-Related Public Policy on Established Industries

From a federal perspective, the greatest concerns about increases in industrial energy prices focus on impacts on global competitiveness. Several studies have addressed the effect of increased energy prices on energy-intensive industries (Bassi et al. 2009; Yudken and Bassi 2009, 2010). All have concluded that climate policies that put a price on carbon, if enacted by the U.S. alone or non-uniformly worldwide, could have substantial negative impacts on the competitiveness of U.S. energy-intensive manufacturing industries in the relatively near term, especially if not accompanied by effective energy efficiency investments. Energy-intensive industries are seen as facing the likelihood of increased production costs, with the pulp and paper industry identified as one of those facing the greatest challenges. From a policy standpoint, researchers warn that care must be taken in crafting climate policies so as to not encourage energy-intensive industries simply to shift operations to some other region of the world that may not have comparable greenhouse gas (GHG) emission reduction commitments.

Sector-Wide Risks and Opportunities

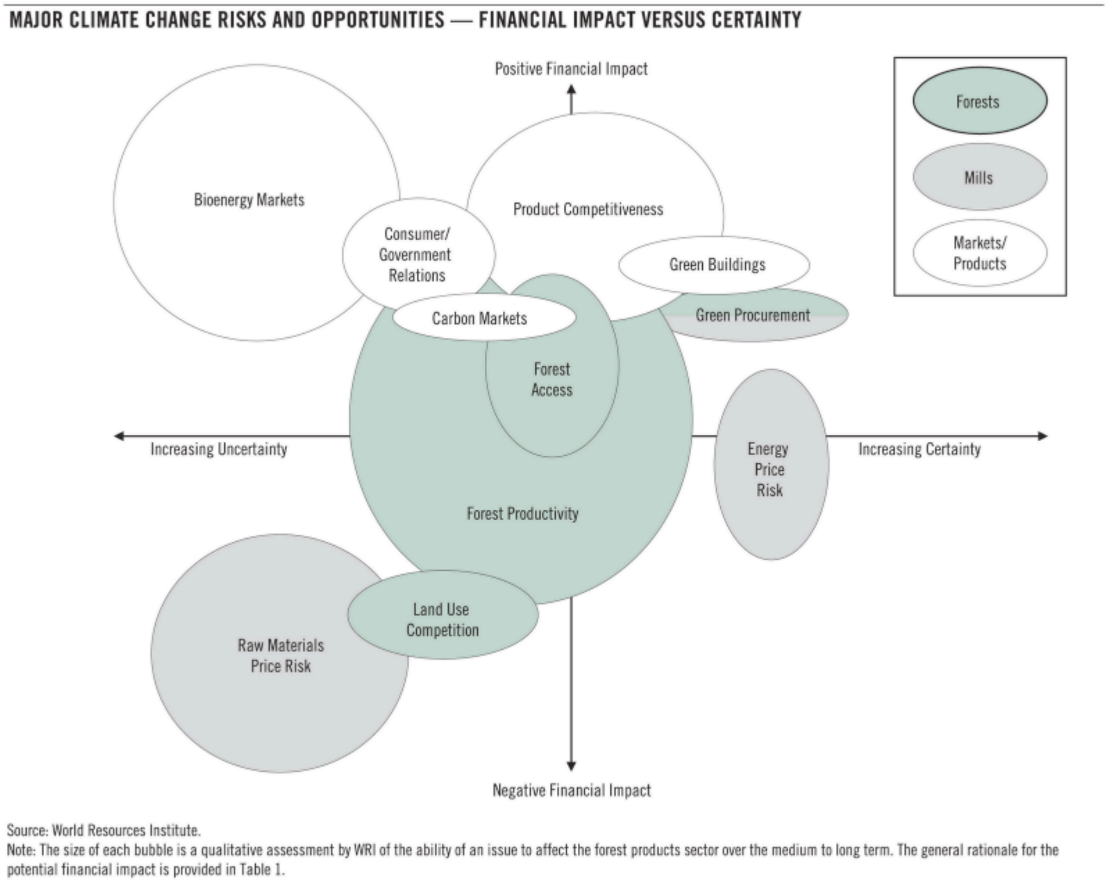
Recently the World Resources Institute (Aulisi et al. 2008) produced a graphic representation of risks and opportunities facing the forest products industry (Figure 1); in this case the focus was not on bioenergy development, but rather on climate change. Realistically, the risks relate not only to climate policy, but to energy policy as well. Risks include impacts of rising energy prices, the potential for raw materials price increases due to competition from a growing bioenergy industry, and increasing land use competition linked to both bioenergy production and public interest in forest carbon reserves.

The risk of increased raw material prices for mills (lower left, Figure 1) is large, though the prospects for increasing prices are uncertain. A good part of that uncertainty hinges on what happens in the public policy arena. The same is true of risks posed by land use competition. Aulisi et al. envision not only risks associated with climate policy, but opportunity as well.

Opportunities envisioned for the forest products industry include:

- The emergence of bioenergy markets.
- Increased competitiveness of wood products with energy-intensive non-renewable materials and products.
- Market opportunities linked to the green building movement and green procurement.
- Opportunities in carbon markets, although the potential here is judged to be both modest and uncertain.
- A positive (as well as negative) impact of fossil fuel price increases. Positive aspects relate to increasing interest in biofuels and relatively greater impacts of fossil fuel costs on energy-intensive competitors.

Figure 1
Major Climate Change Risks and Opportunities in the Forest Products Industry



Source: Aulisi, Sauer, and Wellington (2008)

One thing that is abundantly clear is that from this point forward, the price of wood in any form must at least reflect its energy value, in addition to the costs of growing, harvesting, transporting, and processing.

Table 1 illustrates the relationship between the price of a barrel of oil and the equivalent energy value of various forms of energy and feedstocks used in generating energy. At the spring 2011 petroleum price (yellow shaded line) and at corresponding prices for various energy products and feedstocks, several forms of raw material currently used in producing forest products were selling at prices well below their equivalent energy values; these include southern pine pulpwood, southern pine Chip-N-Saw logs, conifer chips, and even some species of hardwood sawlogs. Figures also suggest that if energy prices were to rise 50 percent over mid-2011 levels (i.e. $150/bbl), current sawlog prices for some preferred species would be below equivalent energy value. Given the current and expected long-term emphasis on bioenergy, over any extended period of time disparity between price and energy value is not likely to persist.

Table 1
Value of Different Energy Products and Feedstocks Based on Net Heat Value and Various Prices per Barrel of Petroleum

	Petroleum	Equivalent Value	Southern Pine Pulpwood (Delivered)	Southern Pine Chip-N-Saw Logs	Southern Pine Sawlogs (Delivered)	Western Softwood Sawlogs (Delivered)	Hardwood Sawlogs (Delivered)	Wood Pellets	Hardwood Chips/Shavings (Price/odt)	Softwood Chips (Price/odt)
Btu – Net heating value	5,576,000/Bbl		9,160,000 Btu/Cord	10,345,000 Btu/Cord	6,966,000 Btu/M Bdft Scribner	6,670,000 Btu/M Bdft Scribner	8,300,000 Btu/M Bdft Scribner	13,600,000/t	13,800,000/t	6,060,000/
	($/Bbl)	($/Million Btu)	($/cord)	($/cord)	($10³ Bdft Scribner)	($10³ Bdft Scribner)	($10³ Bdft Scribner)	($/ton)	($/ton)	($/ton)
	50	8.63	79.05	89.28	60.12	57.56	71.63	117.65	119.37	52.30
	75	12.94	118.53	133.86	90.14	86.31	107.40	175.70	178.30	78.42
	100	17.26	158.10	178.55	120.23	115.12	143.26	235.50	238.74	104.60
	125	21.57	197.58	223.14	150.26	143.87	179.03	293.50	297.82	130.71
	150	25.88	237.06	267.73	180.28	172.62	214.80	351.43	356.66	156.83
	200	34.52	316.20	357.11	240.47	230.25	286.52	470.60	477.48	209.19
	250	43.14	395.16	446.28	300.51	287.74	358.06	587.00	595.64	261.43
	300	51.76	474.12	535.46	360.56	345.24	429.61	702.86	713.32	313.67
Mid 2009 Price (Avg. U.S. $)	61.66	11.06	23.58	42.19	333.35	359.38	151.00-271.00	244.00	--	PNW 82.5 South 64.4
Feb./Apr. 2011 Price (Avg U.S. $)	99.21	17.12	29.13	43.88	340.00	567.00	#2 Sawlogs (oak, ash, maple) 200-350	249.00	--	PNW 60-16 South 60-7

- Gross heating values and efficiency estimates from USDA-Forest Service Fuel Value Calculator (2008).
- Conifer chip prices from Random Lengths Yardstick (2010, 2011b), and converted from oven dry metric tons (odmt) to oven dry tons (odt).
- Volumes per cord as per Dobie and Wright (1975); wood volumes assumed for southern pine pulpwood – 85 cubic feet/cord; C-N-S logs 96 cubic feet/cord.
- Net Btu values for pulpwood determined based on wood volume per cord, calculated mass of dry wood based on average specific gravity of 0.47, average dry basis moisture content of 65%, and efficiency factor in energy conversion of 0.67. (wet basis moisture content – (100*65/100 + 65 =39.4%; wood substance = 60.6%; 85 ft^3/cord*.47*62.4 lb/ft^3*.606*8600 Btu/lb*.67 = 8,705,000 Btu/cord); Without the .67 efficiency factor – 85 x .47 x 62.4 x .606 x 8600= 12,990,000
- Net Btu values for sawlogs determined based on weights per board foot of logs per Page and Bois (1961), adjusted for specific gravity; specific gravity of logs assumed as 0.47 for SYP, 0.45 for western softwood species, and 0.56 for hardwood species. In all cases, average dry basis moisture content of 65% and efficiency factor in energy conversion of 0.67 assumed.
- Pine pulpwood and CNS log prices from LSU Ag Center (http://www2.lsuagcenter.com/agsummary/narrative.aspx)
- Hardwood Sawlog Prices from Northeast Timber Exchange (http://northeasttimberexchange.com/?page_id=4)
- Though not shown, the energy values of switchgrass, corn stover, and other forms of energy crops and agricultural residue are very similar to those of wood. On a moisture-free basis, switchgrass and corn stover have net heating values at 80% efficiency of 12.4 and 14.1 million Btu per ton, respectively.

Energy Policy and the Paper Industry

In considering potential impacts of climate and energy policies on the domestic paper industry, it is informative to look at the experience in Europe where there is a longer history of energy and climate policy initiatives. For example, pulpwood is now regularly being chipped for energy uses in Sweden, either for heat and power or for pellet manufacture, and similar trends are underway elsewhere in Europe (Sommerauer 2009). In Sommerauer's view, growth in energy wood demand is changing the fundamental nature of pulpwood and chip markets such that changes will not simply be reversed when pulp, paper, and sawn timber demand recovers. In his words, "Energy wood is creating a floor beneath the pulpwood market, and given the scale of . . . renewable energy targets – and the need to mobilize more costly sources of energy wood – it is a floor that is far more likely to rise than to fall in the future."

Regarding the United States, a pair of recent studies (Brown and Atamturk 2008, Brown and Back 2009) examined likely impacts of energy and climate policies on the pulp and paper industry. Examined in the first study were potential impacts of adoption of a 25-percent renewable portfolio standard (RPS) and a 25-percent renewable fuels standard (RFS), and implementation of a national GHG cap and trade system. Findings indicate significant impacts of RPS and cap and trade implementation including increased prices of biomass, diversion of significant quantities of biomass toward production of energy rather than paper, and an erosion of markets as a result of increased production costs.

The second study (Brown and Back 2009) analyzed, through use of the National Energy Modeling System, potential impacts to the pulp and paper industry of a shift to 25 percent renewable electricity (as promised by President Obama in his 2008 election campaign), implementation of a federal carbon cap and trade program, and aggressive pursuit of a federal industrial energy efficiency program. It was determined that a shift toward renewable electricity without a parallel program to increase industrial energy efficiency could increase the price of biomass for electricity production by 160 percent by 2030, a figure that drops to 67 percent if energy efficiency is pursued concurrent with a cap and trade initiative; the magnitude of increase in both cases would clearly impact pulpwood prices. A cap and trade program alone would raise the price of biomass for electricity production by an estimated 28 percent by 2030. The price of industrial electricity (and likely other forms of energy) would rise as well. This analysis suggested increased electricity costs of 6 to 18 percent as a result of joint implementation of all three policies. Thus, both raw material costs and the costs of energy would likely rise for the pulp and paper industry.

Both of the Brown et al. studies, as well as several others, have identified the potential for energy efficiency gains in the pulp and paper industry that could at least partially offset the deleterious effects of increasing raw material prices. In fact, a recent study found that the pulp and paper industry is one of the two industries (the iron and steel industry being the other) having the greatest potential for reduction of energy consumption. Potential energy savings of 25 percent by 2020 through implementation of proven technologies and process improvements were identified (Brown and Atamturk 2008, p. 8).

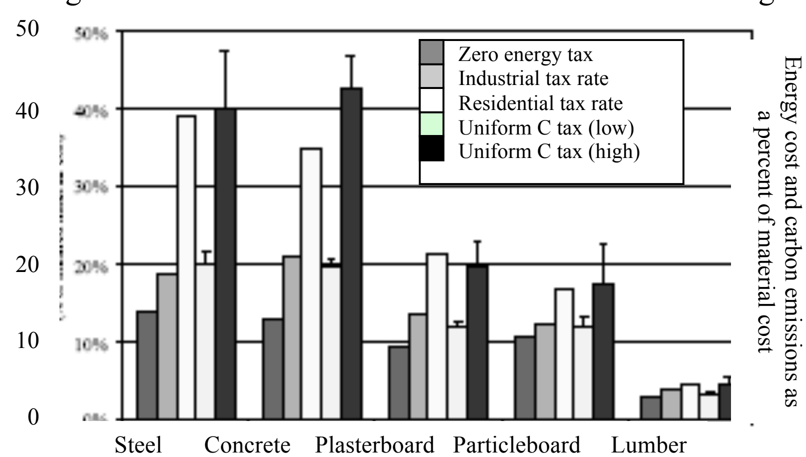
Beyond energy efficiency gains, the idea of pulp and paper mills becoming integrated biorefineries that produce not only paper, but also biofuels and other forms of energy and a range of biochemicals, has gained momentum over the past decade. It is envisioned that integrated biorefineries of the future, based in what are now paper mills, will cost effectively convert biomass into variety of end products, a change that could enhance profitability and adaptability to changing economic conditions (USDOE 2007).

Energy Policy and Building Materials Manufacturers

The wood-based building materials industry should be relatively well positioned (with a few notable exceptions) to compete in a carbon and energy constrained world. The energy consumption linked to wood products manufacturing is low compared to energy requirements for competing products (CORRIM 2011). Carbon emissions are similarly lower. Consequently, increases in the cost of fossil fuels, resulting from events in global markets or from public policy actions that would tax energy or carbon, would have greater impact on the fossil-energy and carbon-intensive sectors rather than the wood products sector. Less clear is how the wood products industry would fare in a situation defined by parallel increases in the costs of all fuels, including biomass. For some segments of the wood products industry, a rise in the cost of biomass fuels may also translate to increases in the costs of basic raw materials.

A recent Swedish study (Sathre and Gustavsson 2007) provides one indication of how climate-related public policy may impact manufacturers of competing construction materials (Figure 3). The study evaluated energy costs as a percentage of prices of finished materials used in building construction. Although analyses were based on prices of energy and finished products within Sweden, with prices expressed in Euros (€), findings are informative for other countries. With zero energy or carbon taxes (descriptive of the current situation in the U.S. today), energy costs were found to comprise 13.8, 13.0, 9.4, 10.6, and 3.0 percent of finished material costs for steel, concrete, plasterboard, particleboard, and softwood lumber, respectively. The authors then evaluated the potential impacts of energy, carbon, and sulfur taxes on relative prices of these various materials (Figure 3). Not surprisingly, the relative impact on fossil fuel- and carbon-intensive industries and their products was substantial.

Figure 3
Costs of Energy Inputs and Carbon Emissions of Materials Production, Expressed as a Percentage of Finished Materials Cost Under Different Tax Regimes



(The main bars for uniform carbon taxes assume electricity produced by natural gas-fired condensing plants; the smaller error bars show the effect of electricity production from coal-fired plants)
Source: Sathre and Gustavsson (2007)

For example, imposition of a full suite of energy, carbon, and sulfur taxes had the effect of dramatically raising energy costs as a percentage of finished material costs for steel and concrete, while the effect on lumber was far smaller. In the high uniform carbon and sulfur tax scenario, the energy cost as a percent of finished material cost rose from 13.8 to 40 percent for steel (48 percent when electricity was derived from coal), from 13 to 43 percent for concrete (47 percent when electricity was derived from coal), but only from 3 to 4.3 percent for softwood lumber. In the case of particleboard, instituting the full suite of energy, carbon, and sulfur taxes had the effect of raising energy costs per cost of finished product from 10.6 percent to over 17 percent (and to 23 percent when electricity used was derived from coal).

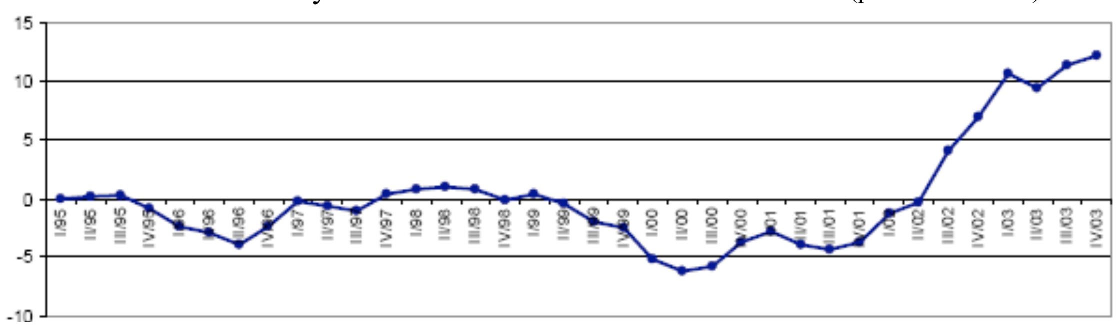
Energy Policy and the Wood Composites Industries

An issue not considered by Sathre and Gustavsson (2007) was the potential for increased competition for woody biomass as a result of favorable tax policy for bioenergy. This issue was considered in a recent examination of impacts of increased energy prices and use of wood for energy on the forest industry of Norway (Trømborg and Solberg 2010). Findings showed that a 40 percent rise in energy prices would increase competition for biomass for bioenergy, impacting various forest products industry segments in different ways. Impacts on the pulp and paper industry were found to be minimal, in large part because Norway's pulp and paper industry primarily relies on spruce pulpwood which is infrequently used in bioenergy production. Nonetheless, a four percent decline in paper industry output was projected over the five year modeling period. The sawmill industry was also impacted, mainly due to an increased price of electricity, but this increase was offset by higher prices received for chips, sawdust, and bark - which in turn negatively impacted the particleboard industry. The particleboard industry was found to suffer the greatest impact from the increase in energy costs, with a projected 12 percent drop in production.

The particleboard industry faces all of the risks of other industries from increased energy costs, but as pointed out by Trømborg and Solberg (2010), the industry today finds its primary raw material increasingly sought by others, and even subsidized, as an energy resource for use by a developing bioenergy industry. The record of wood costs in the EU-15[3] in 2001-2002 illustrates the dramatic price increases faced by the wood industry in the early years of the past decade (Figure 4).

Figure 4

Wood Cost History in the EU 15 in the Period 1995-2003 (percent: 1995=0)



Source: Van Riet (2004)

[3] The term EU-15 refers to the fifteen original members of the European Union: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom.

Wood costs have also risen substantially in recent years for North American manufacturers of fiberboard, core stock, and underlayment-grade particleboard. North American wood costs roughly doubled between 2005 and early 2007 (Roberts 2007) and have risen another 40 to 50 percent since then. The causes of this cost increase have been rising demand for wood pellets and declining sawmill activity. Sawmills are the source of sawdust and shavings for pellet fuel manufacturers as well as for many composite manufacturers, and the recent decline in lumber production also resulted in markedly lower availability of sawdust and shavings. As long ago as 2007, Roberts observed that the pellet industry needed to begin utilizing fiber sources other than sawdust and shavings in order to expand.

Wood composite manufacturers are also experiencing increased resin costs – costs that are directly related to the market price of petroleum. Winchester (2005) documented a 170-200 percent rise in the market price of urea and a doubling of phenol market prices during the period 1999-2005, citing the 250+ percent rise in the price of crude oil and the 160 percent rise in the price of natural gas that occurred during that period. Spelter et al. (2010) focused on resin costs, chronicling the resin cost history for the U.S. oriented strandboard (OSB) industry in the six-year period 2000-2006; these prices rose 61 percent during that time frame.

As illustrated in Table 2, the effect of a continuation of these various trends is likely to affect specific industries within the forest products sector quite differently. For instance, the energy intensities of all of the particle-based panel industries (particleboard, MDF, and OSB) are substantially greater than those of the softwood plywood industry. The energy intensity of resins is also much greater in the particle-based panel industries, posing greater risk for future price and availability issues. The plywood industry is insulated from increasing competition for wood raw materials stemming from rising bioenergy demand and better positioned should a carbon tax come into effect because of lower energy consumption. Thus, should energy prices rise significantly, whether as a result of market forces, a carbon tax, or incentives for increased use of bioenergy, then the plywood industry could conceivably begin to regain the market share lost earlier to OSB. On the other hand, for the same reasons, the OSB industry may find new opportunities in decking, underlayment, and other markets to the detriment of the particleboard industry.

Table 2
Cradle-to-Gate Cumulative Energy Requirements to Manufacture Various Products (MJ/m^3), Wood Raw Material Needs, and Carbon Liberation in Manufacture

	Particleboard	MDF	OSB	Softwood Plywood PNW	Softwood Plywood SE
Wood collection & transp. to mill	3,504	1,683	1,342*	812	865
Resin	3,105	3,924	3,392	329	408
Catalyst	88	--	--	--	--
Wax	26	266	Included in resin	--	--
Urea scavenger	16	33	--	--	--
Wood fuel	561	7,718	4,197	1,550	2,290
Fossil fuel	3,564	7,083	3,389	1,273	2,707
Nuclear				10	55
Hydro-electric				307	8
Total energy input	10,865	20,707	12,320	3,140	5,060
Wood in product	672 kg/m^3	793 kg/m^3	620 kg/m^3	504 kg/m^3	625 kg/m^3
Carbon (CO_2 equiv.)	392kg	621kg	488	216	345

Source: Particleboard–Wilson (2010b); MDF–Wilson (2010a); OSB–Kline (2005); Plywood–Wilson and Sakimoto (2005); Wood harvest and transport data for plywood production from Johnson et al. (2005); Plywood resin energy data–Wilson (2010c).
* Based on figure for MDF and weighted by wood mass.

Within the plywood industry itself, policy resulting in increased prices of energy or increased taxation of carbon emissions, without some kind of modification for regional variation, would favor the Pacific Northwest where energy intensity is lower, in part due to species differences and where hydro-electric generation is more common.

All of the composite panel industries, and especially the particle-based panel industries, could face stiff competition from foreign competitors should domestic energy prices rise absent similar increases in competing regions. It will be extremely important for policy-makers to keep in mind that even seemingly straightforward measures may have unintended and detrimental consequences for domestic industries, including serious erosion of global competitiveness. Policy measures can also tilt the playing field so as to create winners and losers among domestic competitors.

Energy Policy and the Lumber Industry

While studies consistently show the lumber industry to face less risk from energy and climate policy than other forest sector industries, almost all research to date has based such conclusions on studies of softwood sawmills. It has long been recognized that hardwood sawmills, however, have higher electricity costs in sawing than softwood mills because of typically slower processing rates linked to greater wood density, production of thinner lumber, and the need for greater care in producing grade lumber. Thermal energy consumption is also greater due to longer drying times linked to lower moisture content requirements and slower drying rates needed to avoid drying defects (Table 3). Electrical and thermal requirements have been shown to be 97 and 75 percent greater, respectively, in hardwood lumber production as compared to softwood. Consequently, rising energy costs pose a greater challenge to the hardwood lumber industry than to its softwood counterpart.

Table 3
Comparison of Hardwood to Softwood Lumber Energy Use

	Overall Energy Consumption [1,2]			
	Electrical Energy		Thermal Energy	
	MJ/m[3]	kWh/MBF	MJ/m[3]	kWh/MBF
Hardwood Lumber	597	297	5,400	9.6 million
Softwood Lumber	335	151	3,600	5.5 million

[1] All values provided in actual dimensions
[2] Final dry planed lumber dimensions of 19.1mm (0.75 in) thick by 14.0mm (5.5 in. wide.
[3] 1.76 m^3 per 1.0 nominal MBF (thousand board feet) dry planed lumber and includes walnut steaming and plant heating.
[4] 1.623 m^3 per nominal MBF (thousand board feet) planed dry lumber; 3.6 MJ per kWh, 1054 per million BTU

Source: Bergman and Bowe (2007)

Problem Areas in Current Bioenergy Policy and Suggestions for Modification to Reduce Impacts on Established Industries

Lack of Policy Focus

The final annual report to Congress on the National Biomass Research and Development Initiative (USDA/USDOE 2006) lists the following objectives of the program:

1. Increased domestic energy security
2. Enhancement of the environment and public health
3. Job creation and enhanced economic development of the rural economy
4. Diversify markets for raw agricultural and forestry products

Pursuit of objectives 1 and 2 is linked to development of bioenergy production facilities within the United States, commercialization of unused biomass resources, and development of new biomass resources for domestic use in energy production. Although actions to support the first two objectives may well result in measurable progress toward objectives 3 and 4, a recent initiative on the part of the International Trade Administration to provide assistance to U.S.-based companies for export of biomass feedstocks (International Trade Association 2010) suggests a policy disconnect. While perhaps good for rural jobs, this strategy would appear to be in direct conflict with objective 1, and might also work against the interests of established biomass-based industries.

Diversion of Raw Material from Established Value-Added Industries

Programs that provide direct support for collection, transport, and delivery of biomass to bioenergy facilities, if in place for a significant period, will inevitably undermine established biomass users, even if barriers are erected to prevent support payments from being applied to diversion of traditionally used forms of biomass. An example of such a program is the Biomass Crop Assistance Program (BCAP) of the U.S. Department of Agriculture.

According to White (2010), increased use of woody biomass for bioenergy can be expected to create what are described as ripple effects in the forest and agricultural sectors. He goes on to say, “Increased use of mill residues for bioenergy will likely decrease their availability for their current use (e.g., oriented strandboard, bark mulch, and pellet fuel).” In White’s view, the likelihood of milling residues being drawn away from existing production uses to bioenergy production will increase as biomass prices increase. Sedjo (2010) expressed the same view, pointing out that even in the absence of the BCAP subsidy, there were high levels of entry into traditional wood markets by wood pellet producers. He also pointed out that electrical power producers in the southern U.S. are proceeding with plans to increase their use of biomass largely from traditional industrial wood markets based on findings that freshly harvested wood is more suitable to their equipment than forest residues that contain dirt and grime.

Sedjo observed that avoiding the diversion of materials from existing production processes will be difficult. He posited that the conflict for resources will be greatest between traditional wood industries, such as pulp and paper and composite products, and bioenergy producers. He further noted that separating markets for very similar products is very difficult and rarely successful.

Creation of Biomass Demand that Exceeds Supply

Aggressive incentives for bioenergy production and insufficient attention to biomass supply has resulted in a significant gap between biomass supply and demand in Europe. A similar situation may be developing in the United States. Galik et al. (2009) identified risks to users of forest resources in the southeastern U.S. stemming from demand exceeding supply for woody biomass. They reported that all forest users would be affected, and especially industries that depend upon residues of other industries for raw material supplies. Stokes (2010) also identified biomass supply problems in this region. A problem in the western United States is the exclusion of biomass from federal lands from qualification for the biofuels renewable fuels standard – thus making associated investment ineligible for the myriad of federal bioenergy development support programs.

Lack of Recognition of the Sustainability Benefits of Biomass

As reported by Research Reports International (RRI) (2006), biomass costs are increased by attention to sustainability concerns – concerns that are focused on biomass energy only. In the words of RRI, "The lack of policy to credit the distinct sustainability benefits of biomass or to require sustainable use of natural gas and other fossil resources makes the cost of biomass energy to appear high. In order for biomass-fueled generation to be able to compete effectively on a large scale with other renewable and fossil fuel alternatives, its environmental benefits must be realized." Participants in a Pinchot Institute hosted workshop (2010) similarly pointed out that climate and energy policy does not recognize avoided GHG emissions, a benefit of wood products and biofuels; in this regard, some participants expressed concern that this could lead to competition between carbon-for-storage (no harvesting) vs. carbon-for-bioenergy, another area yet unresolved in the energy and climate policy arena.

How Energy and Climate-Related Policies and Initiatives Might be Modified to Reduce Impacts on Established Industries

Based on findings linked to development of this report, the following is an abbreviated summary of modifications to energy and climate-related policies and initiatives recommended in the longer report:

- Ensure that government initiatives relative to biomass supply keep pace with efforts to encourage biomass consumption (demand) for energy production.
    - Maintain a focus on new sources of supply.
    - Remove restrictions on harvest of biomass from federal lands.
    - Eliminate programs and provisions that provide direct support or subsidies for collection, transport, and delivery of biomass to bioenergy facilities.
- Ensure that incentives for establishment of large-scale bioenergy facilities include requirements for the careful assessment of biomass resource availability and established uses within a material procurement region. Avoid endorsement of any facility based primarily on pursuit of economies of scale.
- In regions with well established competition for biomass resources, provide greater emphasis on regionally appropriate small-scale bioenergy development (district and institutional heating, mill-scale combined heat and power systems) than large-scale development.
- Reconsider bioenergy program objectives and eliminate conflicting goals and associated initiatives.

- Consider the track record of policy experience within the European Union when developing any kind of energy or climate policy initiative relative to bioenergy development.
- Expand the current policy focus of carbon initiatives (e.g. EPA Clean Air Act, Waxman-Markley and related legislation) to include industries beyond those deemed most critical.
- Credit the distinct sustainability benefits of biomass energy in policy initiatives and/or implement penalties for non-sustainable use of natural gas or other fossil fuel resources.
- Recognize that industries potentially facing not only increasing energy costs but also increased competition for primary raw materials, as a result of energy and climate policy, deserve particular attention with regard to policy alleviating measures.

What Industries Can Do to Proactively Address Potential Problems/Opportunities

In view of the large impact that public policy can have on the health and ultimately survival of industries, it is perhaps obvious that industries individually need to keep abreast of policy discussions that might affect them. In addition, the dual risks posed to many forest products industry sectors by climate and energy policies on the one hand, and rising market-driven energy prices on the other, suggest a need for proactive action on an industry-by-industry basis to assess risks, and to identify and implement strategies to alleviate these risks.

Perhaps most obvious is the need to continually and aggressively seek improvements in energy efficiency and conservation and to understand the carbon footprint of industry operations. One report that will be valuable to the forest products industry is a 2009 report from EPA. With a perhaps misleading title "Potential for Reducing Greenhouse Gas Emissions in the Construction Sector," the report focuses on primary materials used in construction, and sets forth a number of ideas and strategies for beginning to manage carbon emissions.

For industries that rise to the level of "critical industries" based on employment, value-added contribution to the economy, and susceptibility to foreign competition, such as the pulp and paper industry, much of the work in determining what steps need to be taken to address policy impacts has already been done (Francis et al. 2002, Kramer et al. 2009). In addition, pathways for movement toward conversion of pulp and paper mills to integrated biorefineries have been identified, and extensive research and development efforts are ongoing. A comprehensive assessment has also been conducted of the logging industry through a cooperative in Canada led by FP Innovations (Forest Innovation Partnership 2011). In both cases, extensive lists have been prepared of actions that could be taken to improve energy efficiency and reduce energy consumption. They deserve immediate and ongoing attention.

For smaller industries that have not been identified as "critical" the story is much different. There has been relatively little research focused on such industries, and no contingency plans are in place to soften the blow of potential challenges posed by climate or energy policies or energy market developments. As discussed throughout this report, the particleboard industry faces greater challenges than any other industry as a result of bioenergy development, rising energy prices that have inspired the bioenergy phenomenon, and rising resin costs that are linked to increases in petroleum prices. For this industry, a critical self-examination of alternative raw material options would seem to make sense (i.e. alternatives to both wood and fossil-based resins); consideration of product redesign so as to minimize raw material inputs may also be warranted. Proactive action to organize and perhaps seek support for a well-funded, targeted program of research focused on energy and climate issues and implications is suggested.

Summary

Current and proposed climate and energy policies, and specifically incentives for the development of bioenergy, have the potential to negatively impact established biomass-based industries. Higher costs of energy and energy-intensive or petroleum-derived raw materials, as well as increased competition for biomass resources are among developments likely to result from energy- and climate-focused policy initiatives. Long-term implications of rising energy prices for the domestic wood products industry – whether resulting from market forces or public policy – point to similar potential.

The impacts of climate and energy policy vary depending upon the products and industries involved. Wood composites manufacturers face some of the highest risks from the dual challenges of rising energy costs and increase competition for raw material supplies. Current policies should be reexamined and modified to reduce the negative impacts on established industries. Potential policy improvements include balancing supply and demand drivers, requiring careful assessment of available resources, and recognizing the unique GHG and sustainability benefits of bioenergy.

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