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# Woody Biomass for Electricity Generation in Florida: Bioeconomic Impacts under a Proposed Renewable Portfolio Standard (RPS) Mandate

## Final Report

*Prepared for:*

Florida Department of Agriculture and Consumer Services
Division of Forestry

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# EXECUTIVE SUMMARY

Currently under consideration in the Florida legislature is a Renewable Portfolio Standard (RPS) proposal mandating that 20% of the future retail electricity sold in Florida must be generated from renewable sources. Such a policy would be phased-in over time using interim targets (7%, 12%, and 18%), and would be fully implemented at the 20% level by 2021. It is widely assumed that Florida's abundant wood resources would be relied upon in order to meet much of the RPS-imposed demands for electricity, given that factors such as technological constraints and cost considerations will combine to limit the amount of renewable energy that will come from solar, wind, and other sources of renewable energy.

The study presented in this document estimates the bioeconomic impacts that this policy will potentially have on the forestry sector in Florida by simulating increased demand for timber resources and observing the resulting effect on prices, harvests, and inventories of merchantable timber derived from private owners of forestland. We then use this information to project the allocation of harvested timber between the generic forest products industry and the electric power sector in Florida. Specific attention is paid to the aggregate supply profile, which consists of various sources of woody biomass that we project will be accessed to meet the proposed RPS.

As part of our analysis, we develop several different possible scenarios that represent different woody biomass feedstock source combinations. First we begin with a scenario that assumes only merchantable timber (MT) will be utilized to satisfy the RPS mandate. Although an unrealistic assumption, it is a natural starting point given the model we employ. The second scenario examines urban wood waste (UWW) and logging residuals (LR) as additional sources of woody biomass with which to augment the MT being used as electricity generation feedstock. UWW is considered to be large diameter wood typically generated by tree servicing companies, while LR are derived from the discarded tree tops and tree limbs that are generated during the harvest of MT. The next scenario is one in which we add short rotation energy crops (SREC) to the second scenario (i.e., MT/UWW/LR). Given the uncertainty in projecting the amount of Florida farmland that will be converted to SREC in the near future, we assume two distinct cases for SREC production resulting from the adoption of the proposed RPS. The "SREC_low" and "SREC_high" scenarios are based, respectively, on: traditional species of eucalyptus planted on 1% to 5% of Florida farmland, and high-yielding eucalyptus species planted on a maximum of 15% of Florida farmland.

Our findings distinctly indicate that the proposed policy mandate would place significant stress on the forest products industry in the state. We observe, for example, that UWW and LR do not comprise a significant amount of the aggregate supply of woody biomass required under a 20% RPS. This is generally true of the SREC_low scenario that is modeled, as well. Thus, as a consequence, the majority of the required aggregate supply is usually filled by MT in these scenarios. Moreover, most of these scenarios cannot even supply the required amount of woody biomass that would be needed under the RPS. In other words, several scenarios are observed to have *unmet demand.* The simulation results demonstrate that timber prices increase, the supply of harvested timber to the existing forest products industry decreases, and the raw inventory of pine timber destined for pulpwood decreases due to the hypothetical imposition of the RPS mandate being considered by the legislature. These effects are mitigated only when we model the SREC_high scenario. Nevertheless, the reduction in the inventory of an expanded pine pulpwood stocking class (5" to 12.9" dbh) over time seriously calls into question the feasibility of the proposed policy mandate. Taken together, consideration of all of the evidence strongly suggests that a 20% RPS should not be adopted for Florida.

We also examined an alternative projection for RPS-derived demand for renewable energy; one which is based on additional amounts of other sources of renewable energy (e.g., wind, solar, biogenic municipal waste) beyond what was assumed in the initial simulations discussed above. This alternative projection is modeled (in Section 5) by assuming 2.5 times the original estimate of other renewable energy sources; it is strictly a hypothetical projection and is offered in order to present a "lower bound" case (i.e., in terms of potential impacts) for use in comparison with the initial set of simulations.

The findings from this alternative RPS scenario indicate that SREC, at the very least, would be required to mitigate the impacts of RPS-derived demand on merchantable timber resources. In this case, however, the SREC_high feedstock scenario would actually preclude the need for using *any* merchantable timber in order to comply with the proposed RPS. While the SREC_low scenario appears to approach feasibility in the alternative case, the impact on the forest products industry would likely still be significant in terms of increased price pressures on both pine pulpwood timber and pulpwood logs derived from hardwood timber stock. Combined with reductions in the inventory of the expanded pine pulpwood stock, and its effect on the overall sustainability of the forest resource, prudence would seem to require that the proposed policy mandate should not be enacted by the legislature.

Despite focusing principally on the proposed 20% RPS, we also modeled hypothetical RPS mandates set at 7% and 12%. We find that a 12% RPS would also adversely impact the forest products industry, especially in terms of declining pine pulpwood inventory, for all of the initial (i.e., Section 4) simulations that do not include SREC_high feedstock as part of the aggregate supply of woody biomass. This particular scenario (MT/UWW/LR+SREC_high) actually precludes the need for harvesting merchantable timber whatsoever under either a 7% or a 12%

RPS of the initial simulations. For the alternative (i.e., Section 5) simulations, relatively minor impacts are observed only for the MT scenario under a 12% RPS; all other scenarios require no merchantable timber. Furthermore, except for the initial MT simulation of Section 4, all of the 7% RPS projections modeled in the study impart a relatively benign impact on the forest products industry. The alternative simulations under a 7% RPS have little, if any, impact at all.

Finally, it is important that we alert the reader regarding the limitations of this analysis. The SRTS bioeconomic model that we employed for the simulations is excellent job at mechanistically calculating harvest levels, and related prices, as a function of input demands and various assumed parameters. We must be clear, however, that there is a definite limit as to how accurately future market behavior can be projected. As is true of all modeling efforts, SRTS cannot account for every conceivable economic variable; much less for the variety of strategic responses one would expect from all of the economic actors that will be affected by an RPS policy mandate. Nor can we as analysts constructing specific scenarios; thus this study utilizes a large number of assumptions and speculates, probably rather narrowly, about how the economic agents involved will respond to the RPS under consideration. In as much as this allows us to model the future, it no doubt contributes to the inherent uncertainties involved in projecting future responses to a given policy proposal.

For these reasons we analyze multiple simulations based on several different feedstock component scenarios, including those based on the alternate RPS projection mentioned above. As such, we strongly advise that the results presented in this study be viewed as *qualitatively* as possible, in spite of all of the quantitative output derived from the SRTS model that is used to generate this report. It is to this end that we rely heavily on graphic representations to convey the results that were obtained from the simulations.

# 1. INTRODUCTION

Bioenergy production in Florida is expected to increase significantly over the next several decades due to uncertainty associated with the cost of fossil fuels, the growing concerns about energy security, and efforts directed at addressing the effects of climate change (USDOE, 2008). A strong push in this direction may well come from the Florida legislature, which instructed the Florida Public Service Commission (FPSC) to develop draft rules establishing a renewable portfolio standard (RPS) for the state. According to the FPSC (2009), these rules "would require each investor-owned electric utility to supply a percentage of retail electricity sales from renewable energy resources located in Florida." The draft RPS rule was submitted to the Florida legislature on January 30, 2009 for their consideration.

The forestry sector is very important to Florida. On an annual basis, the forest products industry generates approximately $16.7 billion in output (revenue) impacts and $7.0 billion in value added (income) impacts; it employs 89,000 persons (employment impact), and is a leading economic sector in many rural counties in the northern part of the state (Hodges *et al.*, 2008). As woody biomass is used for electric power generation by either combustion or a gasification process, and for combined heat and power systems in industrial facilities, it is natural to assume that increased bioenergy production will impact the forestry sector. In 2006, wood and the wood products industry accounted for 380 megawatts (MW) of electricity in Florida, or 0.7% of installed generation capacity (Navigant, 2008). Based on their analyses, however, Navigant Consulting estimates the technical potential for additional electricity generation from forest-derived woody biomass and short rotation woody crops ranges from 2075 to 4400 MW (3.9% to 8.3% of 2006 capacity).

While their study is useful for such estimates, it does not specifically address what the impacts on the forestry sector will be given the anticipated demand for renewable energy in the future—in particular the demand arising from the adoption of the proposed RPS. Therefore, the objective of the present study is to estimate the bioeconomic impacts that an RPS mandate for woody biomass-derived electricity will have on the forestry sector in Florida. Specifically, we employ the Subregional Timber Supply (SRTS) model to simulate the effect that increased demand for timber will have on the prices, harvests, and inventories of four wood product categories (derived from private owners of forestland). This information is then used to project the allocation of harvested timber (for each wood product) between the generic forest products industry and the electric power industry in Florida. Aggregate demand and supply profiles are also developed and presented based on the above information. The aggregate supply profile, in particular, is a key focus of this study since it represents the various components that comprise the woody biomass supply projected to be required under the proposed RPS.

The remainder of this report is structured as follows. Section 2 discusses RPS mandates in other states, the proposed adoption of an RPS in Florida, and details of how the RPS is calculated in this study. Section 3 provides a comprehensive overview of the SRTS model used to simulate various projections derived from the RPS mandate being considered. Section 4 presents results for model simulations that represent the most likely scenario to be expected given current assumptions and expectations (note that a summary list of the key assumptions employed appears in Appendix A). Section 5 includes alternative simulations derived from a hypothetical projection which assumes an increase in the availability of non-woody biomass renewable energy sources; these results form a lower bound of expected impacts that would result from the RPS as currently proposed. Finally, Section 6 provides the summary conclusions of this report.

## 2. RENEWABLE PORTFOLIO STANDARD (RPS)

Among the many policy vehicles that can be employed to increase the supply of renewable energy is the so-called renewable portfolio standard (RPS). The RPS is simply a quota mandated by a governmental authority (i.e., state or federal) that requires energy producers to generate a certain amount of their power output from renewable sources such as wind, solar, or biomass. The United State Department of Energy defines an RPS as "a state policy that requires electricity providers to obtain a minimum percentage of their power from renewable energy resources by a certain date" (USDOE, 2009a). While a federal RPS mandate of 20% is a feature of the "American Clean Energy and Security Act" bill that was passed in June 2009 by the House of Representatives, currently the creation of RPS mandates has been limited to individual state legislatures adopting this policy instrument. As of June 2009, RPS policies have been promulgated in 27 states throughout the country, plus the District of Columbia (see Table 2.1); an additional 5 states (North Dakota, South Dakota, Utah, Virginia, Vermont) have set voluntary targets for the adoption of renewable energy instead of an RPS that has a binding objective (USDOE, 2009a).

Typically, an RPS is phased in over a certain time period and is defined as a percentage of total electricity output that is sold by public utilities. However, as can be seen in Table 2.1, Iowa and Texas designate their RPS in terms of a capacity requirement defined in megawatts (MW). This table also shows the final year in which the targeted RPS amount is to be achieved by a particular state, and the regulatory organization that administers the policy. The RPS mandates currently adopted range from a low of 8% (Pennsylvania) to a high of 40% (Maine), with the average being 18.5%. The average phase-in time, as calculated from 2010 as the base year, is 9.8 years.

Table 2.1 Existing renewable energy policies by state, amount, and final phase-in year.

| State / D.C. | Amount | Year | Organization Administering RPS |
|---|---|---|---|
| Arizona | 15% | 2025 | Arizona Corporation Commission |
| California | 33% | 2030 | California Energy Commission |
| Colorado | 20% | 2020 | Colorado Public Utilities Commission |
| Connecticut | 23% | 2020 | Department of Public Utility Control |
| District of Columbia | 20% | 2020 | DC Public Service Commission |
| Delaware | 20% | 2019 | Delaware Energy Office |
| Hawaii | 20% | 2020 | Hawaii Strategic Industries Division |
| Iowa | 105 MW | | Iowa Utilities Board |
| Illinois | 25% | 2025 | Illinois Department of Commerce |
| Massachusetts | 15% | 2020 | Massachusetts Division of Energy Resources |
| Maryland | 20% | 2022 | Maryland Public Service Commission |
| Maine | 40% | 2017 | Maine Public Utilities Commission |
| Michigan | 10% | 2015 | Michigan Public Service Commission |
| Minnesota | 25% | 2025 | Minnesota Department of Commerce |
| Missouri | 15% | 2021 | Missouri Public Service Commission |
| Montana | 15% | 2015 | Montana Public Service Commission |
| New Hampshire | 23.8% | 2025 | New Hampshire Office of Energy and Planning |
| New Jersey | 22.5% | 2021 | New Jersey Board of Public Utilities |
| New Mexico | 20% | 2020 | New Mexico Public Regulation Commission |
| Nevada | 20% | 2015 | Public Utilities Commission of Nevada |
| New York | 24% | 2013 | New York Public Service Commission |
| North Carolina | 12.5% | 2021 | North Carolina Utilities Commission |
| North Dakota* | 10% | 2015 | North Dakota Public Service Commission |
| Oregon | 25% | 2025 | Oregon Energy Office |
| Pennsylvania | 8% | 2020 | Pennsylvania Public Utility Commission |
| Rhode Island | 16% | 2019 | Rhode Island Public Utilities Commission |
| South Dakota* | 10% | 2015 | South Dakota Public Utility Commission |
| Texas | 5,880 MW | 2015 | Public Utility Commission of Texas |
| Utah* | 20% | 2025 | Utah Department of Environmental Quality |
| Vermont* | 10% | 2013 | Vermont Department of Public Service |
| Virginia* | 12% | 2022 | Virginia Department of Mines, Minerals, and Energy |
| Washington | 15% | 2020 | Washington Secretary of State |
| Wisconsin | 10% | 2015 | Public Service Commission of Wisconsin |

* These states have set voluntary goals for adopting renewable energy instead of a binding RPS.
Source: "Summary of State Renewable Portfolio Standards" (USDOE, 2009a).

**Proposed RPS for Florida**

The Florida legislature is currently considering a 20% RPS mandate that would be fully implemented in 2021; it would be phased-in using interim targets of 7% by 2013, 12% by 2016, and 18% by 2019 (FPSC, 2009). The draft rule specifies that the delineated percentages will be based on retail electricity sales from the previous year, for each investor-owned utility subject to the mandated policy (FPSC, 2009). Given that several factors (e.g., technological constraints, cost considerations) will combine to limit the amount of renewable energy that will come from solar and wind, it is widely assumed that the abundant wood resources that Florida possesses will be accessed to meet much of the RPS-imposed demands for electricity derived from renewable sources. As such, this study is focused strictly on likely sources of woody biomass that will be accessed in order to meet the requirements of the proposed Florida RPS, net of other renewable energy sources. With the above information as a starting point, below we calculate what a 20% RPS for Florida would encompass (in terms of woody biomass) using data and energy projections obtained from the U.S. Department of Energy (USDOE, 2009b).

***Calculation of the RPS***

Estimation of the RPS began with data on electricity generation for sales, in billion kilowatt-hours (kWh), made to customers in the Florida Reliability Coordinating Council (FRCC) region of Florida, which comprises all of Florida except for approximately half of the panhandle. These data are estimated annual values projected to the year 2030. We subsequently inflate each annual value by 6.1% to account for electricity consumption in counties of the panhandle which lie outside the jurisdiction of the FRCC. The data series is then extrapolated out another 10 years to 2040. These data represent the total annual sales of electricity (TASE), from which the RPS will be derived by multiplying the data series by the appropriate factor. For example, total electricity sales will be multiplied by 0.20 in order to define a 20% RPS demand.

The same source of data (USDOE, 2009b) supplies values, also expressed in billion kWh, for the amount of renewable energy generated in the FRCC region. These data are broken down by the type of renewable energy, which are listed as solar, wind, hydropower, woody biomass, and biogenic municipal waste. As before, the data are inflated by an annual value by 6.1% (to account for the non-FRCC panhandle counties) and extrapolated out to 2040. Ignoring the woody biomass category, for each year of the data series (2006-2040) we sum together all of the other renewable energy sources (ORES). This represents the projected future supplies of renewable energy that is exclusive of woody biomass. We then estimate the demand for woody biomass under a 20% RPS by subtracting the amount of electricity generated from ORES from 0.2 times the total sales of electricity to consumers in Florida. In summary form, the calculation is represented as such: [( TASE * 0.20 ) – ORES ].

This formula provides us with annual estimates (in billion kWh) of the woody biomass that will be required under the proposed 20% RPS mandate. Table 2.2 displays these estimates for selected years of the projection; in addition, this table also provides estimates from an alternative projection based on a higher level of ORES, as well. This projection is referred to as the *"High ORES"* projection which, as the name implies, assumes that a larger proportion of ORES will be

Table 2.2 Initial and alternative projections for the composition of the proposed 20% RPS.

| Year | 20% RPS | *Initial Projection* | | | | *High ORES Projection* | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | ORES | | Woody Biomass | | High ORES | | Woody Biomass | |
| | (BkWh) | (BkWh) | (%) | (BkWh) | (%) | (BkWh) | (%) | (BkWh) | (%) |
| 2013 | 45.6 | 13.5 | 30% | 32.2 | 70% | 13.5 | 30% | 32.2 | 70% |
| 2016 | 47.4 | 13.5 | 28% | 33.9 | 72% | 33.7 | 71% | 13.7 | 29% |
| 2020 | 50.8 | 13.5 | 27% | 37.3 | 73% | 33.7 | 66% | 17.1 | 34% |
| 2025 | 56.5 | 13.5 | 24% | 43.0 | 76% | 33.7 | 60% | 22.8 | 40% |
| 2030 | 61.6 | 13.5 | 22% | 48.1 | 78% | 33.7 | 55% | 27.9 | 45% |
| 2035 | 66.7 | 13.5 | 20% | 53.3 | 80% | 33.7 | 50% | 33.1 | 50% |
| 2040 | 71.9 | 13.5 | 19% | 58.4 | 81% | 33.7 | 47% | 38.2 | 53% |

available for generating electricity. Model simulations based on the initial projection represent an upper bound of woody biomass required to meet the RPS, while the simulations based on the *High ORES* projection are intended to be viewed in contrast as a lower bound. Figures 2.1a and 2.1b below are provided in order to highlight the difference in the two projections.

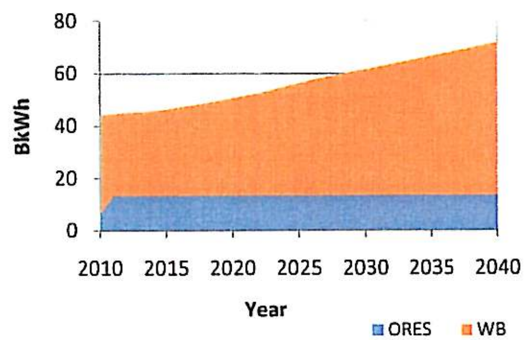


Figure 2.1a Composition of the proposed 20% RPS mandate.

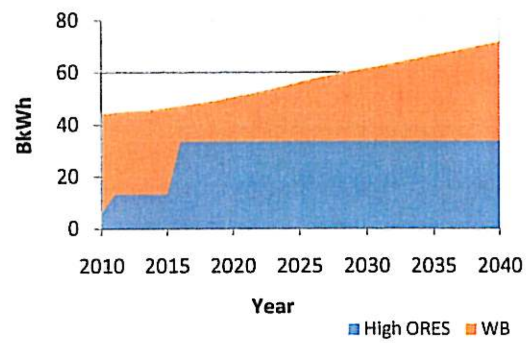


Figure 2.1b Proposed 20% RPS under the "High ORES" scenario.

Note that the comparatively small proportion of RPS-mandated electricity that is derived from ORES in Figure 2.1a is based directly on *Annual Energy Outlook* data (USDOE, 2009b). The initial projection which relies on this data, therefore, is assumed to be the more plausible scenario of the two. This is because, according to a renewable energy forecasting expert, ORES in Florida is likely to remain constant as the total demand for renewable energy increases—with woody biomass most likely making up the difference, since it represents a lower cost technology.[1] Nevertheless, in order to model an RPS with higher levels of electricity derived from ORES, we assume 2.5 times the amount of ORES (beginning in 2016) estimated by the USDOE, and make the calculation as described previously.

This alternative is provided with the acknowledgment that: (1) the *High ORES* projection is strictly representative of a hypothetical simulation only; and (2) there is no empirical evidence

[1] Personal communication with Chris Namovicz of the Energy Information Administration (EIA), USDOE.

to support the assumption that 2.5 times the USDOE's estimated amount of ORES will in fact be generated in the near future. While it is reasonable to assume that some increase in ORES may well occur in the future (e.g., from technological advances), it is doubtful that the levels of ORES depicted in Figure 2.1b will be reached anytime in the next 15 to 20 years. Thus, we stress that the purpose of this alternative projection is to provide a lower bound that can be used in comparison against the initial simulations.

***Conversion to a Green Ton Basis***

The next step is to convert the woody biomass specified as electricity in billion kWh, to woody biomass as represented by thermal energy in terms of trillion BTUs. We employ an effective conversion factor of 13,648 BTU / kWh, which is simply the standard electricity to thermal energy conversion factor (3,412 BTU per kWh) at a 25% level of efficiency.[2] Note that, in a study of biomass-fueled power plants, Wiltsee (2000) reports that the "typical" value among the 20 plants sampled is approximately 14,000 Btu / kWh (24.4% efficiency, HHV).[3] For the present study, we assume a gradual increase in thermal efficiency after 2020, which reaches a maximum of 35% in 2040.[4]

Next we convert woody biomass as heat energy (in terms of trillion BTUs) to mass that is expressed in million green tons. This is accomplished by first multiplying by one million in order to obtain the RPS demand in million BTUs, then dividing by a conversion factor of 12,040,000 semi-dry tons / BTU. This factor is the Gross Heating Value (i.e., HHV) for semi-dried wood (30% moisture content), according to USFS (2004). The use of this value reflects

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[2] As part of the conversion calculation, we also divide by 1,000 to obtain a result denominated in trillion BTUs.
[3] HHV stands for "higher heating value". According to personal communication with Ryan Katofsky, co-author of the Navigant (2008) report, it is standard practice to utilize HHV-based conversion factors when conducting analyses of power plants.
[4] The increase in thermal efficiency is assumed to result from: the increased use of co-firing with coal in the near future, the gradual phase-in of gasification combined-cycle plants over time (as older combustion steam turbines are replaced), and technological advances to all types of biomass power plants.

our assumption that woody biomass will undergo at least some drying prior to undergoing combustion for electricity. Finally, we multiply by 1.4 to make the final conversion from semi-dry tons to green tons. As such, Figure 2.2 illustrates the 20% RPS demand for woody biomass as calculated in the initial projection, as well as for the *High ORES* projection.

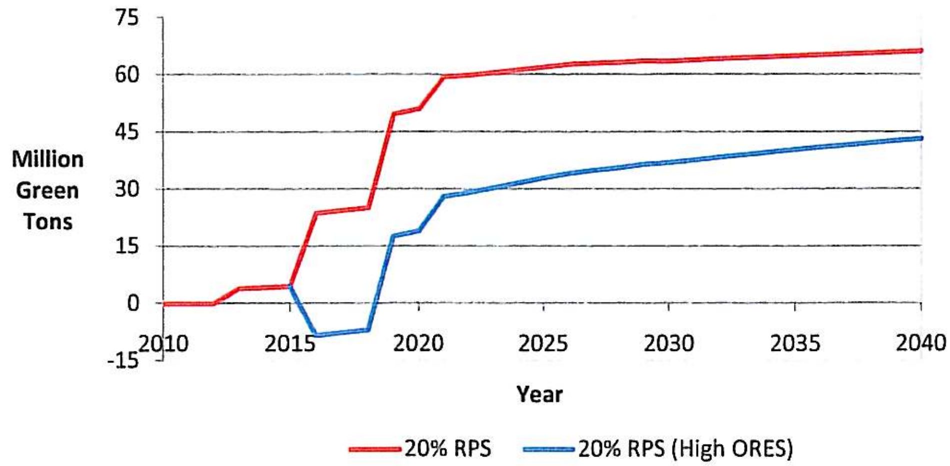


Figure 2.2 Projected demand for woody biomass, in million green tons per year.

Figure 2.2 illustrates the "stair-step" implementation schedule, mentioned previously, whereby the proposed RPS is ramped up over an approximately 10 year period; the full 20% RPS level is achieved in 2021. On first observance of the *High ORES* projection, the increase in the level of ORES that we assume from 2016 onwards appears to simply shift the initial projection downward. Closer inspection reveals that the rate of increase is greater for the *High ORES* projection in the latter half of the time horizon displayed. This is due to the fact that the assumed efficiency improvements in the thermal-to-electricity combustion process play a much more prominent role in the initial projection, since a much greater proportion of woody biomass is being utilized in this projection as compared to the *High ORES* projection.

The projections shown in the figure above specifically represent the amount of woody biomass supply needed to generate electricity that, when combined with electricity generated from ORES, will satisfy the required demand set forth in the proposed Florida RPS. Note also that the woody biomass in this figure is *generic feedstock*—in other words, we have not yet specified the particular provenance from which this supply may be derived. Several different types and/or sources of woody biomass are considered as part of this study, and are discussed in further detail later. Particular focus is given to merchantable timber, however.

For example, both projections that we model (the initial projection, and the *High ORES* projection) postulate an extreme case in which all woody biomass required to meet the calculated RPS demand is derived solely from merchantable timber (i.e., pulpwood and sawtimber). As such, the RPS demand for merchantable timber would then be equivalent to the demand for woody biomass as represented in Figure 2.2. This demand is then fed into the bioeconomic model to simulate what the resultant impacts on the forestry sector would be. Since the SRTS model only deals in demand for merchantable timber, the additional scenarios which assume other sources of woody biomass feedstock (e.g., urban wood waste) are used to meet the conditions of the RPS must first subtract such volumes from the overall demand for woody biomass, as represented in Figure 2.2. The net demand for merchantable timber is then fed into the model to generate a new set of impacts on the forestry sector that are specific to that particular feedstock combination scenario.

## 3. SUBREGIONAL TIMBER SUPPLY (SRTS) MODEL

Beginning in 1958, the United States Forest Service (USFS) has prepared periodic analyses of national timber supply and demand. Following the passage of the Renewable Resource Planning Act (RPA) in 1974, better integration of economic theory and available data allowed the development of empirical national and regional timber supply and demand projections (Adams and Haynes, 1980). The Subregional Timber Supply (SRTS) model was developed to disaggregate the RPA model demands to the USFS's Forest Inventory and Analysis (FIA) survey units across the South. Subsequently, additional inventory modeling drawn from approaches employed by Cubbage *et al.* (1990) was later added to the SRTS model. This approach projected timber inventory using area, growth, and removals for FIA data by forest management type. SRTS incorporated this inventory projection model into a timber market model framework in order to project inventory, removals, and price based on theoretical supply and demand interactions, for a single product for two species groups—total volume for softwoods and hardwoods.

This two species group/single product version of SRTS has been used to examine timber supply and prices in the U.S. South (Abt *et al.*, 2000; Bingham *et al.*, 2003) and Northeast (Sendek *et al.*, 2003). Prestemon and Abt (2002) employed the SRTS model to project timber supply in the Southern Forest Resource Assessment, while Schaberg *et al.* (2005) used the model to analyze the impacts of wood chip mills on timber supply in North Carolina. SRTS continues to be utilized by forest industry analysts and state forestry agencies, and improvements are continually made to the model—some in response to updates to the FIA data that is the empirical foundation of SRTS.

## Model Approach

Like most natural resource assessment tools, SRTS combines an economic resource allocation module with a biological model. In SRTS, the focus is on linking timber market price and harvest feedbacks with forest resource dynamics. The model was developed to examine the impact of market-level demand assumptions on the sub-regional, ownership, and forest type sub-components of the supply side of the market. SRTS is a simulation tool that allows the user to examine the potential impact of different demand and supply assumptions on market and resource futures. It was initially developed to project total volume by two major species groups, softwoods and hardwoods. In its initial form, SRTS tracked inventory, growth, and removal data for 10 year age classes, which was then developed to project volumes and inventories through time. The model and data have now been improved to tabulate aggregate data in 5 year age classes and their associated diameter distributions. This detailed tracking allows the model to be expanded to project timber inventories by multiple product classes and species groups.

### *Market Module*

SRTS models project demand as a function of product stumpage price and demand shifters specified exogenously by the user. The product price responsiveness (demand price elasticity) is specified, as are demand shifts over time. Demand and product specifications apply to the whole market region being modeled. The model uses constant elasticity functional forms which ensure that the user-specified elasticities hold over all price-quantity combinations.

Product supply is modeled as a function of product stumpage price and inventory. The user specifies the supply-price elasticity by product and owner. The user can also specify the supply inventory responsiveness by owner. The product price and harvest levels by product, sub-region, and owner are simultaneously determined in the market equilibrium calculations. The inventory shift for the equilibrium calculation is estimated in the inventory module described below.

In each year, the output from the market module is an equilibrium harvest by product for each region-owner combination. A goal program formulation described below allocates product harvest across management types and age classes.

***Inventory Module and Goal Program***

The inventory model begins with an estimate of initial inventory by sub-region, ownership, species, forest type, and five year age class. Inventory changes through time by adding net growth and by subtracting harvest estimated in the market module. Timberland acreage change can either be user-specified or linked to price sensitive land use models. Due to time constraints, in this study we assume no net change in timberland acreage. While we fully expect that the increased demand for merchantable timber resulting from a Florida RPS would lead to increases in timberland acreage, forecasting by Wear (2002, p. 164) to 2020 indicates that Florida is "expected to experience substantial losses of forest land in response to population and income change." For the limited purposes of this study, we assume these influences cancel each other out.

The equilibrium harvests by region, owner, and product are allocated to the inventory by, management type and age class, with a goal program. The link between the products and inventory is based on user-specified product definitions. Product definitions are specified in terms of a range of diameters and a percentage of the product that is used as pulpwood. Using this information, a product mix is calculated for harvest in any management type and age class. The objective function for the goal program is to harvest across management types and age classes (for each owner/region) to obtain the projected target removals mix, while harvesting consistent with historical harvest patterns for this region/owner. The "consistent with historical" requirement is defined as bounds around existing removal-to-inventory intensities. If the new product mix cannot be met with this constraint, the removal-to-inventory bounds are relaxed.

For partial harvests, the goal program defines a stocking target (volume per acre), for each management type and age class, based on starting data. If the current stocking is greater than the target, then harvest is considered to be thinning. When volume per acre reaches the target, the remaining harvest is considered to be final harvest with the acres returned to age class zero. Under most circumstances this maintains average stocking near target levels throughout the projection. Thinning intensity can be changed by modifying the target stocking level.

***Model Inputs***

The basic SRTS inventory dataset consists of estimates of growing stock inventory, growth per acre, removals, and acreage by sub-region, species group, ownership, forest type and five year age class. These datasets are provided with the assistance of the USDA Forest Service Forest Inventory and Analysis (FIA) Group in the Southern Research Station. These datasets are updated approximately every three months. The FIA data are the key biological forest resource drivers for the inventory, by forest management type, age class, and species groups. These data are now collected annually in all states in the South and are available from the USDA Forest Service by request, or can be obtained through the FIA website (USFS, 2009). The website describes the data sets and FIA procedures, which are rather complex. The SRTS model uses a variation of the basic data sets with the area, inventory, growth, and removals classified into the relevant age class, management type, and species group categories.

Given the recent change in ownership structure of timberland, the distinction between the forest industry ownership and the miscellaneous corporate category is unclear. Therefore, both corporate and non-corporate private categories are specified. The corporate category includes vertically integrated forest industry, and miscellaneous corporate owners including Timber Investment and Management Organizations (TIMOs) and Real Estate Investment Trusts

(REITs). Since public land harvest decisions are not necessarily price responsive, public lands are excluded from the market simulations.

For growing stock inventory, removals, and timberland acres, the input file includes regional totals by owner, management type, species group, and five year age class. Estimates of growth per acre, however, are based on regression models. For small regions, the growth on re-measured plots is highly variable. Rather than have the model use estimates based on the few plots that fall into any one category in the region of interest, regressions are used to determine the shape over the growth curve from a broader region, while allowing the curve to shift to reflect local growth levels. Separate equations are estimated by species group, physiographic region, management type, and owner. A dummy variable is used to allow intercept shifts in the curve for each state. For example there is one curve for the corporate owned pine plantations in the coastal plain of Georgia. Florida coastal plain corporate owned pine plantations would have the same shape but a different intercept. Non-corporate growth curves would have a different shape and different intercept shifts. For pine plantations, the level of the growth curve can be further calibrated to match the mean of the local region/owner data. For plots with missing ages, age is estimated using a regression on age and plot characteristics.

Most of the effort in developing a model run is accessing and summarizing the starting inventory data. This has been made more challenging by recent decisions by the Forest Service to limit distribution of both ownership and county-level data. There have also been challenges associated with calculating growth and removals during the transition from periodic to annual inventories.

***Model Flow***

A run is initiated by applying starting harvest to the inventory data to estimate the initial shift in supply curves by region, owner, and product. The model then shifts the aggregate product demand curve as specified by the user. Demand is then modeled at the aggregate level (i.e., all region/owners in the model run are assumed to face the same product demand curve). Harvest, demand, or price can be specified as the exogenous demand variable and the market module will find the equilibrium solution for the other two parameters. Given the user-specified demand shift and estimated inventory shifts by product, region, and owner from the inventory module, the model uses a binary search algorithm to find the market-clearing price. This simultaneously determines harvest shifts across regions and owners. Harvest and acreage shifts are applied and the model proceeds to the next year.

SRTS is essentially a simulation framework that allows the user to use a simple market equilibrium mechanism to explore market and inventory responses to various supply and demand scenarios. "Forecasts" using the model require estimates of supply and demand elasticities specific to sub-regions, owners, and products. Since these are generally not available, using results from aggregate Southwide studies have allowed us to explore the basic economic implications at a detailed level, but they do not reflect many factors that might be unique to a particular region. By applying broad regional elasticities to specific regions and products, the model undoubtedly underestimates regional and product variation. This is assumed to provide a more realistic assessment than ignoring sub-regional economic responses.

**Background Details**

Below we briefly describe some of the background details specific to the scenarios that are simulated in this study. Included are some basic assumptions about how the products being modeled are defined, how the region being modeled is delineated, and how the baseline scenario is defined and employed.

***Product Categories: Merchantable Timber***

SRTS utilizes diameter distributions for each sub-region, owner, management type, and each 5-year age class to calculate product removals and inventory volumes by age class. The user must specify a diameter range and a "cull" factor which determines how much volume (in each product category) contributes to pulpwood. As such, for this study we selected four products defined by broad species type (hardwood and softwood) and diameter. We refer to these four categories as: *Pine Roundwood*; *Pine, Large Sawtimber*; *Hardwood Pulpwood*; and *Hardwood Sawtimber*.

*Pine Roundwood* represents an expanded pine pulpwood category. Whereas pulpwood derived from pine is normally delineated as 5" to 6.9" diameter breast-height (dbh) in the SRTS model, in order to meet the large volume demands of the proposed RPS we have expanded this category to include pines up to 12.9" dbh. This modification allows SRTS to access more of the standing resource, and results in all pine growing stock above 13" dbh to be categorized as *Pine, Large Sawtimber*. The category *Hardwood Pulpwood* is comprised of various species of hardwood trees that are 5" to 8.9" dbh, while *Hardwood Sawtimber* contains hardwood growing stock that is greater than 9" dbh.

SRTS requires that demand be input according to the product categories specified by the user. As such, we must apportion the RPS demand estimate calculated for a particular scenario amongst the four products identified in the previous paragraph. Therefore, we have assumed that the total RPS demand will be supplied as follows: 80% from *Pine Roundwood*; 10% from *Pine, Large Sawtimber*; 8% from *Hardwood Pulpwood*; and 2% from *Hardwood Sawtimber*.

***Model Elasticities***

Both the supply and demand price elasticities can vary by product, as can the inventory supply elasticity. Previous research has been conducted on aggregate demand and supply elasticities, but values for individual products are not available in the literature. The consensus on these elasticities is that they are inelastic (Pattanayak *et al.*, 2002). In this study, we assume a demand elasticity of -0.2 for all four SRTS products. We selected this value because it is very similar to the value (-0.15) used by Pacheco *et al.* (1997), and because it is roughly the mid-point of two estimates (-0.03 and -0.43) that they observed in the literature.

We also assume the following supply elasticities, by ownership category and generic product type (i.e., pulpwood or sawtimber), that were estimated by Liao and Zhang (2008):

0.90 Forest Industry, *Pine Roundwood* and *Hardwood Pulpwood*
0.70 Forest Industry, *Pine Large Sawtimber* and *Hardwood Sawtimber*
0.32 NIPF Landowner, *Pine Roundwood* and *Hardwood Pulpwood*
0.29 NIPF Landowner, *Pine Large Sawtimber* and *Hardwood Sawtimber*

***Resource Supply Sub-regions***

The area that SRTS considers when calculating a harvest profile is also specified by the user. In this study we select the four FIA survey sub-units of Florida to form the basis of our modeling simulations. In addition to these sub-units, however, we also chose to include selected counties of 3 of the 4 FIA sub-units in southern Alabama and southern Georgia that share a border with Florida.[5] This is done to reflect the reality that timber resources in these counties will likely be accessed to fill the increased demand expected under the proposed Florida RPS. A list of these counties is provided below by the appropriate sub-unit:

Alabama_SE subunit: Coffee, Dale, Geneva, Henry, Houston

Georgia_SW subunit: Baker, Berrien, Brooks, Colquitt, Cook, Decatur, Early, Grady, Lanier, Lowndes, Miller, Mitchell, Seminole, Thomas

Georgia_SE subunit: Atkinson, Brantley, Camden, Charlton, Clinch, Echols, Glynn, Pierce, Ware

[5] The fourth external sub-unit (Alabama_SW-S) bordering Florida consists of 5 counties, all of which are included.

***Baseline Scenario***

We employ a hypothetical demand scenario, using 2006 as a baseline year, from which the impacts of the proposed RPS can be estimated. The current economic recession is accounted for by assuming a reduction in demand from 2007 to 2010, and a comparable rebound from 2011 to 2013. Demand returns to 97% of the 2006 level by 2014, then gradually increases to the base level in 2018. Subsequent years are constant at the original 2006 level; in other words, we assume no increase in the demand for all products beyond what is posited for recovering from the recession.

The type of recession represented in our baseline scenario is referred to as a "v-recession", meaning it has a sharp decline and sharp rebound without a long period at the lowest level. According to an article published in the *Wall Street Journal*, the probability that the current recession will be of this type is only 15 percent (Wessel, 2009). We nevertheless assume this type of recession for the present study because, while we have information about the decline, we do not have any forecasts regarding either the length of time the economy is expected to stay at the bottom of the cycle, or a recovery trajectory that is different from the recession trajectory. Recent demand analyses indicate that both sawtimber and pulpwood demands have declined as much as 30% since 2005, with the pulpwood demands occurring more recently. An example of the baseline output results for the *Pine Roundwood* category is shown in Figure 3.1 below. The effects of the recession are clearly observable in the first third of the projection for both the price and stock removal variables.

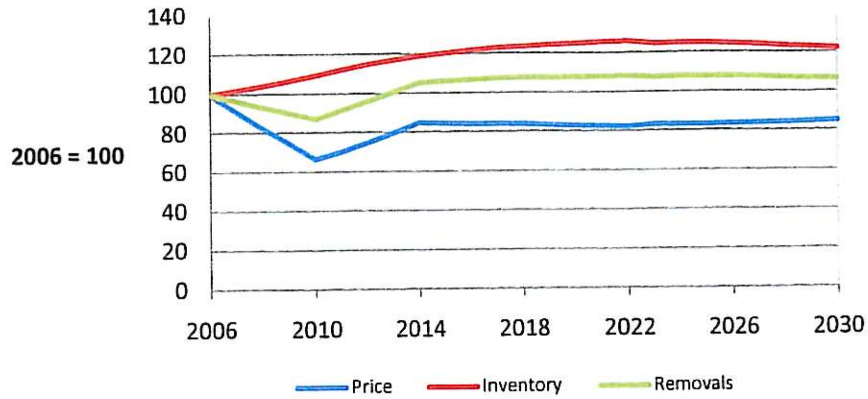


Figure 3.1 Baseline with recession for the *Pine Roundwood* product category.

Results from the baseline scenario modeling run are used in many of the calculations that serve to quantify the impacts of the RPS-based simulations. The policy scenarios are built by adding the estimated RPS demand for each product category (discussed above) to the baseline demand corresponding to each product. This provides the actual "Input Demand" (for each of the 4 products) that is fed into the model so that SRTS can simulate the amount of harvest to be expected, given the biologic and economic parameters that underlie the model.

# 4. RESULTS FOR THE INITIAL RPS PROJECTION

This section presents numerical results which are summarized and displayed for the different biomass feedstock source combinations fed into SRTS. Graphs that visually convey the dynamic impact of RPS demands at the 7%, 12%, and 20% levels are featured, as well.[6]

**MT Scenario**

The presentation of modeling results begins with an extreme-case scenario represented by simulations in which all woody biomass required under an RPS is derived from merchantable timber (i.e., pulpwood and sawtimber) only. As mentioned previously, the RPS demand for merchantable timber in such a case is equivalent to the total demand for woody biomass as represented in Figure 2.2 (page 9).[7] Clearly this situation is unlikely to be the case, as we expect other sources of woody biomass to be accessed by biomass power plant operators in Florida. It is a natural starting point for constructing the modeling scenarios, however. In addition, it also represents the absolute maximum in terms of the impacts on the timber resources in the modeled region.

Figures 4.1a and 4.1b show the aggregate demand, harvest, and supply characteristics for merchantable timber (MT) as modeled under the 20% RPS scenario. Understanding Figure 4.1a in terms of its components is important to comprehending the derivation of the supply of MT shown in the second figure. First, the "Base Harvest" (orange line) represents the supply of MT that normally goes to the forest products industry (FPI) in the absence of any RPS mandate for Florida. The "Input Demand" (red line) is the total demand fed into the model; it is comprised of the "Base Harvest" plus the estimated amount of MT required to meet the proposed mandate

[6] We model the 12% RPS scenario as beginning in 2013 at a 7% level, then increasing to the full 12% in 2018.

[7] Note that the RPS demand in Figure 2.2 projects to 2040. While all the simulations of this study were modeled to 2040, we generally prefer to emphasize the results only to 2030 as being the most reliable given the short to mid-term focus of SRTS as a predictive tool. Output data for the whole series up to 2040, except for the *Hardwood Sawtimber* product category (only to 2030) are provided in Appendix B for the 20% RPS scenario.

(i.e., the RPS demand in Figure 2.2). The "SRTS Harvest" (blue line) is the actual output of the model; it is less than the Input Demand because of the economic equations which define how the resource will be harvested (mainly as a function of supply and demand elasticities). Note that these demand, harvest, and supply values are aggregated for the individual products.

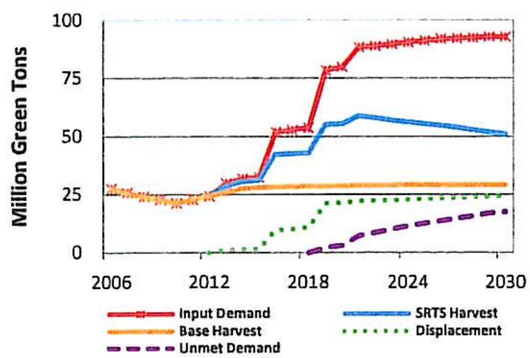


Figure 4.1a Aggregate demand & harvest: 20% RPS, MT only.

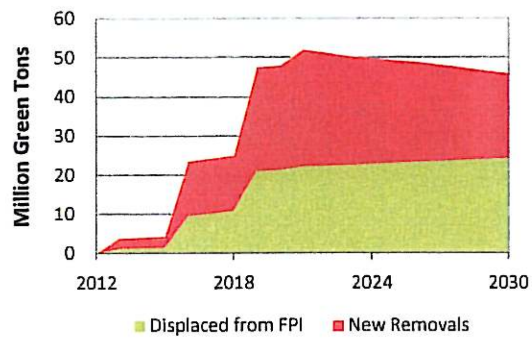


Figure 4.1b Aggregate supply of MT used as woody biomass for 20% RPS.

The difference between the SRTS Harvest and the Base Harvest is labeled "new removals" and represents the (additional) amount of MT harvested as a result of the Input Demand. The difference in Input Demand and SRTS Harvest is the shortfall in supply of MT needed to meet the entire Input Demand. This shortfall must ultimately be derived from timber allocated to the existing FPI (forest products industry), as represented by the Base Harvest. Thus, the amount of MT diverted from the FPI in order to be used as supply for meeting the Input Demand is referred to as "displacement" (green dotted line, Figure 4.1a). When there is not enough displacement to meet the shortfall, then unmet demand exists (purple dashed line).

Figures 4.1c-h display SRTS output data specific to 3 of the 4 product categories, and how the harvest of a given product is allocated between the FPI and the electric power sector. For the *Pine Roundwood* product category, the amount of shortfall exceeds existing supplies of harvested timber beginning in 2019—which means that there is unmet demand even before the full 20% target is implemented in 2021. This is clearly seen in Figures 4.1d below. The situation is similar for *Hardwood Pulpwood* (Figure 4.1h), except that unmet demand does not arise until sometime later. These two figures show that MT alone cannot supply a 20% RPS.

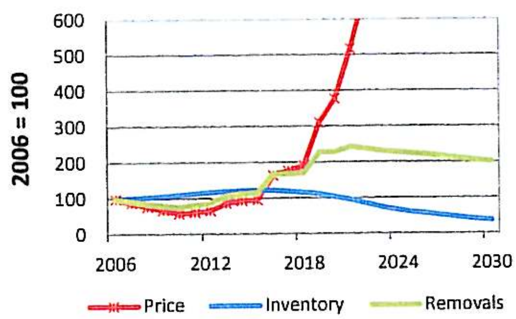


Figure 4.1c SRTS output for product category *Pine Roundwood.*

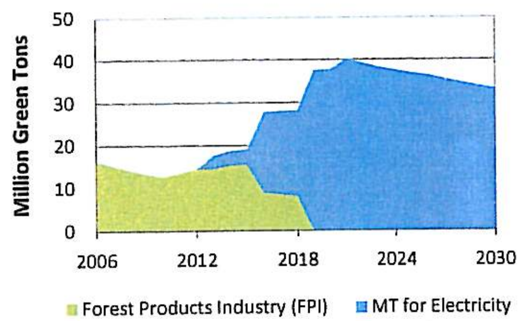


Figure 4.1d Allocation of *Pine Roundwood* supply for 20% RPS (MT only).

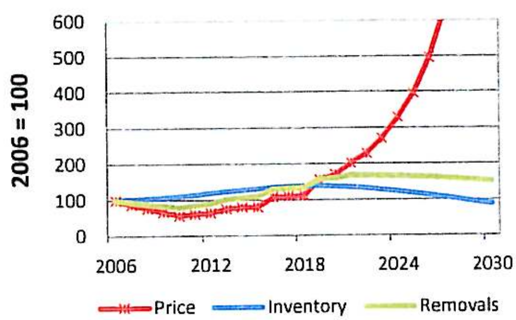


Figure 4.1e SRTS output for *Pine, Large Sawtimber.*

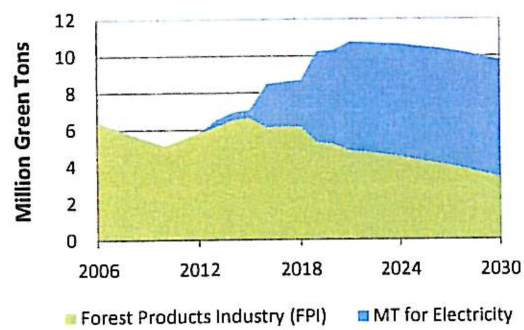


Figure 4.1f Allocation of *Pine, Large Sawtimber* supply (20% RPS).

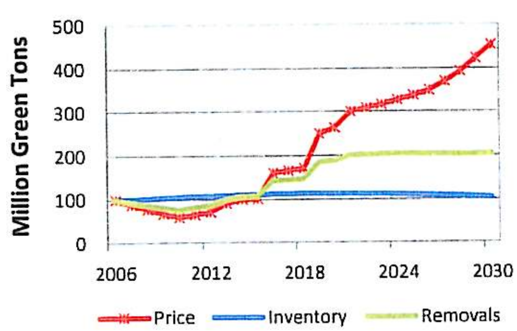


Figure 4.1g SRTS output for *Hardwood Pulpwood.*

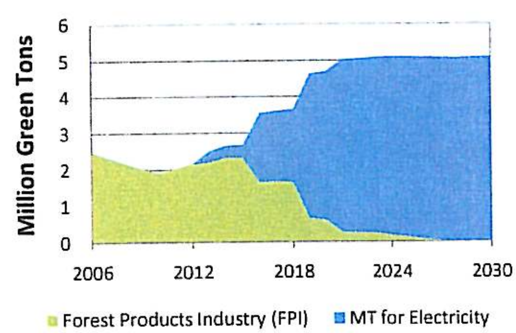


Figure 4.1h Allocation of *Hardwood Pulpwood* supply (20% RPS).

Imposing such large demands on these products causes the price to increase dramatically, which can also be clearly observed in the above graphs. The drawdown in inventory for both of the *Pine* products is what forces the harvest for these products to decline. This consequently causes the decline in supply for these products in the later years of the projection (cf. Figures 4.1d and 4.1f), particularly for *Pine Roundwood.* Summarized data for the aggregate variables of Figures 4.1a and 4.1b are shown in Table 4.1 below. (See Appendix B for the actual output data.)

Table 4.1 Summarized data for the MT scenario under a 20% RPS mandate.

| 20% RPS | 2015 | | 2020 | | 2025 | | 2030 | |
|---|---|---|---|---|---|---|---|---|
| | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) |
| RPS Demand* | 4.5 | 16% | 51.2 | 177% | 62.0 | 212% | 63.6 | 217% |
| New Removals* | 3.1 | 11% | 26.7 | 92% | 26.3 | 90% | 21.8 | 74% |
| Displacement† | 1.5 | 32% | 21.4 | 44% | 23.1 | 47% | 24.3 | 53% |
| New Removals† | 3.1 | 68% | 26.7 | 56% | 26.3 | 53% | 21.8 | 47% |
| Unmet Demand§ | 0.0 | 0% | 3.1 | 6% | 12.6 | 20% | 17.6 | 28% |

* in million green tons (mgrt), and as a percent of Base Harvest
† in million green tons (mgrt), and as a percent of Total Supply
§ in million green tons (mgrt), and as a percent of RPS Demand

Figures 4.2a and 4.2b show that even a 12% RPS significantly impacts the forest industry over time: notice the steady increase in displacement after the full 12% level is attained in 2018.

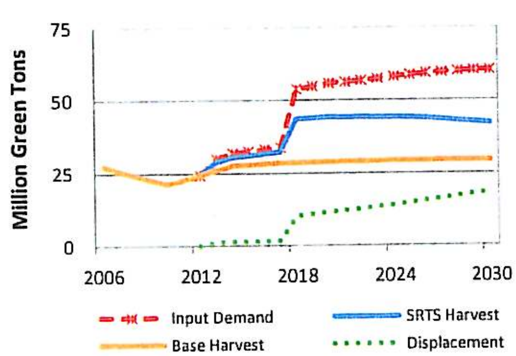


Figure 4.2a Aggregate demand & harvest: 12% RPS, MT only.

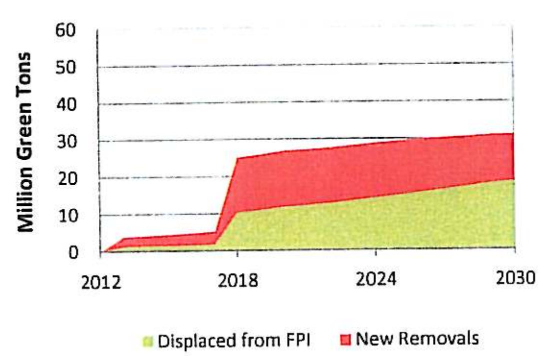


Figure 4.2b Aggregate supply of MT used as woody biomass for 12% RPS.

As displayed in Figures 4.3a and 4.3b, a 7% RPS has a much more moderate effect in terms of the amount of timber harvested as new removals, as well as the amount of timber that is displaced from the forest products industry. Table 4.2 provides the summary data that corresponds to the figures shown for the 7% and 12% RPS scenarios.

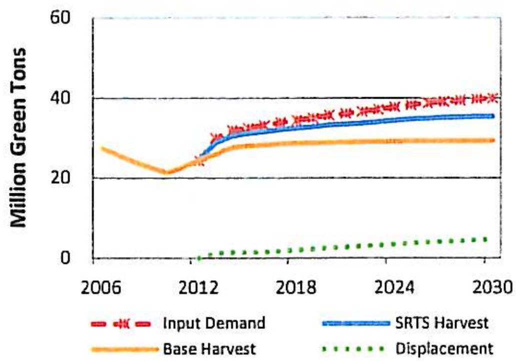


Figure 4.3a Aggregate demand & harvest for 7% RPS, MT only.

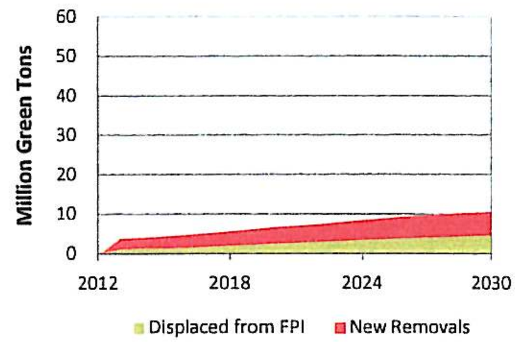


Figure 4.3b Aggregate supply of MT used as woody biomass for 7% RPS.

Table 4.2 Summarized data under 12% and 7% RPS scenarios, MT only.

| 12% RPS | 2015 | | 2020 | | 2025 | | 2030 | |
|---|---|---|---|---|---|---|---|---|
| | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) |
| RPS Demand* | 4.5 | 16% | 27.0 | 93% | 29.4 | 101% | 31.1 | 106% |
| New Removals* | 3.1 | 11% | 15.3 | 53% | 14.8 | 50% | 12.7 | 43% |
| Displacement† | 1.5 | 32% | 11.7 | 43% | 14.7 | 50% | 18.4 | 59% |
| New Removals† | 3.1 | 68% | 15.3 | 57% | 14.8 | 50% | 12.7 | 41% |
| Unmet Demand§ | 0.0 | 0% | 0.0 | 0% | 0.0 | 0% | 0.0 | 0% |
| **7% RPS** | **2015** | | **2020** | | **2025** | | **2030** | |
| | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) |
| RPS Demand* | 4.5 | 16% | 6.8 | 24% | 9.1 | 31% | 10.7 | 36% |
| New Removals* | 3.1 | 11% | 4.3 | 15% | 5.4 | 19% | 6.1 | 21% |
| Displacement† | 1.5 | 32% | 2.5 | 36% | 3.7 | 40% | 4.6 | 43% |
| New Removals† | 3.1 | 68% | 4.3 | 64% | 5.4 | 60% | 6.1 | 57% |
| Unmet Demand§ | 0.0 | 0% | 0.0 | 0% | 0.0 | 0% | 0.0 | 0% |

* in million green tons (mgrt), and as a percent of Base Harvest
† in million green tons (mgrt), and as a percent of Total Supply
§ in million green tons (mgrt), and as a percent of RPS Demand

**MT/UWW/LR**

This scenario examines urban wood waste (UWW) and logging residues (LR) as additional sources of biomass that augment the MT used as electricity generation feedstock. Following Carter *et al.* (2007), we consider UWW to be large diameter wood generated by tree servicing companies and assume an availability factor of 60% for this material (i.e., 40% will be unsuitable for use in biomass power plants). A value of 0.203 green tons / capita / year (Wiltsee, 1998) is multiplied by the availability factor, and then yearly estimates of future population for Florida obtained from the Bureau of Economic and Business Research, University of Florida (BEBR, 2009). Thus, we obtain the annual amount of UWW projected to be utilized for bioelectricity.

An auxiliary program of SRTS estimates gross logging residuals (LR), which are the discarded tree tops and limbs generated during the harvest of MT. This program uses *residual factors*, specified by survey unit, to calculate gross LR from the SRTS harvest previously run. For the survey units in this study, the logging residual factors for pine range from 0.043 to 0.063 (per cubic foot of removals) for growing stock, and 0.098 and 0.155 for non-growing stock. For hardwoods, the residual factors range from 0.131 to 0.226 for growing stock and 0.199 and 0.316 for non-growing stock. We assume a conservative utilization factor of 45% to account for the fact that not all of the generated LR will be accessed. The auxiliary program provides output expressed in million green tons, which represents the annual net amount of LR projected to be generated in Florida that would be utilized to produce electrical power under the proposed RPS.

Quantities of UWW and LR are then subtracted from the *total* demand for woody biomass required to meet a 20% RPS (i.e., as shown in Figure 2.2); the net value derived from this calculation is the amount of MT demanded. In other words, this is the amount of MT that must be added to the baseline demand data in order for SRTS to model the projected harvests.

Figures 4.4a and 4.4b display results for a 20% RPS scenario when UWW and LR are used for bioelectricity, in addition to the MT being modeled by SRTS. As in the MT-only simulation, Input Demand exceeds the ability of the model to yield the required amount of MT since, after 2018, the volume of UWW+LR is only about 16% of the total amount of woody biomass required under the RPS. This can be observed in Table 4.3, which contains the summary data for the figures. Thus, the addition of these sources of woody biomass does not significantly reduce the amount of displacement coming from the forest products industry (cf. the MT-only case).

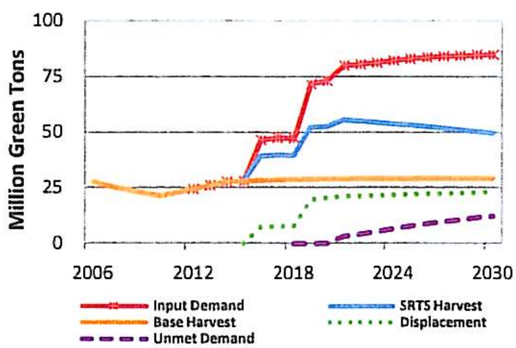


Figure 4.4a Aggregate demand & harvest: 20% RPS, MT/UWW/LR.

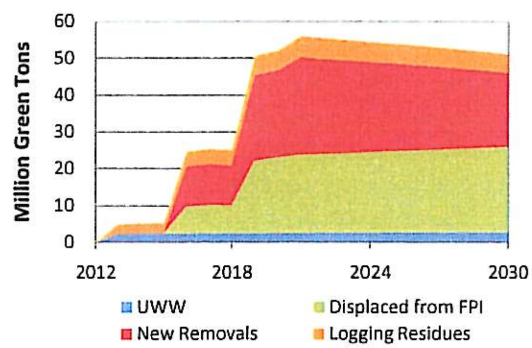


Figure 4.4b Aggregate woody biomass supply for the 20% RPS.

Table 4.3 Summarized data for the 20% RPS scenario, MT/UWW/LR.

| 20% RPS | 2015 | | 2020 | | 2025 | | 2030 | |
|---|---|---|---|---|---|---|---|---|
| | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) |
| RPS Demand* | 0.0 | 0% | 44.3 | 153% | 53.8 | 184% | 55.7 | 190% |
| New Removals* | 0.0 | 0% | 23.7 | 82% | 23.9 | 82% | 20.2 | 69% |
| Urban Wood Waste† | 2.4 | 45% | 2.6 | 5% | 2.8 | 5% | 2.9 | 6% |
| Logging Residues† | 3.0 | 55% | 5.4 | 10% | 5.4 | 10% | 5.0 | 10% |
| Displacement† | 0.0 | 0% | 20.6 | 39% | 22.0 | 41% | 23.1 | 45% |
| New Removals† | 0.0 | 0% | 23.7 | 45% | 23.9 | 44% | 20.2 | 39% |
| Unmet Demand§ | 0.0 | 0% | 0.1 | 0% | 7.8 | 15% | 12.4 | 22% |

* in million green tons (mgrt), and as a percent of Base Harvest
† in million green tons (mgrt), and as a percent of Total Supply
§ in million green tons (mgrt), and as a percent of RPS Demand

Figures 4.4c-h depict the SRTS output data and resource allocations for *Pine Roundwood, Pine Large Sawtimber*, and *Hardwood Pulpwood.* As before, the data corresponding to the individual products are presented in Appendix B (as are the *Hardwood Sawtimber* graphs).

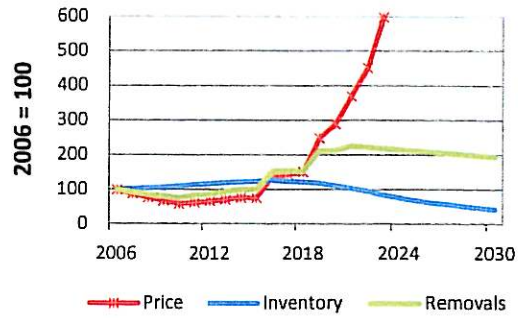


Figure 4.4c SRTS output for product category *Pine Roundwood.*

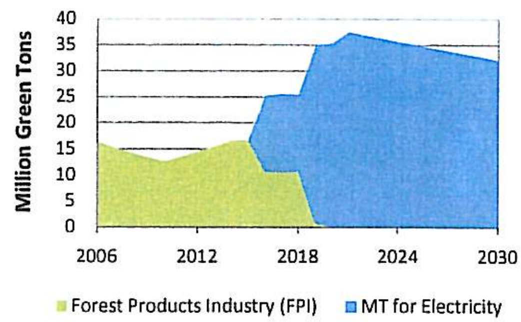


Figure 4.4d Allocation of *Pine Roundwood* 20% RPS (MT/UWW/LR).

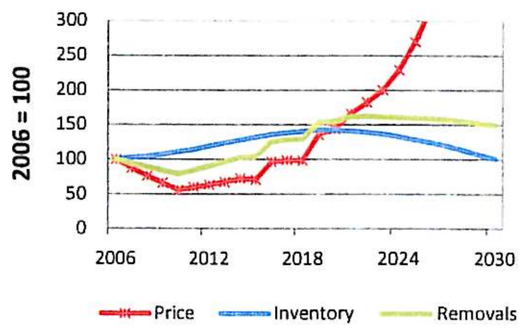


Figure 4.4e SRTS output for *Pine, Large Sawtimber* (MT/UWW/LR).

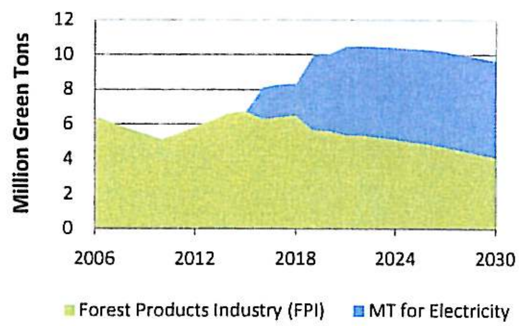


Figure 4.4f Allocation of *Pine, Large Sawtimber* supply (20% RPS).

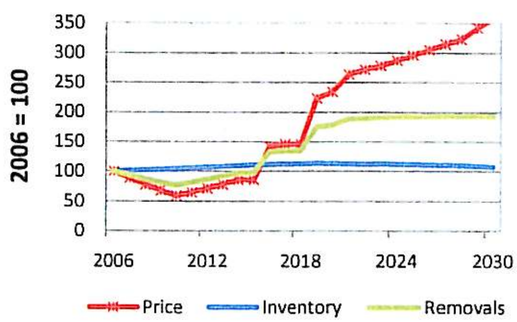


Figure 4.4g SRTS output for *Hardwood Pulpwood* (MT/UWW/LR).

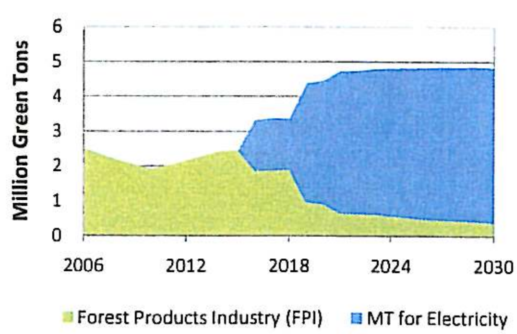


Figure 4.4h Allocation of *Hardwood Pulpwood* supply (20% RPS).

Figure 4.4d shows that *Pine Roundwood* again has shortfall exceeding existing supplies of harvested timber beginning in 2019. Unlike before, however, the existing supply of *Hardwood Pulpwood* is always greater than the shortfall in demand—albeit not by very much. Nonetheless, Figure 4.4h clearly shows that this product category is still heavily affected.

The main difference between the figures corresponding to the individual products of the MT-only scenario and the above figures is that here we observe that the addition of UWW+LR eliminates the need for merchantable timber until the 12% level of the RPS is reached in 2016. After that year, the addition of these sources of woody biomass has only a marginal effect on total supply. The price, inventory, and stock removal trends are all very similar to those viewed earlier for the MT-only simulation.

Figures 4.5a and 4.5b illustrate that a 12% RPS still has a significant impact on the forest products industry in terms of displacement. Even though UWW and LR comprise 21% to 25% of required woody biomass, this amount still does not reduce the displacement to a level that can be considered relatively benign. Table 4.4 provides the summary data that corresponds to the figures shown for both the 12% and 7% RPS scenarios for MT/UWW/LR.

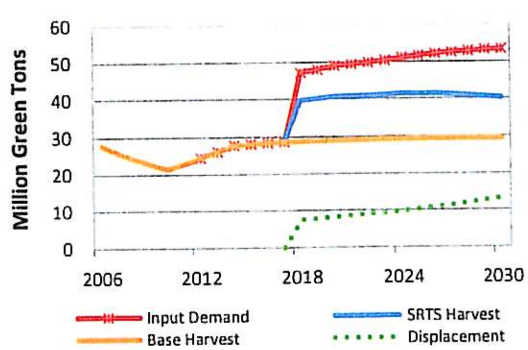


Figure 4.5a Aggregate demand & harvest: 12% RPS, MT/UWW/LR.

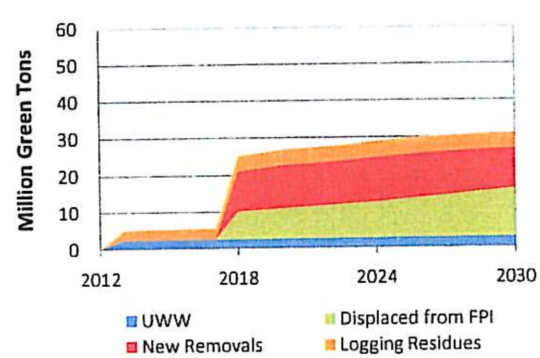


Figure 4.5b Aggregate woody biomass supply under a 12% RPS.

Table 4.4 Summarized data under 12% and 7% RPS scenarios, MT/UWW/LR.

| 12% RPS | 2015 | | 2020 | | 2025 | | 2030 | |
|---|---|---|---|---|---|---|---|---|
| | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) |
| RPS Demand* | 0.0 | 0% | 20.1 | 70% | 22.4 | 76% | 24.0 | 82% |
| New Removals* | 0.0 | 0% | 11.8 | 41% | 12.1 | 41% | 10.9 | 37% |
| Urban Wood Waste† | 2.4 | 45% | 2.6 | 10% | 2.8 | 9% | 2.9 | 9% |
| Logging Residues† | 3.0 | 55% | 4.2 | 16% | 4.3 | 15% | 4.1 | 13% |
| Displacement† | 0.0 | 0% | 8.3 | 31% | 10.3 | 35% | 13.1 | 42% |
| New Removals† | 0.0 | 0% | 11.8 | 44% | 12.1 | 41% | 10.9 | 35% |
| Unmet Demand§ | 0.0 | 0% | 0.0 | 0% | 0.0 | 0% | 0.0 | 0% |
| **7% RPS** | **2015** | | **2020** | | **2025** | | **2030** | |
| | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) |
| RPS Demand* | 0.0 | 0% | 1.1 | 4% | 3.0 | 10% | 4.4 | 15% |
| New Removals* | 0.0 | 0% | 0.8 | 3% | 2.2 | 7% | 2.7 | 9% |
| Urban Wood Waste† | 2.4 | 45% | 2.6 | 38% | 2.8 | 30% | 2.9 | 27% |
| Logging Residues† | 3.0 | 55% | 3.2 | 46% | 3.3 | 36% | 3.4 | 32% |
| Displacement† | 0.0 | 0% | 0.2 | 3% | 0.8 | 9% | 1.7 | 16% |
| New Removals† | 0.0 | 0% | 0.8 | 12% | 2.2 | 24% | 2.7 | 25% |
| Unmet Demand§ | 0.0 | 0% | 0.0 | 0% | 0.0 | 0% | 0.0 | 0% |

* in million green tons (mgrt), and as a percent of Base Harvest
† in million green tons (mgrt), and as a percent of Total Supply
§ in million green tons (mgrt), and as a percent of RPS Demand

Under a 7% RPS, however, the addition of UWW and LR greatly reduces the displacement (and the timber harvested as new removals) required for electrical power generation in Florida. This can be observed in Figures 4.6a and 4.6b.

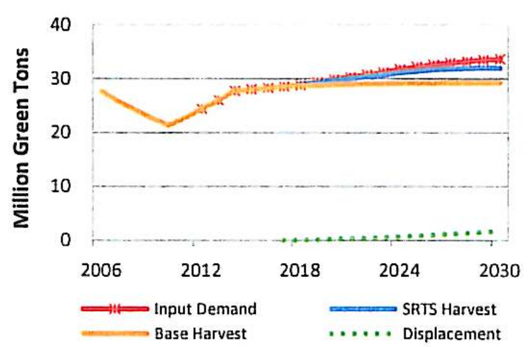


Figure 4.6a Aggregate demand & harvest: 7% RPS, MT/UWW/LR.

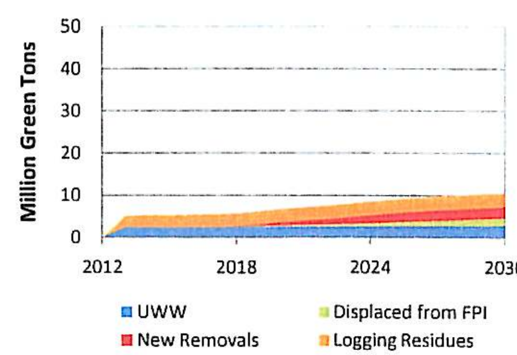


Figure 4.6b Aggregate woody biomass supply under a 7% RPS.

**MT/UWW/LR+SREC**

In this subsection, we model the practical effect of including short rotation energy crops (SREC) into the mix of biomass feedstock sources (e.g., UWW, LR) which are used to reduce the supply of merchantable timber utilized in the generation of electricity under the proposed RPS mandate. SREC generally include such species as eucalyptus, poplar, energy cane, elephant grass, switchgrass, etc. For this study, however, we assume both traditional and high-yielding species of eucalyptus are grown specifically as SREC destined for use as woody biomass feedstock for electrical power generation. Given the uncertainty in projecting the amount of Florida farmland that will be converted to SREC in the near future, we postulate two distinct scenarios for SREC production resulting from the adoption of the proposed RPS.

Based on data from Navigant (2008), we assume that a total of 8.9 million acres of farmland in Florida could *theoretically* be converted to SREC. As Navigant assumes that 1.318 million of these acres will be allocated to SREC by 2020 (Navigant 2008, p. 98), we have chosen this value as the maximum number of farmland acres for SREC.[8] Added to this is 123,000 acres of reclaimed phosphate mining land that is currently available and ideally suited for SREC production (Navigant, 2008). Thus, a total of 1.441 million acres are allocated to SREC under our high adoption / high productivity scenario which assumes this allocated land will produce high yielding eucalyptus at a rate of 32 green tons / acre / year (Rockwood *et al.*, 2008).

The minimum land available for SREC in our projections assumes that available Florida farmland is converted to SREC production, over time, within a range that is bounded by 1% (2012) to 5% (2033) of the total available farmland (i.e., 8.9 million acres). The rate of conversion between 2012 and 2033 equals an increase of 0.2% per year. These acreage values

[8] Prior to 2020 (and from an initial value in 2012), the increase in Florida farmland that we project to be converted to SREC is approximately 1.65% per year—which is within the range assumed by Navigant (2008, p. 97).

(445,000 acres for the 5% maximum) are added to the 123,000 acres coming from the reclaimed mining land, and establish our low adoption / low productivity scenario with the allocated land producing eucalyptus at a rate of 20 green tons / acre / year (Rockwood *et al.*, 2008).

***SREC_low Simulation***

Figures 4.7a and 4.7b display the aggregated results for the 20% RPS scenario when the low adoption / low productivity scenario for SREC is incorporated into the mix of woody biomass feedstock sources. As in all the previous 20% RPS simulations, the addition of SREC does not make a significant difference despite the fact that the amount of woody biomass coming from SREC_low is equal to, or greater than, that of UWW+LR (see Table 4.5) following the step increase to 12% in 2016. This is because the amount of unmet demand is still such that SRTS must "max out" new removals, and large amounts of product must be displaced from the forest products industry, in an attempt to yield the required amount of merchantable timber to make up the balance of woody biomass supply (which is net of UWW/LR+SREC_low).

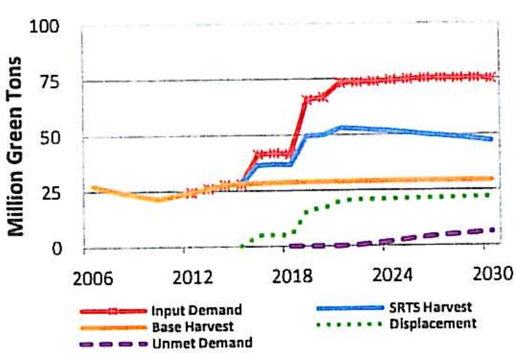


Figure 4.7a Aggregate demand & harvest: 20% RPS, MT/UWW/LR+ SREC_low.

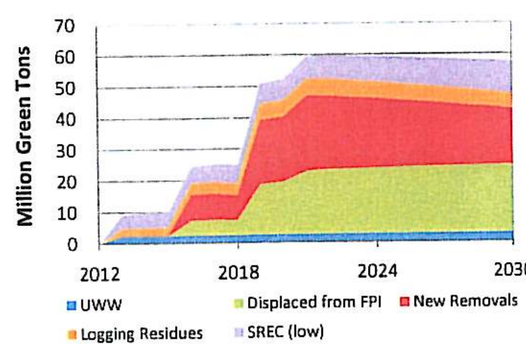


Figure 4.7b Aggregate woody biomass supply for the 20% RPS.

Table 4.5 Summarized data, 20% RPS scenario (MT/UWW/LR+SREC_low).

| 20% RPS | 2015 | | 2020 | | 2025 | | 2030 | |
|---|---|---|---|---|---|---|---|---|
| | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) |
| RPS Demand* | 0.0 | 0% | 37.9 | 131% | 45.6 | 156% | 45.7 | 156% |
| New Removals* | 0.0 | 0% | 21.0 | 73% | 21.6 | 74% | 17.8 | 61% |
| Urban Wood Waste† | 2.4 | 24% | 2.6 | 5% | 2.8 | 5% | 2.9 | 5% |
| SREC (low)† | 5.0 | 48% | 6.7 | 13% | 8.5 | 14% | 10.3 | 18% |
| Logging Residues† | 2.8 | 28% | 5.1 | 10% | 5.2 | 9% | 4.8 | 8% |
| Displacement† | 0.0 | 0% | 16.9 | 32% | 21.1 | 36% | 21.7 | 38% |
| New Removals† | 0.0 | 0% | 21.0 | 40% | 21.6 | 36% | 17.8 | 31% |
| Unmet Demand§ | 0.0 | 0% | 0.0 | 0% | 2.9 | 6% | 6.1 | 13% |

* in million green tons (mgrt), and as a percent of Base Harvest
† in million green tons (mgrt), and as a percent of Total Supply
§ in million green tons (mgrt), and as a percent of RPS Demand

The SRTS output and resource allocation for *Pine Roundwood, Pine Large Sawtimber,* and *Hardwood Pulpwood* are displayed in Figures 4.7c-h below (actual data values in Appendix B). The price, inventory, and stock removal trends are all moderated somewhat by the addition of SREC_low, although we again observe more-or-less marginal impacts in terms of reduced displacement (and less MT allocated to bioelectricity) because the demand of the RPS is still very large. The impact on *Pine Roundwood* (Figure 4.7d) in particular is still severe—supplies of this product, in fact, are still unable to meet the required demand.

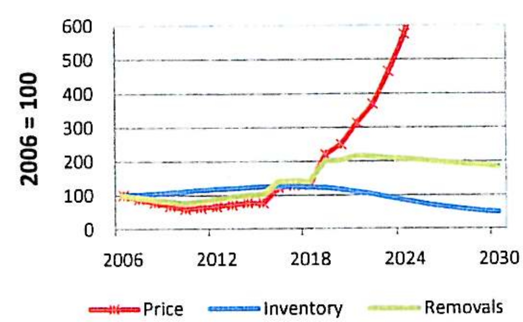


Figure 4.7c SRTS output for *Pine Roundwood* (20% RPS).

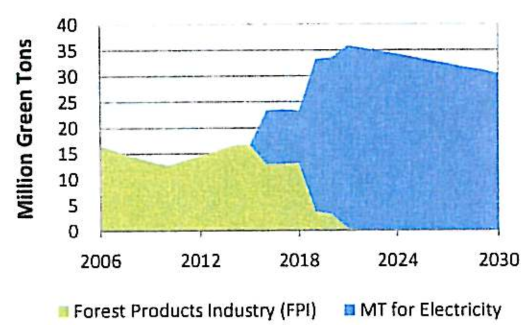


Figure 4.7d Allocation of *Pine Roundwood* (MT/UWW/LR+SREC_low).

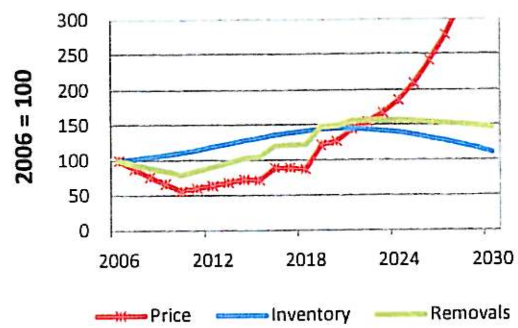


Figure 4.7e SRTS output for *Pine, Large Sawtimber*.

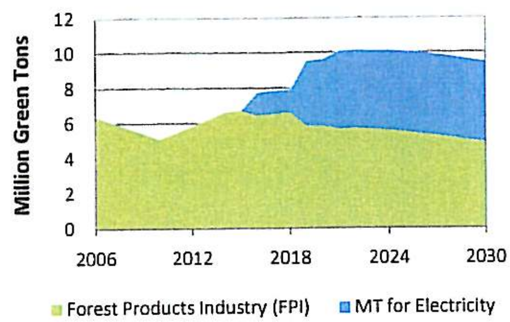


Figure 4.7f Allocation of *Pine, Large Sawtimber* supply (20% RPS).

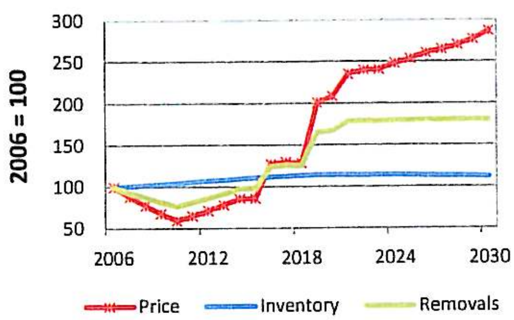


Figure 4.7g SRTS output for *Hardwood Pulpwood*.

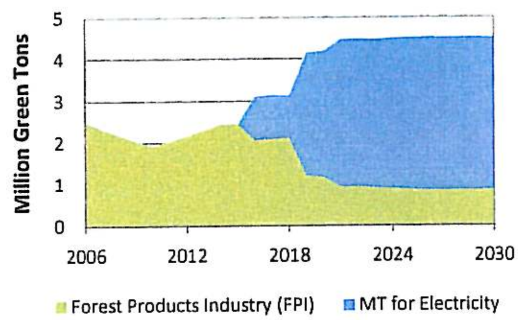


Figure 4.7h Allocation of *Hardwood Pulpwood* supply (20% RPS).

Figures 4.8a and 4.8b indicate that the amount of new removals and displacement under the 12% RPS scenario are significantly lessened over time, as compared to the previous simulation which did not include the SREC_low component. Note that, unlike the previous 12% RPS scenarios, the harvest of new removals (and the subsequent displacement) does not begin until the year 2018. Moreover, by 2025 the amount of merchantable timber (i.e., New Removals + Displacement) required is reduced to less than 50% (Table 4.6).

Finally, we do not include figures or summarized data for a 7% RPS, as the volume of woody biomass coming from UWW and SREC_low precludes the need for woody biomass supplies derived from MT (i.e., there is zero demand for MT in all years for the 7% RPS).

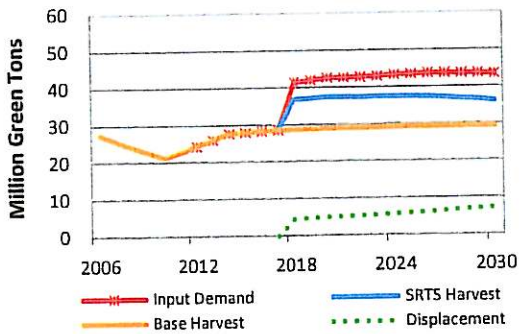


Figure 4.8a Aggregate demand & harvest: 12% RPS, MT/UWW/LR+ SREC_low

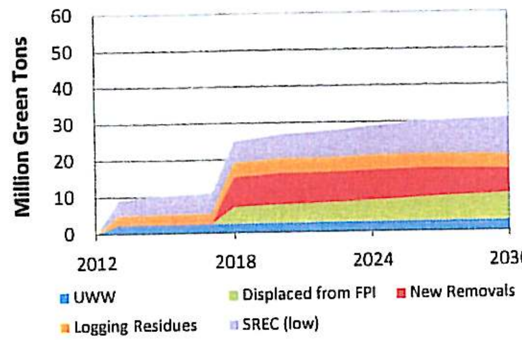


Figure 4.8b Aggregate woody biomass supply under a 12% RPS.

Table 4.6 Summarized data under a 12% RPS, MT/UWW/LR+SREC_low.

| 12% RPS | 2015 | | 2020 | | 2025 | | 2030 | |
|---|---|---|---|---|---|---|---|---|
| | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) |
| RPS Demand* | 0.0 | 0% | 13.7 | 47% | 14.3 | 49% | 14.1 | 48% |
| New Removals* | 0.0 | 0% | 8.6 | 30% | 8.3 | 28% | 6.8 | 23% |
| Urban Wood Waste† | 2.4 | 24% | 2.6 | 10% | 2.8 | 9% | 2.9 | 9% |
| SREC (low)† | 5.0 | 48% | 6.7 | 25% | 8.5 | 29% | 10.3 | 33% |
| Logging Residues† | 2.8 | 28% | 3.9 | 15% | 3.9 | 13% | 3.8 | 12% |
| Displacement† | 0.0 | 0% | 5.1 | 19% | 6.0 | 20% | 7.3 | 24% |
| New Removals† | 0.0 | 0% | 8.6 | 32% | 8.3 | 28% | 6.8 | 22% |
| Unmet Demand§ | 0.0 | 0% | 0.0 | 0% | 0.0 | 0% | 0.0 | 0% |

* in million green tons (mgrt), and as a percent of Base Harvest
† in million green tons (mgrt), and as a percent of Total Supply
§ in million green tons (mgrt), and as a percent of RPS Demand

### *SREC_high Simulation*

Figures 4.9a and 4.9b are the results for a 20% RPS scenario under the assumption that a high adoption / high productivity scenario for SREC is a component of the mix of woody biomass feedstock sources. In stark contrast to all of the previous 20% RPS simulations, the addition of SREC_high makes a tremendous difference in terms of the amount of new removals and displacement needed to fulfill the RPS demand requirement for woody biomass. Moreover, the previously observed unmet demands (for 20% RPS) have been satisfied—clearly as a result of the enormous contribution made by the volume of SREC_high being accessed. Note that, in the early years of the simulation, SREC supplies a much greater volume of woody biomass than is actually required to meet the RPS demands under the 7% and 12% stair-step levels. Not until the 18% step level is activated in 2019 does there appear demand for MT (i.e., new removals and displacement). Table 4.7 provides the summary data corresponding to the figures shown below.

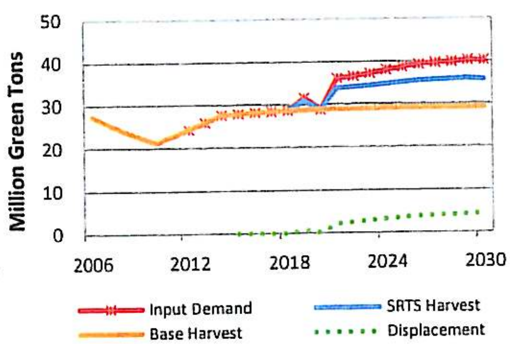


Figure 4.9a Aggregate demand & harvest: 20% RPS, MT/UWW/LR+ SREC_high.

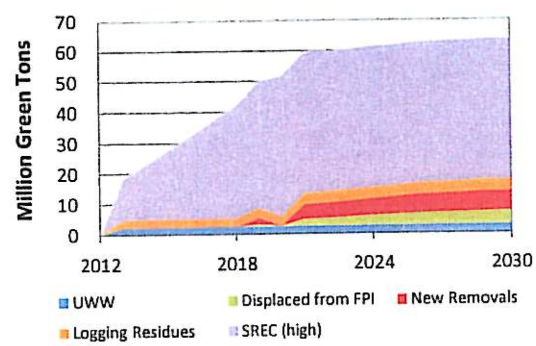


Figure 4.9b Aggregate woody biomass supply under a 20% RPS.

Table 4.7 Summarized data, 20% RPS scenario (MT/UWW/LR+SREC_high).

| 20% RPS | 2015 | | 2020 | | 2025 | | 2030 | |
|---|---|---|---|---|---|---|---|---|
| | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) |
| RPS Demand* | 0.0 | 0% | 0.0 | 0% | 9.4 | 32% | 10.9 | 37% |
| New Removals* | 0.0 | 0% | 0.0 | 0% | 5.9 | 20% | 6.4 | 22% |
| Urban Wood Waste† | 2.4 | 9% | 2.6 | 5% | 2.8 | 4% | 2.9 | 5% |
| SREC (high)† | 22.7 | 81% | 46.1 | 89% | 46.1 | 74% | 46.1 | 72% |
| Logging Residues† | 2.8 | 10% | 3.0 | 6% | 3.7 | 6% | 3.7 | 6% |
| Displacement† | 0.0 | 0% | 0.1 | 0% | 3.5 | 6% | 4.5 | 7% |
| New Removals† | 0.0 | 0% | 0.0 | 0% | 5.9 | 9% | 6.4 | 10% |
| Unmet Demand§ | 0.0 | 0% | 0.0 | 0% | 0.0 | 0% | 0.0 | 0% |

* in million green tons (mgrt), and as a percent of Base Harvest
† in million green tons (mgrt), and as a percent of Total Supply
§ in million green tons (mgrt), and as a percent of RPS Demand

The aggregate results above are, of course, reflected in the SRTS output and resource allocation profiles of the individual products, as seen in Figures 4.9c-h below. Since most of the woody biomass for electricity generation is now coming from SREC_high under this scenario, a

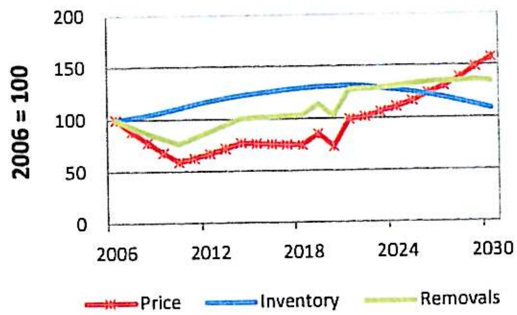


Figure 4.9c SRTS output for *Pine Roundwood* (20% RPS).

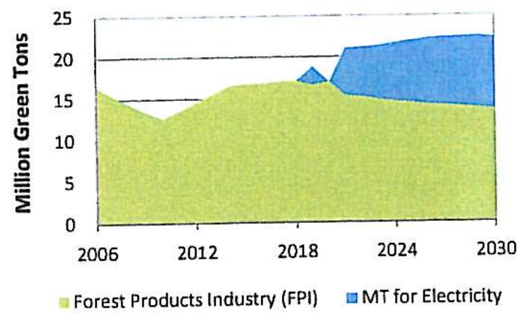


Figure 4.9d Allocation of *Pine Roundwood* (MT/UWW/LR+SREC_high).

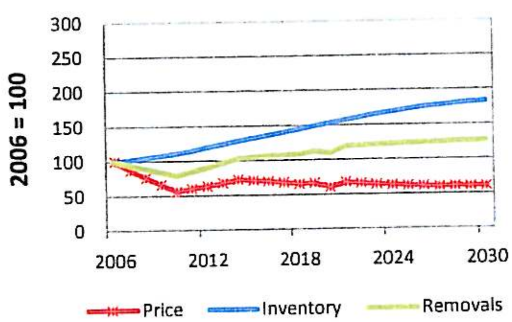


Figure 4.9e SRTS output for *Pine, Large Sawtimber*.

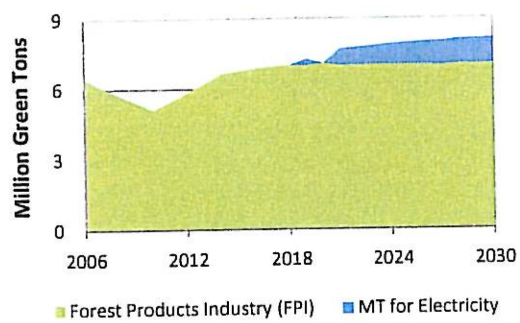


Figure 4.9f Allocation of *Pine, Large Sawtimber* supply (20% RPS).

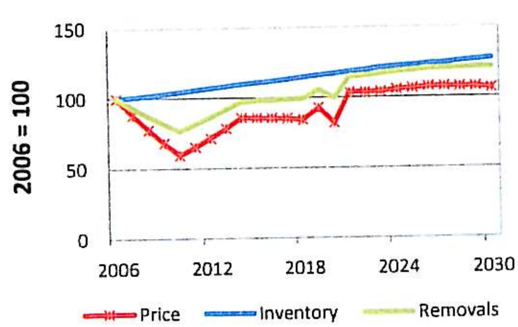


Figure 4.9g SRTS output for *Hardwood Pulpwood*.

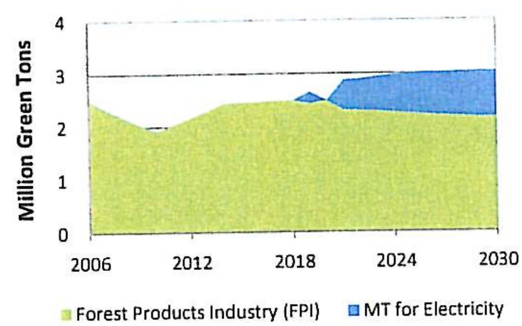


Figure 4.9h Allocation of *Hardwood Pulpwood* supply (20% RPS).

remarkably reduced impact on the individual forest products is evident. While the impact on the *Pine Roundwood* category is much less than in the previous simulations for a 20% RPS, the price trend in 2030 is still more than 50% higher than the baseline value. Moreover, the actual magnitude of MT required for electricity is approximately 10.9 million green tons per year in 2030 (although less than half this amount is displacement). Even under this extremely optimistic scenario for biomass feedstock sources (i.e., mainly the projection of SREC), it is clear that one must still anticipate a fairly significant impact on the forest products—at least in terms of the price of *Pine Roundwood.*

Note that Figure 4.9c indicates the inventory for *Pine Roundwood* is trending downward as a function of the RPS-induced harvests, as well. While the projected inventory remains above the 2006 baseline at 2030 (actually through 2032), scrutiny of the output data in Table B.4.2 of Appendix B reveals that the *Pine Roundwood* inventory falls precipitously to 2040—when it is only 74% of the original base value of 232 million green tons per year. This has important implications for long term sustainability of forest resources, as the *Pine Roundwood* product category would comprise most of the supply of merchantable timber harvested to meet RPS-derived demands for woody biomass. This issue is discussed in further detail in the conclusion of this report.

Note that we do not include figures or summarized data for the 7% and 12% RPS scenarios. This is because the volume of woody biomass coming from UWW (6%) and SREC_high (94%) in 2025 and beyond precludes the need for woody biomass supplies derived from merchantable timber. As such, there is zero demand for MT in all years for the 7% and 12% RPS scenarios under the high adoption / high productivity assumption for SREC.

## 5. RESULTS FOR THE *HIGH ORES* RPS PROJECTION

The alternative calculation that provides for lower estimates of the woody biomass required under a proposed 20% RPS is referred to as the *"High ORES"* projection. The rationale for this alternative is based on the fact that the amount of electricity generated from other renewable energy sources (ORES), which the USDOE projects will be produced in Florida in the future, remains constant under the initial projection following the hypothetical imposition of the RPS in 2013. Since some conjecture exists to question the static nature (and low relative magnitude) of the USDOE's estimates, we include the *High ORES* projection in this study in order to serve as a lower bound of the volume of woody biomass required under the proposed RPS mandate.

As described previously in Section 2, the *High ORES* projection is calculated in the same manner as the initial base projection of a 20% RPS—with the exception that the USDOE projection for ORES is arbitrarily assumed to be 2.5 times greater. Summarized, the formula is: [( TASE * 0.20 ) – ( 2.5 * ORES )].[9] Essentially, this projection assumes a more balanced ratio of ORES to woody biomass in the mid- to later years of the projection. This was clearly observed earlier in Table 2.2 (page 6), where the proportion of ORES (High) ranges from 60% in 2025 to 47% in 2040. Finally, we note that the estimated 20% RPS is specified in billion kWh and ultimately converted into green tons / year following the same procedure explained earlier.

Although it is reasonable for one to assume that some increase in ORES will occur in the future (e.g., from technological advances), we remain doubtful that the levels of ORES specified as above will be reached anytime in the next 15 to 20 years. As such, we ardently stress that the true value of this projection lies in its use in comparison against the simulations of the previous section that are derived from the initial RPS projection.

[9] Recall that TASE stands for "total annual sales of electricity" to retail customers.

**MT Scenario (*High ORES*)**

The extreme-case scenario corresponding to merchantable timber (MT) as the sole source of woody biomass supplied under an RPS is equivalent to the total demand for woody biomass as exhibited in Figure 2.2 (page 9, blue line). Although we believe this is an unlikely situation, given the expectation that additional sources of woody biomass will be accessed to generate electricity under a Florida RPS, we nevertheless model this case under a 20% RPS scenario. The results are illustrated below in Figures 5.1a and 5.1b (see Appendix C for the actual data values).

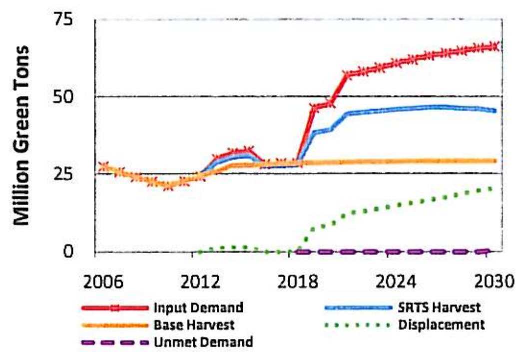


Figure 5.1a Aggregate demand & harvest: 20% RPS, MT (*High ORES* ).

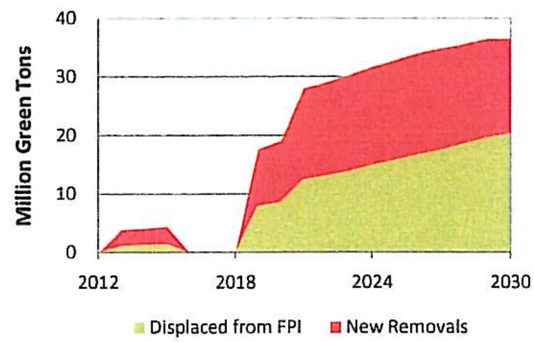


Figure 5.1b Aggregate supply of MT used as woody biomass for 20% RPS.

With this specification, we observe two key differences between the original simulation for MT-only (Figures 4.1a and 4.1b) and this simulation. First, the hypothetical increase in amount of ORES in 2016 leads to zero demand for merchantable timber for a couple of years. Second, the overall demand for woody biomass is greatly reduced here, which means that the amount of unmet demand is much less than before. In fact, as the summarized aggregated data of Table 5.1 shows, unmet demand is only 1% of the RPS demand in 2030. Nevertheless, the displacement observed (20 million green tons in 2030) for this scenario is still extreme enough that a 20% RPS under the *High ORES* projection would still clearly affect the forest products (FPI) industry in a detrimental manner. The *Pine Roundwood* product category, in particular, is shown to bear the brunt of the displacement. This can be readily observed in Figures 5.1c below. As before, the data values for the individual product categories are presented in Appendix C.

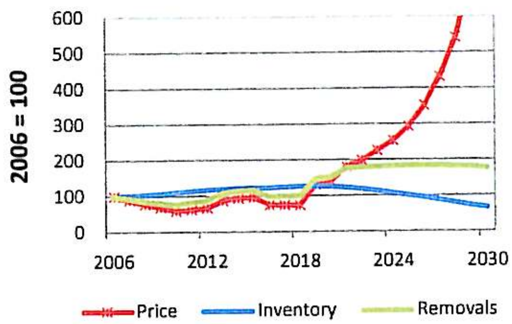


Figure 5.1c SRTS output for *Pine Roundwood* (20% RPS).

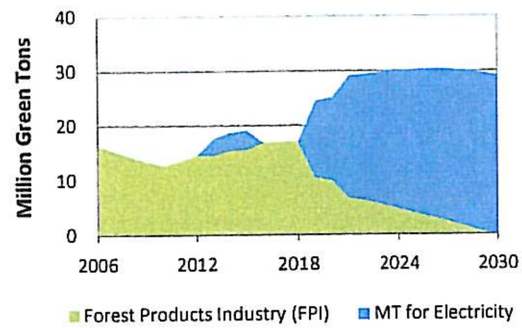


Figure 5.1d Allocation of *Pine Roundwood*, MT scenario (*High ORES*).

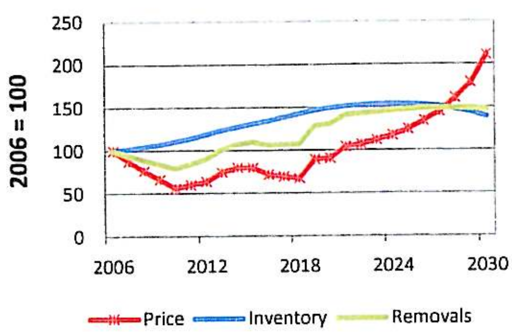


Figure 5.1e SRTS output for *Pine, Large Sawtimber* (20% RPS)

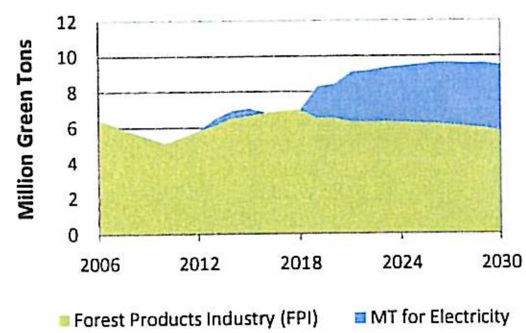


Figure 5.1f Allocation of *Pine, Large Sawtimber* supply, MT (*High ORES*).

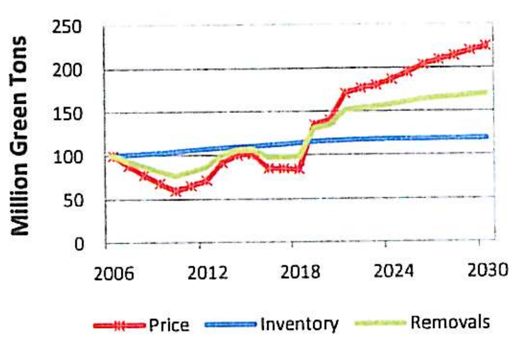


Figure 5.1g SRTS output for *Hardwood Pulpwood* (20% RPS).

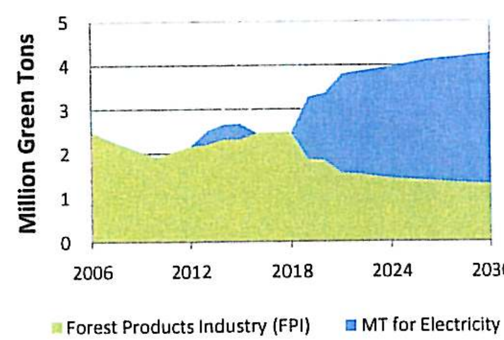


Figure 5.1h Allocation of *Hardwood Pulpwood* supply, MT (*High ORES*).

Table 5.1 Summarized aggregated data for the *High ORES* MT scenario under a 20% RPS.

| 20% RPS | 2015 | | 2020 | | 2025 | | 2030 | |
|---|---|---|---|---|---|---|---|---|
| | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) |
| RPS Demand* | 4.5 | 16% | 19.1 | 66% | 32.9 | 112% | 36.9 | 126% |
| New Removals* | 3.1 | 11% | 10.5 | 36% | 17.1 | 58% | 16.2 | 55% |
| Displacement† | 1.5 | 32% | 8.6 | 45% | 15.8 | 48% | 20.4 | 56% |
| New Removals† | 3.1 | 68% | 10.5 | 55% | 17.1 | 52% | 16.2 | 44% |
| Unmet Demand§ | 0.0 | 0% | 0.0 | 0% | 0.0 | 0% | 0.4 | 1% |

* in million green tons (mgrt), and as a percent of Base Harvest
† in million green tons (mgrt), and as a percent of Total Supply
§ in million green tons (mgrt), and as a percent of RPS Demand

Figures 5.2a and 5.2b display results for the 12% RPS scenario, while Table 5.2 shows the summarized aggregated data for these figures (we do not show results for the 7% RPS scenario).

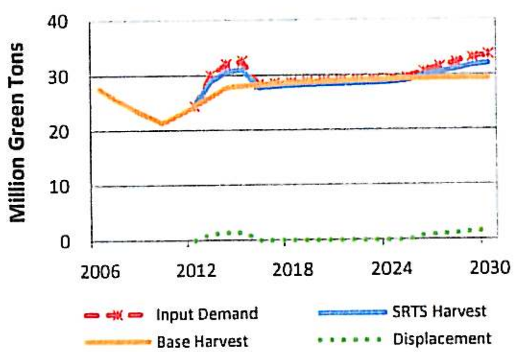


Figure 5.2a Aggregate demand & harvest: 12% RPS, MT (*High ORES* ).

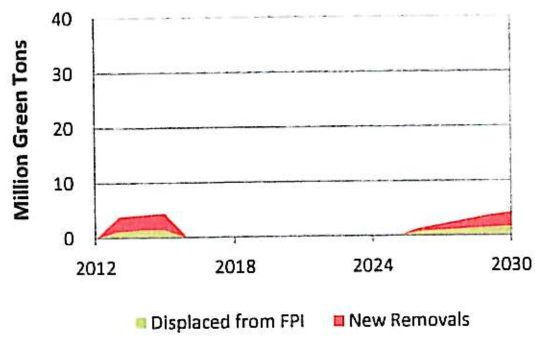


Figure 5.2b Aggregate supply of MT used as woody biomass for 12% RPS.

Table 5.2 Summarized aggregated data for the *High ORES* MT scenario under a 12% RPS.

| 12% RPS | 2015 | | 2020 | | 2025 | | 2030 | |
|---|---|---|---|---|---|---|---|---|
| | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) |
| RPS Demand* | 4.5 | 16% | 0.0 | 0% | 0.3 | 1% | 4.4 | 15% |
| New Removals* | 3.1 | 11% | 0.0 | 0% | 0.0 | 0% | 2.7 | 9% |
| Displacement† | 1.5 | 32% | 0.0 | 0% | 0.0 | 0% | 1.7 | 38% |
| New Removals† | 3.1 | 68% | 0.0 | 0% | 0.0 | 0% | 2.7 | 62% |
| Unmet Demand§ | 0.0 | 0% | 0.0 | 0% | 0.0 | 0% | 0.0 | 0% |

* in million green tons (mgrt), and as a percent of Base Harvest
† in million green tons (mgrt), and as a percent of Total Supply
§ in million green tons (mgrt), and as a percent of RPS Demand

MT/UWW/LR ( ***High ORES*** )

Figures 5.3a and 5.3b depict a 20% RPS where urban wood waste (UWW) and logging residuals (LR) are used for bioelectricity, in addition to MT. UWW+LR precludes the need for MT in the early years of the simulation run. When the 18% RPS step level is activated in 2019, however, UWW+LR accounts for only 32% of the aggregate woody biomass supply (see Table 5.3). Thus, displacement again impacts the forest products industry—but not until the latter part of the run is it extreme. Note that new removals comprise the greatest share of aggregate supply.

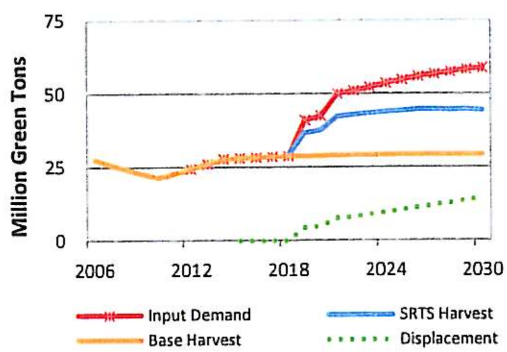


Figure 5.3a Aggregate demand & harvest: 20% RPS, MT/UWW/LR.

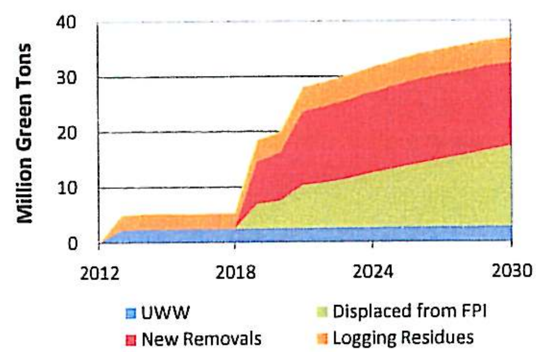


Figure 5.3b Aggregate woody biomass supply for the 20% RPS.

Table 5.3 Summarized data for the 20% RPS scenario, MT/UWW/LR (*High ORES* ).

| 20% RPS | 2015 | | 2020 | | 2025 | | 2030 | |
|---|---|---|---|---|---|---|---|---|
| | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) |
| RPS Demand* | 0.0 | 0% | 13.6 | 47% | 25.6 | 87% | 29.5 | 101% |
| New Removals* | 0.0 | 0% | 8.7 | 30% | 15.0 | 51% | 15.0 | 51% |
| Urban Wood Waste† | 2.4 | 45% | 2.6 | 13% | 2.8 | 8% | 2.9 | 8% |
| Logging Residues† | 3.0 | 55% | 3.9 | 19% | 4.6 | 14% | 4.5 | 12% |
| Displacement† | 0.0 | 0% | 4.9 | 25% | 10.5 | 32% | 14.5 | 39% |
| New Removals† | 0.0 | 0% | 8.7 | 43% | 15.0 | 46% | 15.0 | 41% |
| Unmet Demand§ | 0.0 | 0% | 0.0 | 0% | 0.0 | 0% | 0.0 | 0% |

* in million green tons (mgrt), and as a percent of Base Harvest
† in million green tons (mgrt), and as a percent of Total Supply
§ in million green tons (mgrt), and as a percent of RPS Demand

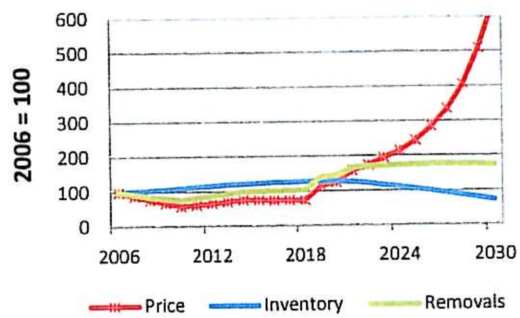


Figure 5.3c SRTS output for *Pine Roundwood* (20% RPS).

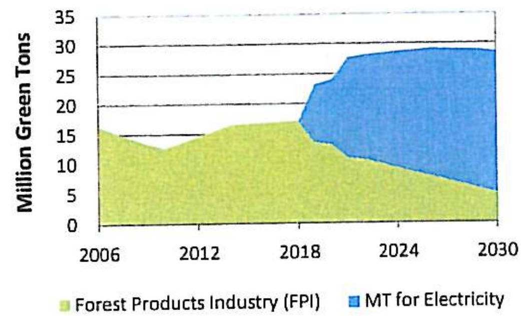


Figure 5.3d Allocation of *Pine Roundwood* (*High ORES* MT/UWW/LR).

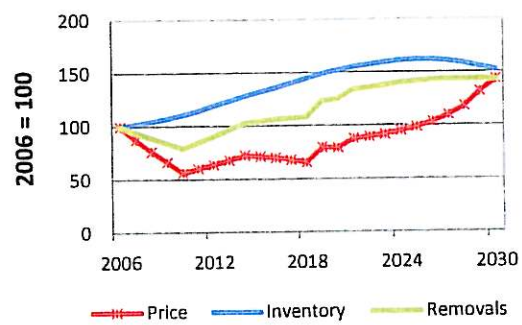


Figure 5.3e SRTS output for *Pine, Large Sawtimber,* 20% RPS.

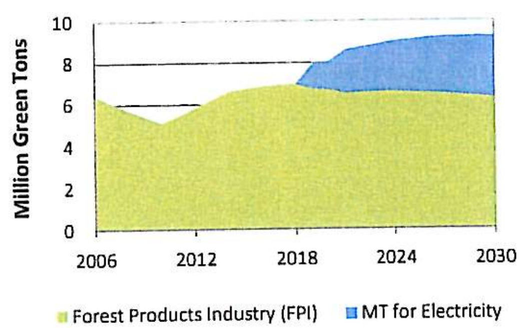


Figure 5.3f Allocation of *Pine, Large Sawtimber* supply (*High ORES* ).

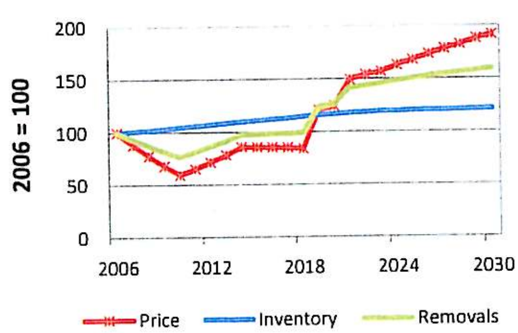


Figure 5.3g SRTS output for *Hardwood Pulpwood,* 20% RPS.

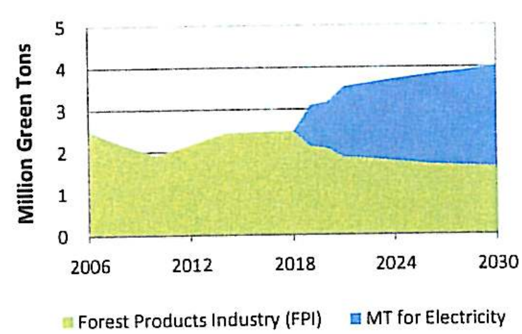


Figure 5.3h Allocation of *Hardwood Pulpwood* supply (*High ORES* ).

**MT/UWW/LR+SREC_low ( *High ORES* )**

Figures 5.4a and 5.4b display results for the low adoption / low productivity SREC (short rotation energy crops) scenario which forms part of the mix of feedstock sources (e.g., UWW, LR) which are used to reduce the supply of merchantable timber utilized to generate electricity under a proposed 20% RPS mandate. The corresponding aggregated summary data for these figures is presented in Table 5.4, while Figures 5.4c-h provide results specific to the individual forest products.

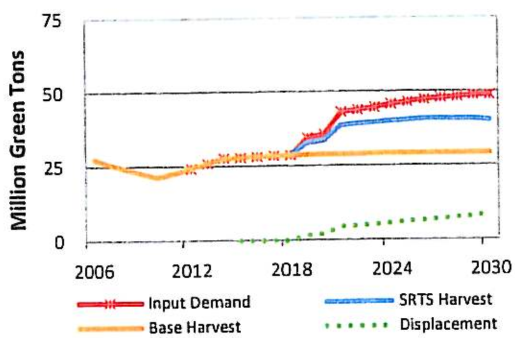


Figure 5.4a Aggregate demand & harvest: 20% RPS, MT/UWW/LR+ SREC_low (*High ORES* ).

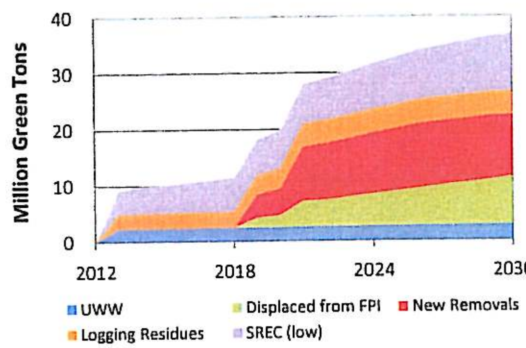


Figure 5.4b Aggregate woody biomass supply for the 20% RPS.

As observed in the previous simulation, UWW and LR preclude the need for MT in the early years of the model run—and in this case, SREC_low is actually superfluous until the 18% RPS step is activated in 2019. In the later years of the simulation, SREC_low is a relatively significant component of the aggregate supply (28%, or 10.3 million green tons / year), helping to reduce the amount of displacement somewhat. Regardless of this improvement, however, the forest products industry is still significantly impacted by displacement. The effects are, as expected, particularly manifest on the price and inventory of the *Pine Roundwood* product category (Figure 5.4c), and the price of *Hardwood Pulpwood* (Figure 5.4g).

Table 5.4 Summarized data, *High ORES* 20% RPS scenario (MT/UWW/LR+SREC_low).

| 20% RPS | 2015 | | 2020 | | 2025 | | 2030 | |
|---|---|---|---|---|---|---|---|---|
| | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) | (mgrt) | (%) |
| RPS Demand* | 0.0 | 0% | 6.9 | 24% | 17.4 | 59% | 19.5 | 67% |
| New Removals* | 0.0 | 0% | 4.8 | 16% | 11.2 | 38% | 11.0 | 38% |
| Urban Wood Waste† | 2.4 | 24% | 2.6 | 13% | 2.8 | 8% | 2.9 | 8% |
| SREC (low)† | 5.0 | 48% | 6.7 | 34% | 8.5 | 26% | 10.3 | 28% |
| Logging Residues† | 2.8 | 28% | 3.6 | 18% | 4.2 | 13% | 4.2 | 11% |
| Displacement† | 0.0 | 0% | 2.1 | 11% | 6.2 | 19% | 8.5 | 23% |
| New Removals† | 0.0 | 0% | 4.8 | 24% | 11.2 | 34% | 11.0 | 30% |
| Unmet Demand§ | 0.0 | 0% | 0.0 | 0% | 0.0 | 0% | 0.0 | 0% |

* in million green tons (mgrt), and as a percent of Base Harvest
† in million green tons (mgrt), and as a percent of Total Supply
§ in million green tons (mgrt), and as a percent of RPS Demand

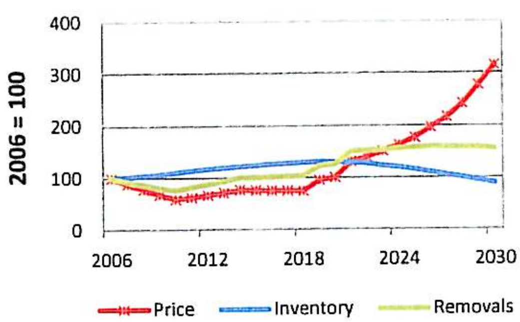


Figure 5.4c SRTS output for *Pine Roundwood*, 20% RPS (*High ORES* ).

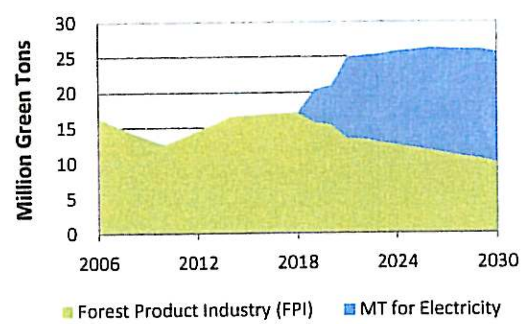


Figure 5.4d Allocation of *Pine Roundwood* (MT/UWW/LR+SREC_low).

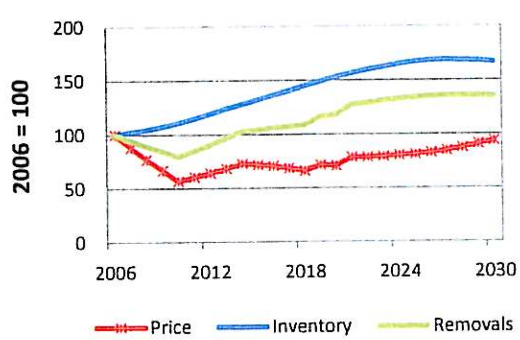


Figure 5.4e SRTS output for *Pine, Large Sawtimber*, 20% RPS.

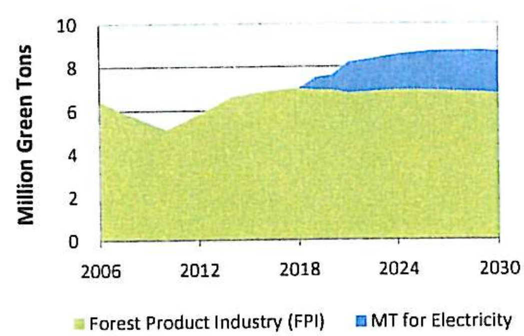


Figure 5.4f Allocation of *Pine, Large Sawtimber* supply (*High ORES* ).

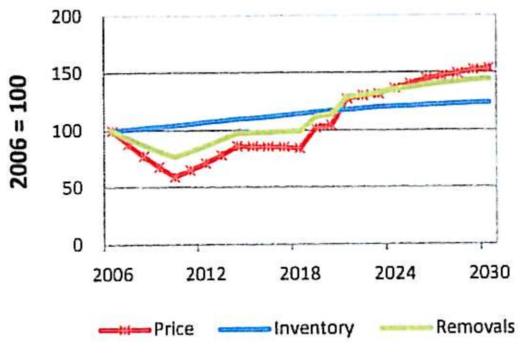


Figure 5.4g SRTS output for *Hardwood Pulpwood,* 20% RPS.

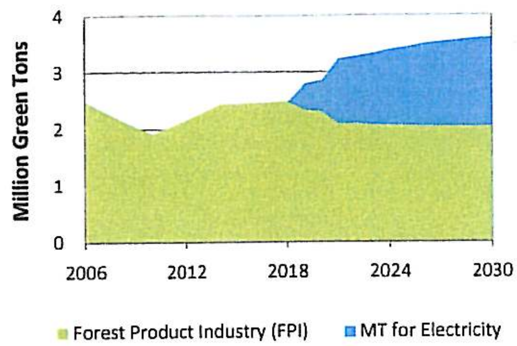


Figure 5.4h Allocation of *Hardwood Pulpwood* supply (*High ORES* ).

Note that we do not present any figures or data tables for a 7% or 12% RPS scenario. This is due to the fact that there is zero demand for merchantable timber in all years for the 7% and 12% RPS scenarios under the low adoption / low productivity assumption for SREC. Moreover, we did not run *any* simulations for the high adoption / high productivity SREC scenario for the same reason. Because very large volumes of woody biomass are produced under the SREC_high projection, when combined with the assumption regarding ORES in this section, (i.e., 2.5 times the amount of ORES projected by the USDOE), there is absolutely no need for harvested merchantable timber to meet RPS-derived demands for woody biomass.

# 6. CONCLUSIONS

The purpose of this study is to estimate the bioeconomic impacts that a proposed 20% renewable portfolio standard (RPS) mandate will have on the forestry sector in Florida. While such an objective is clear enough, we must explicitly note that there are a considerable amount of assumptions employed in an analysis of this scope—many of which contribute to the inherent uncertainty involved in projecting future responses to this policy. It is for these reasons that we provide multiple simulations based on several different feedstock component scenarios; as well as an alternate projection (i.e., the *High ORES* simulations) that is based on 2.5 times the original estimate of ORES (other renewable energy sources). Given this, and despite the *quantitative* output rendered from the Subregional Timber Supply (SRTS) model that we utilize, we strongly recommend that the results presented in this study be viewed as *qualitatively* as possible due to the large number of assumptions applied. That prospect is helped by the fact that we rely heavily on graphic representations to convey the simulation results.

Unless otherwise stated, the following conclusions refer to the simulations derived from the initial projection (Section 4). The proposed RPS for Florida under consideration would impart a considerable amount of stress on the forest products industry in the state through higher stumpage prices and displacement of merchantable timber to utilities. Simulation results from the SRTS bioeconomic model demonstrate that this policy mandate would most likely lead to: (1) increased timber product prices; (2) unmet demand for merchantable timber per the RPS mandate; (3) decreased supplies of harvested merchantable timber allocated to the existing forest product industry; and (4) decreases in the inventory of the *Pine Roundwood* product category, which is the largest and most important of the four product categories modeled in this study. However, including SREC_high as a feedstock component would mitigate, or actually eliminate

(#2 above), some of these impacts. We also find that urban wood waste (UWW) and logging residuals (LR) do not comprise a significant amount of the total supply of woody biomass required by the 20% RPS. This is generally true of SREC _low as a feedstock source, as well.

Regarding the price of timber, there is no question that increased harvesting resulting from a 20% RPS mandate will cause timber prices to rise; significantly so, for many scenarios. These increases are likely to have a negative effect on the forest products industry because we assume that they will be unable to compete for higher priced timber with the electrical utilities that will be *mandated* to meet the requirements of the RPS. Consequently, merchantable timber will be diverted from existing forest product industries in order to generate renewable electricity. We refer to this process as "displacement". In contrast to this impact, however, the proposed RPS will likely be beneficial to forest landowners, timber harvesting firms, and businesses that support these operations.

The unmet demand referred to in point #2 above is salient because it indicates that the requirement for woody biomass under a 20% RPS cannot be achieved unless large amounts of SREC are assumed. Unmet demand arises in the softwood and hardwood pulpwood product categories: (a) when *all* of the harvested pulpwood timber stock is allocated to the electrical power generation sector; and (b) when that amount, plus the harvested sawtimber stock, is insufficient to meet the volumes that we estimate will be required under the RPS. As shown in Figure 6.1 below, the addition of SREC_low feedstock to the MT/UWW/LR scenario reduces the amount of unmet demand, but does not eliminate it completely. This graph also shows that, for both of these scenarios, the amount of unmet demand increases over time due to the fact that RPS demand rises as a function of the projected escalation in the demand for electricity in Florida over the period 2010 – 2040.

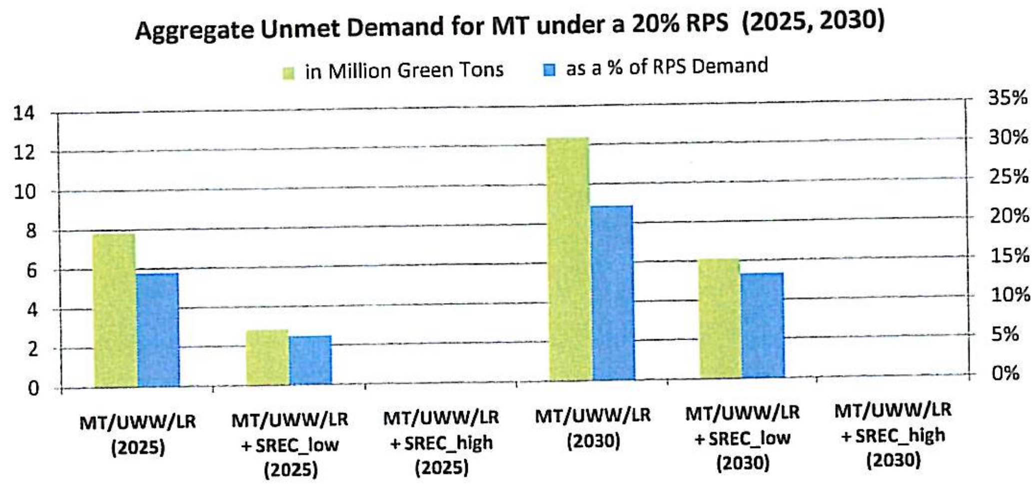


Figure 6.1 Aggregated unmet demand for merchantable timber under a 20% RPS mandate in 2025 and 2030, by feedstock source combination scenario.

Conversely, however, Figure 6.1 indicates that a 20% RPS based on the SREC_high feedstock scenario is able to meet all of the demand for woody biomass per the RPS mandate. As observed earlier in Table 4.7, the huge volume of SREC projected to be produced under this particular scenario (46 million green tons / year) accounts for approximately three-quarters of the total annual requirement of woody biomass. This is why the unmet demand viewed in the other scenarios is eliminated under the MT/UWW/LR+SREC_high case, and why displacement from the forest products industry is only 6% to 7% of the total supply required from 2025 to 2030.

As described previously, merchantable timber normally destined for the forest products industry will likely be diverted to electric utilities. Such displacement results from the fact that demand for woody biomass under the RPS simply cannot be met from the aggregation of new removals of merchantable timber, UWW, and LR alone. Thus, displacement serves as an indicator of the impact of the proposed RPS, and a key consideration of whether or not a given scenario will even be feasible. Figure 6.2 illustrates that substantial displacement (> 70%) is observed for the MT/UWW/LR scenario, as well as for the subsequent one in which SREC_low feedstock is added to it. Even though a vast majority of merchantable timber would be diverted away from the forest products industry under both scenarios, such volumes are *still insufficient* to meet the RPS-required demand for woody biomass for bioelectricity generation (cf. Figure 6.1). We conclude, therefore, that both scenarios are unrealistic and would be substantially disruptive to the forestry products industry in Florida.

What about the MT/UWW/LR+SREC_high scenario? While Figure 6.2 reveals that displacement is greatly reduced when SREC_high feedstock is added to MT/UWW/LR, we still must assess forest resource sustainability in order to conclusively determine its feasibility. This will addressed below in due course. Yet, the figure makes it clear that the requisite volume of woody biomass demanded under a 20% RPS is incapable of being met unless the mandated supplies include—*at the very least*—high-yielding SREC planted on 15% of Florida's farmland, and/or other sources of woody biomass not considered here, and/or additional (and significant) amounts of other sources of renewable energy (e.g., wind, solar, biogenic municipal waste) that are not already accounted for by this study.

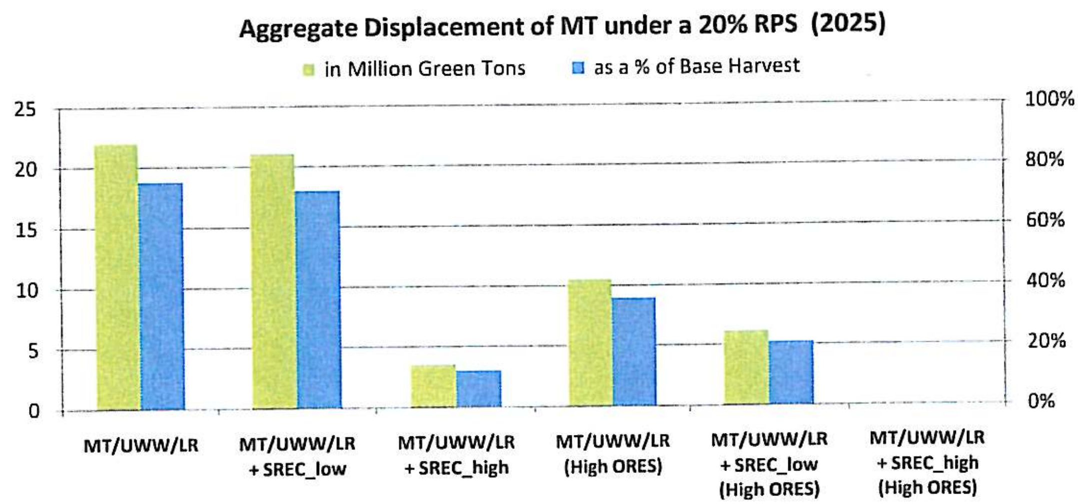


Figure 6.2 Displacement of merchantable timber to the forest products industry (FPI) in 2025 under a 20% RPS mandate, by feedstock source combination scenario.

For this latter situation to occur, however, would most likely require technological advances that cannot reliably be predicted at this particular point in time, and would probably not be available anytime in the near future. Nevertheless, we attempt to project such a case by postulating the *High ORES* projection in which we assume 2.5 times the original estimate of other renewable energy sources. As Figure 6.2 depicts, simulations derived from the *High ORES* projection indicate that SREC are necessary to mitigate the more extreme levels of displacement resulting from RPS-derived demand for merchantable timber resources. In terms of lessened impacts on the forest industry, the *High ORES* SREC_low scenario appears to be within the realm of feasibility (6.2 million green tons of displacement) in the figure. However, close inspection of the effect on the price and inventory of the *Pine Roundwood* product category (Figures 5.4c and 6.3), and the price of *Hardwood Pulpwood* (Figure 5.4g), seems to indicate otherwise in the later years of the simulation. Furthermore, while the *High ORES* SREC_high scenario actually precludes the utilization of *any* merchantable timber whatsoever in order to meet demands under the proposed RPS, this particular simulation is dependent upon multiple liberal assumptions—the actual attainment of which would likely require the occurrence of fortuitous circumstances.

Point #4 in the second paragraph of this section refers to decreases in the inventory of the *Pine Roundwood* product category as one consequence of the proposed RPS mandate. *Pine Roundwood* represents an expanded pine pulpwood category (which we assume to consist of all pine trees in the 5" to 12.9" dbh range), and is the largest and most important of the four product categories modeled in this study. As such, we view its inventory as a rough indicator for the sustainability of forest resources under the RPS. This is especially so because we assume that most of the merchantable timber accessed for bioelectricity generation will be derived from this product category. As displayed in Figure 6.3, the inventory for *Pine Roundwood* is graphed as a trend through time for each of the six scenarios that have been discussed so far in this section. Note that the "Status Quo" (no RPS) scenario presented in the legend of this figure is equivalent the *High ORES* MT/UWW/LR+SREC_high scenario, since the latter features zero demand for merchantable timber as mentioned at the end of Section 5. Moreover, although we formerly restricted the presentation of model results to a time horizon ending in 2030, in Figure 6.3 we plot the data series through 2040—specifically since the drawdown in inventory is obscured for several of the simulations (especially the MT/UWW/LR+SREC_high scenario) if the graph is limited to 2030.

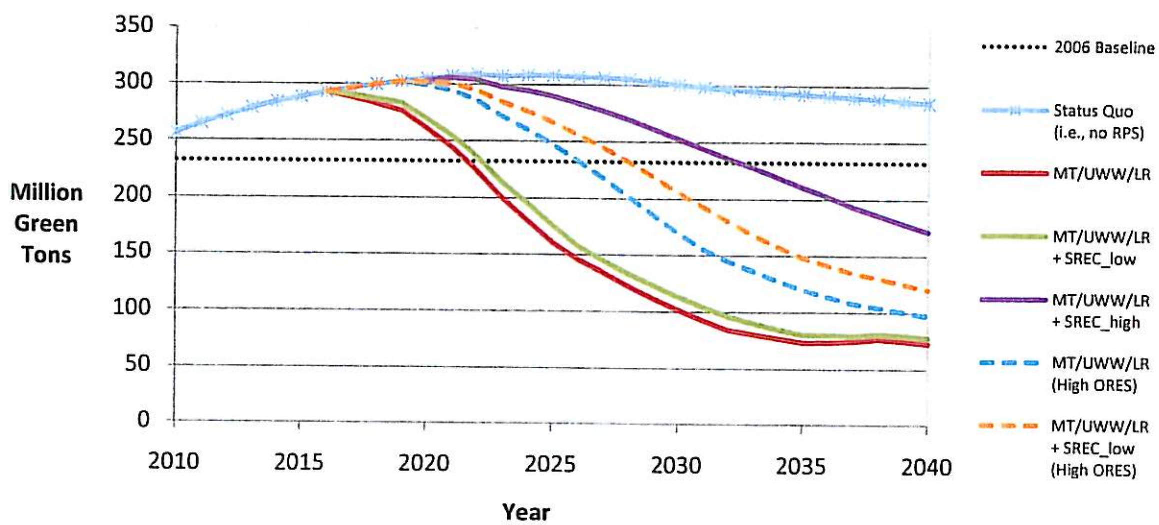


Figure 6.3 Inventory trend of *Pine Roundwood* product category under a 20% RPS mandate, by feedstock source combination scenario.

It is incumbent upon us to emphasize that all of the graphs and data presented in this report are not meant to be absolutely realistic predictions of the future, for various reasons discussed later. Nor is Figure 6.3 immune from uncertainties introduced by all long-term predictions derived from computer models, particularly in the latter years of the simulations. Nevertheless, it is clear that the trends depicted in the figure are not favorable with respect to the overall sustainability of the *Pine Roundwood* inventory under a 20% RPS mandate. This graph shows that even the volume of woody biomass generated by the MT/UWW/LR+SREC_high scenario cannot prevent a 20% RPS mandate from adversely impacting, in the long-run, the overall sustainability of forest resources in Florida (and the selected counties in southern Alabama and southern Georgia). Thus, taken as a whole, the evidence presented in this report strongly suggests that an RPS mandate set at 20% of total annual electricity sales should be rejected.

Will all that being said, however, it is well worth reiterating that this study employed a large number of assumptions. Much conjecture exists regarding forecasts of everything from demand for electricity in the period 2010–2040, to future population trends in Florida, to the rate at which farmland in the state will be converted to short rotation energy crops, etc. How electric utilities will *actually* respond to an enacted RPS mandate is also open to debate, as well. This particular question is important in that it illustrates the limitation of the SRTS model to accurately project future market behavior. This model is excellent at mechanistically calculating harvest levels, and related prices, as a function of input demands and various assumed parameters. But it certainly cannot account for every conceivable economic variable, much less for the variety of strategic responses one would expect from all of the economic actors that will be affected by an RPS policy mandate.

This is why the extreme price increases forecasted are rather unlikely. Market forces will work to mitigate these increases, since the very same high prices will actually bring other options into play. Importing pulpwood from Brazil, efficiency increases in production, renewable energy credits (RECs), etc. are just a few examples of how the various economic agents might respond. However, given the enormity of the volumes of merchantable timber being discussed here, there is a limit to the adaptability that will surely take place. And while such adaptability (and other factors) will dampen the price effects predicted by SRTS, the massive amount of woody biomass required under a 20% RPS will *still* need to be met under the terms of the mandate, regardless of all of the other considerations.

Some additional assumptions that were necessarily made in the course of framing the whole problem are briefly mentioned as follows. For example, while we posit that the electric power sector will access the various sources of woody biomass we have estimated to be available, there is no guarantee that some of these sources (especially UWW and LR) will be utilized in practice. It may be, for example, that the supply of these sources proves to be too unreliable, uneconomical, and/or more limited in volume than we assume. Furthermore, given the mandated nature of the RPS demand, we have made the simplifying assumption that procurement costs and logistical considerations (e.g., most of the supply is in North Florida, while most of the demand is in South Florida) are no obstacle to the electric utilities that will require the various sources of woody biomass that we model in this study. This is, of course, quite unlikely to be the case in the real world—most especially with regard to transportation costs. Note also that, although we make the implicit assumption that all of the RPS demand must be met with physical renewable energy resources, it is conceivable that the aforementioned RECs may be used to fill shortfalls in demand for renewable energy. These types of transactions would accordingly lessen the amount of woody biomass used as feedstock for electricity generation, thus placing less of a burden on the forest products industry in those scenarios where there is no *a priori* unmet demand due to huge supply shortfalls.

Finally, despite our focus on the proposed 20% RPS emphasized in this report, we also compiled results for hypothetical RPS mandates set at 7% and 12%. These levels are delineated by the Florida Public Service Commission (FPSC) as interim "steps" of the proposed mandate, such that the 20% level is gradually achieved from the initial 7% that would be implemented in 2013. In general, we find that a 12% RPS would also adversely impact the forest products industry for all of the initial simulations (Section 4) that do not include the conservative SREC_low assumption as part of that particular feedstock mix. Little, if any, impacts are observed for the *High ORES* simulations under a 12% RPS mandate, however. Note also that the liberal SREC_high scenario precludes the need for harvesting merchantable timber whatsoever under either a 7% or a 12% RPS of the initial simulations. Moreover, except for the initial MT-only simulation presented in Section 4, all of the 7% RPS projections we modeled impart a relatively benign impact on the forest products industry—with those of the *High ORES* simulations having little, if any, impact at all.

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APPENDIX A

## Summary List of Key Assumptions

### RPS Calculations

- The defining characteristics and timing of a Florida RPS are based specifically on the proposal put forth by the Florida Public Service Commission.
- Following USDOE assumptions, electricity from ORES (other renewable energy sources) is comparatively low and remains fairly constant over the course of the projection. Note the simulations presented in Section 5 assume a level of ORES that is 2.5 times higher.
- We assume 25% thermal efficiency in production of electricity from woody biomass until 2020, based on standard combustion steam turbines. Thereafter, a gradual increase in efficiency (to a maximum of 35% in 2040) is assumed to result from the adoption of gasification combined-cycle plants, co-firing with coal, and/or other technological improvements.
- The conversion of RPS demand for woody biomass expressed as thermal energy, to RPS demand in terms of mass (i.e., weight), is based on the conversion value of 12,040,000 semi-dry tons per BTU (HHV). We assume that woody biomass will be allowed to dry to at least 30% moisture content before combustion commences.

### SRTS Modeling

- In addition to Florida, the region modeled in this study includes selected counties from southern Alabama and southern Georgia.
- Four product categories are defined, including an expanded category for pulpwood derived from pine species. Each category is assumed to contribute to the calculated RPS demand, with the majority (80%) coming from pine pulpwood.
- A key consideration of the SRTS model is the specification of the supply and demand elasticities for each product category. These parameters are delineated in Section 3.
- This study assumes that there is no net change in timberland acreage over time.
- Public lands are excluded from the market simulations of this study.

**Feedstock Sources**

- The availability, collection, and distribution of feedstock sources (including merchantable timber) for supply to electrical power generation plants is estimated independent of transportation costs and/or other logistical considerations.
- Supply of urban wood waste is based on an estimate of population increase for Florida (which averages 1.09% per year), an estimated per-capita generation factor, and a 60% utilization factor.
- Approximately 50% of the logging residues generated by merchantable timber harvesting will be utilized as feedstock for electricity generation.
- Two different projections are calculated for woody biomass supplied by short rotation energy crops: a low productivity / low adoption projection, and a high productivity / high adoption projection. The former assumes eucalyptus species that yield 20 green tons per acre per year, and the conversion of up to 5% of Florida farmland for such production. The latter projection assumes a yield of 32 green tons per acre per year, and the conversion of 15% of Florida farmland by 2020.

APPENDIX B

## Supporting Data for the RPS Projections of Section 4

### MT Scenario

Table B.1.1 Aggregated supply of merchantable timber (MT) used for electricity, in million green tons.

| Year | 7% RPS | | 12% RPS | | 20% RPS | |
|---|---|---|---|---|---|---|
| | New Removals | Displaced from FPI | New Removals | Displaced from FPI | New Removals | Displaced from FPI |
| 2012 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2013 | 2.75 | 1.22 | 2.75 | 1.22 | 2.75 | 1.22 |
| 2014 | 2.78 | 1.45 | 2.78 | 1.45 | 2.78 | 1.45 |
| 2015 | 3.07 | 1.46 | 3.07 | 1.46 | 3.07 | 1.46 |
| 2016 | 3.38 | 1.56 | 3.38 | 1.56 | 14.07 | 9.67 |
| 2017 | 3.60 | 1.75 | 3.60 | 1.75 | 14.20 | 10.23 |
| 2018 | 3.81 | 1.98 | 14.91 | 10.27 | 14.31 | 10.87 |
| 2019 | 4.05 | 2.23 | 15.11 | 10.91 | 26.50 | 21.13 |
| 2020 | 4.35 | 2.49 | 15.33 | 11.65 | 26.68 | 21.36 |
| 2021 | 4.50 | 2.72 | 15.20 | 12.13 | 29.98 | 22.22 |
| 2022 | 4.66 | 2.97 | 15.14 | 12.62 | 28.95 | 22.40 |
| 2023 | 4.96 | 3.14 | 15.01 | 13.29 | 27.88 | 22.56 |
| 2024 | 5.18 | 3.45 | 14.95 | 13.98 | 27.09 | 22.85 |
| 2025 | 5.43 | 3.65 | 14.77 | 14.67 | 26.29 | 23.13 |
| 2026 | 5.64 | 3.91 | 14.58 | 15.43 | 25.63 | 23.37 |
| 2027 | 5.85 | 4.04 | 14.14 | 16.20 | 24.62 | 23.61 |
| 2028 | 5.97 | 4.21 | 13.57 | 17.04 | 23.65 | 23.84 |
| 2029 | 6.09 | 4.43 | 13.13 | 17.84 | 22.61 | 24.10 |
| 2030 | 6.10 | 4.60 | 12.71 | 18.36 | 21.78 | 24.29 |
| 2031 | 6.23 | 4.76 | 12.54 | 18.82 | 21.05 | 24.50 |
| 2032 | 6.31 | 4.96 | 12.21 | 19.43 | 20.32 | 24.73 |
| 2033 | 6.38 | 5.17 | 11.83 | 20.08 | 20.15 | 24.97 |
| 2034 | 6.45 | 5.36 | 11.53 | 20.65 | 19.81 | 25.18 |
| 2035 | 6.40 | 5.67 | 11.34 | 20.85 | 19.58 | 25.33 |
| 2036 | 6.32 | 6.00 | 11.15 | 20.97 | 19.80 | 25.48 |
| 2037 | 6.19 | 6.38 | 10.96 | 21.10 | 19.86 | 25.60 |
| 2038 | 6.17 | 6.63 | 10.96 | 21.21 | 19.74 | 25.78 |
| 2039 | 6.12 | 6.90 | 10.77 | 21.30 | 19.50 | 25.87 |
| 2040 | 6.08 | 7.17 | 10.78 | 21.40 | 19.17 | 25.96 |

Table B.1.2 *Pine Roundwood* data for 20% RPS (MT Projection), in million green tons.

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 231.8 | 16.55 | 16.55 | 0.00 | 0.00 | 16.55 | 16.55 | 0.00 | 0.00 |
| 2007 | 89 | 236.3 | 15.40 | 15.40 | 0.00 | 0.00 | 15.40 | 15.40 | 0.00 | 0.00 |
| 2008 | 78 | 242.1 | 14.39 | 14.39 | 0.00 | 0.00 | 14.39 | 14.39 | 0.00 | 0.00 |
| 2009 | 68 | 248.8 | 13.49 | 13.49 | 0.00 | 0.00 | 13.49 | 13.49 | 0.00 | 0.00 |
| 2010 | 59 | 256.5 | 12.68 | 12.68 | 0.00 | 0.00 | 12.68 | 12.68 | 0.00 | 0.00 |
| 2011 | 63 | 265.3 | 13.60 | 13.60 | 0.00 | 0.00 | 13.60 | 13.60 | 0.00 | 0.00 |
| 2012 | 67 | 272.5 | 14.56 | 14.56 | 0.00 | 0.00 | 14.56 | 14.56 | 0.00 | 0.00 |
| **2013** | 87 | 278.9 | 17.73 | 14.56 | 3.18 | 3.18 | 15.57 | 18.75 | 2.16 | 1.01 |
| 2014 | 94 | 282.2 | 18.81 | 15.43 | 3.38 | 3.38 | 16.63 | 20.01 | 2.18 | 1.20 |
| 2015 | 97 | 284.5 | 19.19 | 15.57 | 3.62 | 3.62 | 16.76 | 20.38 | 2.43 | 1.19 |
| 2016 | 165 | 286.4 | 27.92 | 8.93 | 18.99 | 18.99 | 16.90 | 35.89 | 11.02 | 7.97 |
| 2017 | 178 | 278.9 | 28.14 | 8.60 | 19.54 | 19.54 | 17.05 | 36.60 | 11.09 | 8.45 |
| 2018 | 193 | 270.5 | 28.27 | 8.13 | 20.14 | 20.14 | 17.14 | 37.28 | 11.13 | 9.01 |
| 2019 | 313 | 261.5 | 37.69 | 0.00 | 37.69 | 39.77 | 17.17 | 56.94 | 20.52 | 17.17 |
| 2020 | 378 | 242.8 | 37.81 | 0.00 | 37.81 | 40.93 | 17.21 | 58.14 | 20.60 | 17.21 |
| 2021 | 518 | 222.7 | 40.30 | 0.00 | 40.30 | 47.62 | 17.25 | 64.86 | 23.05 | 17.25 |
| 2022 | 680 | 200.0 | 39.36 | 0.00 | 39.36 | 47.96 | 17.29 | 65.25 | 22.08 | 17.29 |
| 2023 | 1012 | 174.2 | 38.32 | 0.00 | 38.32 | 48.48 | 17.26 | 65.73 | 21.07 | 17.26 |
| 2024 | 1320 | 156.1 | 37.67 | 0.00 | 37.67 | 49.12 | 17.32 | 66.44 | 20.35 | 17.32 |
| 2025 | 1648 | 142.4 | 37.01 | 0.00 | 37.01 | 49.62 | 17.32 | 66.95 | 19.69 | 17.32 |
| 2026 | 2091 | 129.2 | 36.45 | 0.00 | 36.45 | 50.18 | 17.30 | 67.48 | 19.16 | 17.30 |
| 2027 | 2483 | 117.3 | 35.62 | 0.00 | 35.62 | 50.45 | 17.27 | 67.73 | 18.34 | 17.27 |
| 2028 | 3010 | 105.4 | 34.83 | 0.00 | 34.83 | 50.64 | 17.24 | 67.88 | 17.59 | 17.24 |
| 2029 | 3513 | 94.9 | 33.97 | 0.00 | 33.97 | 50.95 | 17.19 | 68.14 | 16.78 | 17.19 |
| 2030 | 3718 | 86.0 | 33.34 | 0.00 | 33.34 | 50.92 | 17.14 | 68.06 | 16.21 | 17.14 |
| 2031 | 3727 | 78.8 | 32.80 | 0.00 | 32.80 | 51.15 | 17.08 | 68.23 | 15.72 | 17.08 |
| 2032 | 3891 | 73.1 | 32.29 | 0.00 | 32.29 | 51.38 | 17.02 | 68.40 | 15.27 | 17.02 |
| 2033 | 3110 | 71.3 | 32.35 | 0.00 | 32.35 | 51.60 | 16.99 | 68.59 | 15.36 | 16.99 |
| 2034 | 3113 | 68.8 | 32.22 | 0.00 | 32.22 | 51.81 | 16.94 | 68.76 | 15.27 | 16.94 |
| 2035 | 3186 | 66.1 | 32.12 | 0.00 | 32.12 | 52.02 | 16.91 | 68.93 | 15.21 | 16.91 |
| 2036 | 2390 | 68.4 | 32.47 | 0.00 | 32.47 | 52.22 | 16.88 | 69.09 | 15.59 | 16.88 |
| 2037 | 2015 | 71.0 | 32.64 | 0.00 | 32.64 | 52.41 | 16.82 | 69.23 | 15.81 | 16.82 |
| 2038 | 1962 | 72.1 | 32.70 | 0.00 | 32.70 | 52.60 | 16.79 | 69.38 | 15.91 | 16.79 |
| 2039 | 2190 | 70.4 | 32.53 | 0.00 | 32.53 | 52.78 | 16.73 | 69.51 | 15.81 | 16.73 |
| 2040 | 3131 | 66.9 | 32.29 | 0.00 | 32.29 | 52.96 | 16.68 | 69.64 | 15.61 | 16.68 |

Table B.1.3 *Pine Large Sawtimber* data for 20% RPS (MT Projection), in million green tons.

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 96.3 | 6.46 | 6.46 | 0.00 | 0.00 | 6.46 | 6.46 | 0.00 | 0.00 |
| 2007 | 88 | 98.5 | 6.10 | 6.10 | 0.00 | 0.00 | 6.10 | 6.10 | 0.00 | 0.00 |
| 2008 | 77 | 100.8 | 5.76 | 5.76 | 0.00 | 0.00 | 5.76 | 5.76 | 0.00 | 0.00 |
| 2009 | 67 | 103.5 | 5.46 | 5.46 | 0.00 | 0.00 | 5.46 | 5.46 | 0.00 | 0.00 |
| 2010 | 57 | 106.7 | 5.13 | 5.13 | 0.00 | 0.00 | 5.13 | 5.13 | 0.00 | 0.00 |
| 2011 | 60 | 110.3 | 5.47 | 5.47 | 0.00 | 0.00 | 5.47 | 5.47 | 0.00 | 0.00 |
| 2012 | 64 | 114.8 | 5.84 | 5.84 | 0.00 | 0.00 | 5.84 | 5.84 | 0.00 | 0.00 |
| **2013** | 75 | 119.1 | 6.54 | 6.15 | 0.40 | 0.40 | 6.23 | 6.63 | 0.32 | 0.08 |
| 2014 | 80 | 122.9 | 6.95 | 6.53 | 0.42 | 0.42 | 6.64 | 7.06 | 0.32 | 0.11 |
| 2015 | 80 | 126.4 | 7.10 | 6.65 | 0.45 | 0.45 | 6.75 | 7.21 | 0.35 | 0.10 |
| 2016 | 108 | 129.9 | 8.50 | 6.13 | 2.37 | 2.37 | 6.87 | 9.24 | 1.63 | 0.74 |
| 2017 | 110 | 131.7 | 8.60 | 6.16 | 2.44 | 2.44 | 6.94 | 9.39 | 1.66 | 0.79 |
| 2018 | 112 | 133.3 | 8.69 | 6.17 | 2.52 | 2.52 | 7.00 | 9.52 | 1.68 | 0.83 |
| 2019 | 155 | 134.3 | 10.26 | 5.29 | 4.97 | 4.97 | 7.05 | 12.02 | 3.21 | 1.76 |
| 2020 | 169 | 132.7 | 10.32 | 5.20 | 5.12 | 5.12 | 7.10 | 12.21 | 3.22 | 1.89 |
| 2021 | 202 | 130.4 | 10.78 | 4.83 | 5.95 | 5.95 | 7.14 | 13.09 | 3.64 | 2.31 |
| 2022 | 229 | 127.4 | 10.75 | 4.75 | 5.99 | 5.99 | 7.19 | 13.18 | 3.56 | 2.44 |
| 2023 | 270 | 122.9 | 10.69 | 4.63 | 6.06 | 6.06 | 7.24 | 13.30 | 3.46 | 2.60 |
| 2024 | 330 | 117.9 | 10.65 | 4.51 | 6.14 | 6.14 | 7.28 | 13.42 | 3.37 | 2.77 |
| 2025 | 397 | 113.5 | 10.53 | 4.33 | 6.20 | 6.20 | 7.32 | 13.52 | 3.21 | 2.99 |
| 2026 | 496 | 108.3 | 10.45 | 4.18 | 6.27 | 6.27 | 7.36 | 13.64 | 3.09 | 3.19 |
| 2027 | 632 | 102.2 | 10.32 | 4.01 | 6.31 | 6.31 | 7.41 | 13.71 | 2.91 | 3.39 |
| 2028 | 779 | 96.2 | 10.16 | 3.83 | 6.33 | 6.33 | 7.44 | 13.77 | 2.72 | 3.61 |
| 2029 | 968 | 89.7 | 9.95 | 3.58 | 6.37 | 6.37 | 7.49 | 13.86 | 2.46 | 3.91 |
| 2030 | 1171 | 84.3 | 9.76 | 3.40 | 6.36 | 6.36 | 7.54 | 13.90 | 2.23 | 4.14 |
| 2031 | 1412 | 78.8 | 9.60 | 3.21 | 6.39 | 6.39 | 7.58 | 13.97 | 2.02 | 4.37 |
| 2032 | 1675 | 74.1 | 9.40 | 2.98 | 6.42 | 6.42 | 7.63 | 14.05 | 1.78 | 4.65 |
| 2033 | 1942 | 69.7 | 9.20 | 2.75 | 6.45 | 6.45 | 7.65 | 14.10 | 1.55 | 4.90 |
| 2034 | 2253 | 65.5 | 9.03 | 2.56 | 6.48 | 6.48 | 7.69 | 14.17 | 1.34 | 5.14 |
| 2035 | 2605 | 61.6 | 8.92 | 2.42 | 6.50 | 6.50 | 7.72 | 14.22 | 1.20 | 5.30 |
| 2036 | 2790 | 58.2 | 8.79 | 2.27 | 6.53 | 6.53 | 7.74 | 14.27 | 1.05 | 5.48 |
| 2037 | 2918 | 55.0 | 8.67 | 2.12 | 6.55 | 6.55 | 7.76 | 14.31 | 0.91 | 5.64 |
| 2038 | 3268 | 51.8 | 8.49 | 1.91 | 6.57 | 6.57 | 7.76 | 14.33 | 0.73 | 5.84 |
| 2039 | 3563 | 49.0 | 8.40 | 1.80 | 6.60 | 6.60 | 7.78 | 14.37 | 0.62 | 5.98 |
| 2040 | 3884 | 46.3 | 8.30 | 1.68 | 6.62 | 6.62 | 7.78 | 14.40 | 0.52 | 6.10 |

Table B.1.4 *Hardwood Pulpwood* data for 20% RPS (MT Projection), in million green tons.

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 115.2 | 2.51 | 2.51 | 0.00 | 0.00 | 2.51 | 2.51 | 0.00 | 0.00 |
| 2007 | 88 | 116.3 | 2.34 | 2.34 | 0.00 | 0.00 | 2.34 | 2.34 | 0.00 | 0.00 |
| 2008 | 78 | 117.5 | 2.19 | 2.19 | 0.00 | 0.00 | 2.19 | 2.19 | 0.00 | 0.00 |
| 2009 | 68 | 118.9 | 2.05 | 2.05 | 0.00 | 0.00 | 2.05 | 2.05 | 0.00 | 0.00 |
| 2010 | 59 | 120.4 | 1.92 | 1.92 | 0.00 | 0.00 | 1.92 | 1.92 | 0.00 | 0.00 |
| 2011 | 65 | 122.0 | 2.04 | 2.04 | 0.00 | 0.00 | 2.04 | 2.04 | 0.00 | 0.00 |
| 2012 | 71 | 123.6 | 2.17 | 2.17 | 0.00 | 0.00 | 2.17 | 2.17 | 0.00 | 0.00 |
| **2013** | 92 | 125.1 | 2.52 | 2.20 | 0.32 | 0.32 | 2.30 | 2.62 | 0.21 | 0.10 |
| 2014 | 100 | 126.3 | 2.66 | 2.33 | 0.34 | 0.34 | 2.44 | 2.78 | 0.22 | 0.12 |
| 2015 | 101 | 127.4 | 2.69 | 2.33 | 0.36 | 0.36 | 2.46 | 2.82 | 0.23 | 0.13 |
| 2016 | 161 | 128.5 | 3.56 | 1.66 | 1.90 | 1.90 | 2.47 | 4.37 | 1.09 | 0.81 |
| 2017 | 166 | 128.9 | 3.62 | 1.67 | 1.95 | 1.95 | 2.48 | 4.44 | 1.14 | 0.82 |
| 2018 | 171 | 129.3 | 3.67 | 1.65 | 2.01 | 2.01 | 2.49 | 4.51 | 1.18 | 0.84 |
| 2019 | 251 | 129.7 | 4.64 | 0.66 | 3.98 | 3.98 | 2.49 | 6.47 | 2.15 | 1.83 |
| 2020 | 264 | 129.1 | 4.71 | 0.61 | 4.09 | 4.09 | 2.49 | 6.59 | 2.21 | 1.88 |
| 2021 | 301 | 128.6 | 5.04 | 0.28 | 4.76 | 4.76 | 2.50 | 7.26 | 2.54 | 2.22 |
| 2022 | 309 | 128.2 | 5.05 | 0.26 | 4.80 | 4.80 | 2.50 | 7.29 | 2.56 | 2.24 |
| 2023 | 317 | 128.2 | 5.09 | 0.25 | 4.85 | 4.85 | 2.51 | 7.36 | 2.59 | 2.26 |
| 2024 | 328 | 127.5 | 5.10 | 0.19 | 4.91 | 4.91 | 2.51 | 7.42 | 2.59 | 2.32 |
| 2025 | 338 | 126.6 | 5.10 | 0.13 | 4.96 | 4.96 | 2.50 | 7.47 | 2.59 | 2.37 |
| 2026 | 350 | 125.7 | 5.09 | 0.07 | 5.02 | 5.02 | 2.50 | 7.52 | 2.59 | 2.43 |
| 2027 | 370 | 124.1 | 5.08 | 0.04 | 5.05 | 5.05 | 2.50 | 7.55 | 2.58 | 2.46 |
| 2028 | 393 | 122.3 | 5.07 | 0.01 | 5.06 | 5.06 | 2.50 | 7.57 | 2.57 | 2.49 |
| 2029 | 423 | 120.3 | 5.09 | 0.00 | 5.09 | 5.09 | 2.50 | 7.60 | 2.59 | 2.50 |
| 2030 | 454 | 118.5 | 5.10 | 0.01 | 5.09 | 5.09 | 2.50 | 7.59 | 2.59 | 2.50 |
| 2031 | 484 | 116.7 | 5.08 | 0.00 | 5.08 | 5.12 | 2.50 | 7.62 | 2.57 | 2.50 |
| 2032 | 516 | 115.0 | 5.06 | 0.00 | 5.06 | 5.14 | 2.50 | 7.64 | 2.55 | 2.50 |
| 2033 | 551 | 113.3 | 5.03 | 0.00 | 5.03 | 5.16 | 2.50 | 7.66 | 2.53 | 2.50 |
| 2034 | 587 | 111.6 | 5.00 | 0.00 | 5.00 | 5.18 | 2.51 | 7.69 | 2.50 | 2.51 |
| 2035 | 630 | 109.8 | 4.98 | 0.00 | 4.98 | 5.20 | 2.51 | 7.71 | 2.48 | 2.51 |
| 2036 | 660 | 108.4 | 4.98 | 0.00 | 4.98 | 5.22 | 2.51 | 7.73 | 2.47 | 2.51 |
| 2037 | 701 | 107.0 | 4.97 | 0.00 | 4.97 | 5.24 | 2.51 | 7.75 | 2.45 | 2.51 |
| 2038 | 747 | 105.4 | 4.93 | 0.00 | 4.93 | 5.26 | 2.51 | 7.77 | 2.42 | 2.51 |
| 2039 | 799 | 103.8 | 4.91 | 0.00 | 4.91 | 5.28 | 2.52 | 7.79 | 2.40 | 2.52 |
| 2040 | 859 | 102.0 | 4.90 | 0.00 | 4.90 | 5.30 | 2.52 | 7.81 | 2.38 | 2.52 |

Table B.1.5 *Hardwood Sawtimber* data for 20% RPS (MT Projection), in million green tons.

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 110.0 | 2.09 | 2.09 | 0.00 | 0.00 | 2.09 | 2.09 | 0.00 | 0.00 |
| 2007 | 86 | 111.6 | 1.96 | 1.96 | 0.00 | 0.00 | 1.96 | 1.96 | 0.00 | 0.00 |
| 2008 | 73 | 113.2 | 1.84 | 1.84 | 0.00 | 0.00 | 1.84 | 1.84 | 0.00 | 0.00 |
| 2009 | 62 | 115.0 | 1.73 | 1.73 | 0.00 | 0.00 | 1.73 | 1.73 | 0.00 | 0.00 |
| 2010 | 53 | 116.9 | 1.63 | 1.63 | 0.00 | 0.00 | 1.63 | 1.63 | 0.00 | 0.00 |
| 2011 | 59 | 118.9 | 1.73 | 1.73 | 0.00 | 0.00 | 1.73 | 1.73 | 0.00 | 0.00 |
| 2012 | 65 | 120.9 | 1.84 | 1.84 | 0.00 | 0.00 | 1.84 | 1.84 | 0.00 | 0.00 |
| **2013** | 77 | 122.7 | 2.01 | 1.93 | 0.08 | 0.08 | 1.95 | 2.03 | 0.06 | 0.02 |
| 2014 | 85 | 124.4 | 2.12 | 2.04 | 0.08 | 0.08 | 2.07 | 2.15 | 0.06 | 0.03 |
| 2015 | 85 | 126.1 | 2.14 | 2.05 | 0.09 | 0.09 | 2.08 | 2.17 | 0.06 | 0.03 |
| 2016 | 108 | 127.6 | 2.41 | 1.93 | 0.47 | 0.47 | 2.09 | 2.57 | 0.32 | 0.16 |
| 2017 | 108 | 128.8 | 2.43 | 1.94 | 0.49 | 0.49 | 2.11 | 2.59 | 0.32 | 0.17 |
| 2018 | 108 | 129.9 | 2.44 | 1.93 | 0.50 | 0.50 | 2.11 | 2.62 | 0.32 | 0.18 |
| 2019 | 138 | 131.0 | 2.74 | 1.75 | 0.99 | 0.99 | 2.12 | 3.11 | 0.63 | 0.37 |
| 2020 | 142 | 131.5 | 2.77 | 1.74 | 1.02 | 1.02 | 2.12 | 3.14 | 0.65 | 0.38 |
| 2021 | 155 | 131.9 | 2.88 | 1.68 | 1.19 | 1.19 | 2.12 | 3.31 | 0.75 | 0.44 |
| 2022 | 158 | 132.3 | 2.89 | 1.69 | 1.20 | 1.20 | 2.13 | 3.33 | 0.76 | 0.44 |
| 2023 | 161 | 133.0 | 2.91 | 1.70 | 1.21 | 1.21 | 2.14 | 3.35 | 0.77 | 0.44 |
| 2024 | 164 | 133.2 | 2.92 | 1.69 | 1.23 | 1.23 | 2.14 | 3.36 | 0.78 | 0.44 |
| 2025 | 169 | 133.2 | 2.93 | 1.69 | 1.24 | 1.24 | 2.14 | 3.38 | 0.80 | 0.44 |
| 2026 | 173 | 133.0 | 2.93 | 1.68 | 1.25 | 1.25 | 2.14 | 3.39 | 0.79 | 0.46 |
| 2027 | 181 | 131.9 | 2.92 | 1.66 | 1.26 | 1.26 | 2.14 | 3.40 | 0.78 | 0.48 |
| 2028 | 191 | 130.6 | 2.92 | 1.65 | 1.27 | 1.27 | 2.14 | 3.41 | 0.77 | 0.49 |
| 2029 | 204 | 129.0 | 2.92 | 1.65 | 1.27 | 1.27 | 2.15 | 3.42 | 0.78 | 0.50 |
| 2030 | 214 | 127.6 | 2.91 | 1.63 | 1.27 | 1.27 | 2.15 | 3.43 | 0.75 | 0.52 |

* Note: the table is abbreviated to 2030 in order to save space for the graphs below.

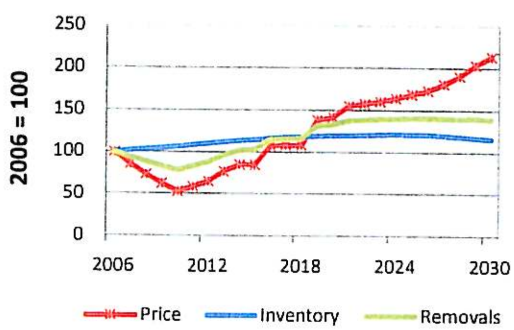


Figure B.1a SRTS output for *Hardwood Sawtimber* (MT only).

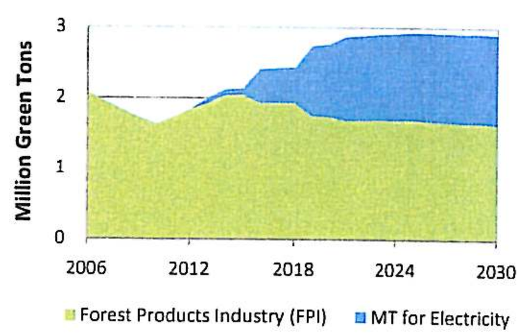


Figure B.1b Allocation of *Hardwood Sawtimber* supply (20% RPS).

**MT/UWW/LR**

Table B.2.1a Aggregated supply of woody biomass used for electricity, in million green tons. 20% RPS (MT/UWW/LR).

| | 20% RPS | | | |
|---|---|---|---|---|
| Year | New Removals | Displaced from FPI | Urban Wood Waste | Logging Residues |
| 2012 | 0.00 | 0.00 | 0.00 | 0.00 |
| **2013** | 0.00 | 0.00 | 2.39 | 2.73 |
| 2014 | 0.00 | 0.00 | 2.41 | 2.92 |
| 2015 | 0.00 | 0.00 | 2.44 | 2.96 |
| 2016 | 10.80 | 7.46 | 2.48 | 4.05 |
| 2017 | 11.13 | 7.74 | 2.51 | 4.10 |
| 2018 | 10.85 | 7.63 | 2.54 | 4.14 |
| 2019 | 23.27 | 19.67 | 2.58 | 5.34 |
| 2020 | 23.66 | 20.58 | 2.61 | 5.37 |
| 2021 | 26.60 | 21.23 | 2.64 | 5.75 |
| 2022 | 25.92 | 21.35 | 2.67 | 5.72 |
| 2023 | 25.32 | 21.52 | 2.71 | 5.64 |
| 2024 | 24.56 | 21.81 | 2.74 | 5.53 |
| 2025 | 23.93 | 22.05 | 2.77 | 5.44 |
| 2026 | 23.25 | 22.22 | 2.80 | 5.39 |
| 2027 | 22.59 | 22.41 | 2.83 | 5.32 |
| 2028 | 21.79 | 22.64 | 2.86 | 5.23 |
| 2029 | 21.08 | 22.89 | 2.89 | 5.15 |
| 2030 | 20.18 | 23.11 | 2.92 | 5.05 |
| 2031 | 19.43 | 23.28 | 2.95 | 4.98 |
| 2032 | 18.65 | 23.46 | 2.98 | 4.91 |
| 2033 | 18.15 | 23.70 | 3.01 | 4.85 |
| 2034 | 17.76 | 23.91 | 3.03 | 4.83 |
| 2035 | 17.21 | 24.18 | 3.06 | 4.80 |
| 2036 | 17.10 | 24.40 | 3.09 | 4.80 |
| 2037 | 16.97 | 24.54 | 3.12 | 4.82 |
| 2038 | 16.96 | 24.71 | 3.15 | 4.85 |
| 2039 | 16.83 | 24.87 | 3.18 | 4.85 |
| 2040 | 16.64 | 24.98 | 3.21 | 4.85 |

Table B.2.1b Aggregated supply of woody biomass used for electricity, in million green tons. 7% and 12% RPS (MT/UWW/LR).

| Year | 7% RPS | | | | 12% RPS | | | |
|---|---|---|---|---|---|---|---|---|
| | New Removals | Displaced from FPI | UWW | Logging Residues | New Removals | Displaced from FPI | UWW | Logging Residues |
| 2012 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2013 | 0.00 | 0.00 | 2.39 | 2.73 | 0.00 | 0.00 | 2.39 | 2.73 |
| 2014 | 0.00 | 0.00 | 2.41 | 2.92 | 0.00 | 0.00 | 2.41 | 2.92 |
| 2015 | 0.00 | 0.00 | 2.44 | 2.96 | 0.00 | 0.00 | 2.44 | 2.96 |
| 2016 | 0.00 | 0.00 | 2.48 | 3.01 | 0.00 | 0.00 | 2.48 | 3.01 |
| 2017 | 0.00 | 0.00 | 2.51 | 3.05 | 0.00 | 0.00 | 2.51 | 3.05 |
| 2018 | 0.12 | 0.03 | 2.54 | 3.09 | 10.93 | 7.55 | 2.54 | 4.15 |
| 2019 | 0.45 | 0.12 | 2.58 | 3.13 | 11.35 | 7.90 | 2.58 | 4.20 |
| 2020 | 0.83 | 0.23 | 2.61 | 3.17 | 11.85 | 8.29 | 2.61 | 4.25 |
| 2021 | 1.07 | 0.32 | 2.64 | 3.19 | 11.82 | 8.62 | 2.64 | 4.26 |
| 2022 | 1.32 | 0.42 | 2.67 | 3.21 | 11.82 | 9.00 | 2.67 | 4.26 |
| 2023 | 1.61 | 0.55 | 2.71 | 3.24 | 11.96 | 9.37 | 2.71 | 4.25 |
| 2024 | 1.93 | 0.69 | 2.74 | 3.27 | 12.18 | 9.74 | 2.74 | 4.27 |
| 2025 | 2.18 | 0.84 | 2.77 | 3.29 | 12.10 | 10.30 | 2.77 | 4.28 |
| 2026 | 2.42 | 1.02 | 2.80 | 3.32 | 12.12 | 10.82 | 2.80 | 4.27 |
| 2027 | 2.54 | 1.18 | 2.83 | 3.34 | 11.90 | 11.37 | 2.83 | 4.24 |
| 2028 | 2.62 | 1.35 | 2.86 | 3.35 | 11.52 | 12.04 | 2.86 | 4.20 |
| 2029 | 2.70 | 1.56 | 2.89 | 3.37 | 11.30 | 12.62 | 2.89 | 4.16 |
| 2030 | 2.67 | 1.74 | 2.92 | 3.38 | 10.91 | 13.13 | 2.92 | 4.10 |
| 2031 | 2.71 | 1.94 | 2.95 | 3.39 | 10.49 | 13.85 | 2.95 | 4.07 |
| 2032 | 2.94 | 1.96 | 2.98 | 3.40 | 10.15 | 14.48 | 2.98 | 4.04 |
| 2033 | 2.94 | 2.19 | 3.01 | 3.41 | 9.84 | 15.05 | 3.01 | 4.02 |
| 2034 | 3.12 | 2.24 | 3.03 | 3.42 | 9.57 | 15.59 | 3.03 | 3.99 |
| 2035 | 3.27 | 2.31 | 3.06 | 3.43 | 9.37 | 16.04 | 3.06 | 3.96 |
| 2036 | 3.41 | 2.39 | 3.09 | 3.43 | 9.32 | 16.33 | 3.09 | 3.94 |
| 2037 | 3.52 | 2.49 | 3.12 | 3.43 | 9.20 | 16.68 | 3.12 | 3.93 |
| 2038 | 3.68 | 2.55 | 3.15 | 3.42 | 9.12 | 16.99 | 3.15 | 3.91 |
| 2039 | 3.76 | 2.68 | 3.18 | 3.41 | 8.97 | 17.37 | 3.18 | 3.88 |
| 2040 | 3.87 | 2.78 | 3.21 | 3.40 | 8.63 | 17.91 | 3.21 | 3.87 |

Table B.2.2 *Pine Roundwood* data for 20% RPS (MT/UWW/LR), in million green tons.

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 231.8 | 16.55 | 16.55 | 0.00 | 0.00 | 16.55 | 16.55 | 0.00 | 0.00 |
| 2007 | 89 | 236.3 | 15.40 | 15.40 | 0.00 | 0.00 | 15.40 | 15.40 | 0.00 | 0.00 |
| 2008 | 78 | 242.1 | 14.39 | 14.39 | 0.00 | 0.00 | 14.39 | 14.39 | 0.00 | 0.00 |
| 2009 | 68 | 248.8 | 13.49 | 13.49 | 0.00 | 0.00 | 13.49 | 13.49 | 0.00 | 0.00 |
| 2010 | 59 | 256.5 | 12.68 | 12.68 | 0.00 | 0.00 | 12.68 | 12.68 | 0.00 | 0.00 |
| 2011 | 63 | 265.3 | 13.60 | 13.60 | 0.00 | 0.00 | 13.60 | 13.60 | 0.00 | 0.00 |
| 2012 | 67 | 272.5 | 14.56 | 14.56 | 0.00 | 0.00 | 14.56 | 14.56 | 0.00 | 0.00 |
| **2013** | 72 | 278.9 | 15.57 | 15.57 | 0.00 | 0.00 | 15.57 | 15.57 | 0.00 | 0.00 |
| 2014 | 77 | 284.3 | 16.63 | 16.63 | 0.00 | 0.00 | 16.63 | 16.63 | 0.00 | 0.00 |
| 2015 | 77 | 288.8 | 16.76 | 16.76 | 0.00 | 0.00 | 16.76 | 16.76 | 0.00 | 0.00 |
| 2016 | 137 | 293.3 | 25.33 | 10.73 | 14.60 | 14.60 | 16.90 | 31.50 | 8.43 | 6.17 |
| 2017 | 146 | 288.7 | 25.68 | 10.59 | 15.09 | 15.09 | 17.05 | 32.15 | 8.63 | 6.47 |
| 2018 | 152 | 283.1 | 25.51 | 10.73 | 14.79 | 14.79 | 17.14 | 31.92 | 8.37 | 6.41 |
| 2019 | 250 | 277.1 | 35.10 | 0.74 | 34.36 | 34.36 | 17.17 | 51.53 | 17.92 | 16.43 |
| 2020 | 290 | 261.5 | 35.38 | 0.00 | 35.38 | 35.46 | 17.21 | 52.67 | 18.17 | 17.21 |
| 2021 | 370 | 244.7 | 37.60 | 0.00 | 37.60 | 40.90 | 17.25 | 58.15 | 20.35 | 17.25 |
| 2022 | 452 | 224.2 | 36.96 | 0.00 | 36.96 | 41.25 | 17.29 | 58.53 | 19.67 | 17.29 |
| 2023 | 599 | 200.4 | 36.39 | 0.00 | 36.39 | 41.80 | 17.26 | 59.06 | 19.13 | 17.26 |
| 2024 | 788 | 180.2 | 35.74 | 0.00 | 35.74 | 42.51 | 17.32 | 59.83 | 18.42 | 17.32 |
| 2025 | 1109 | 160.8 | 35.21 | 0.00 | 35.21 | 43.05 | 17.32 | 60.38 | 17.89 | 17.32 |
| 2026 | 1408 | 146.0 | 34.56 | 0.00 | 34.56 | 43.63 | 17.30 | 60.93 | 17.26 | 17.30 |
| 2027 | 1657 | 134.4 | 34.02 | 0.00 | 34.02 | 43.94 | 17.27 | 61.21 | 16.74 | 17.27 |
| 2028 | 2005 | 122.6 | 33.39 | 0.00 | 33.39 | 44.17 | 17.24 | 61.41 | 16.15 | 17.24 |
| 2029 | 2367 | 111.9 | 32.84 | 0.00 | 32.84 | 44.52 | 17.19 | 61.71 | 15.65 | 17.19 |
| 2030 | 2673 | 101.8 | 32.15 | 0.00 | 32.15 | 44.55 | 17.14 | 61.68 | 15.01 | 17.14 |
| 2031 | 2990 | 92.6 | 31.51 | 0.00 | 31.51 | 44.81 | 17.08 | 61.89 | 14.43 | 17.08 |
| 2032 | 3244 | 84.5 | 30.84 | 0.00 | 30.84 | 45.07 | 17.02 | 62.09 | 13.82 | 17.02 |
| 2033 | 2712 | 80.6 | 30.53 | 0.00 | 30.53 | 45.31 | 16.99 | 62.31 | 13.54 | 16.99 |
| 2034 | 2649 | 77.1 | 30.29 | 0.00 | 30.29 | 45.52 | 16.94 | 62.46 | 13.35 | 16.94 |
| 2035 | 2803 | 73.4 | 29.96 | 0.00 | 29.96 | 45.73 | 16.91 | 62.64 | 13.05 | 16.91 |
| 2036 | 2348 | 73.8 | 30.02 | 0.00 | 30.02 | 45.90 | 16.88 | 62.78 | 13.15 | 16.88 |
| 2037 | 2040 | 74.5 | 29.99 | 0.00 | 29.99 | 46.06 | 16.82 | 62.88 | 13.17 | 16.82 |
| 2038 | 1720 | 76.6 | 30.12 | 0.00 | 30.12 | 46.20 | 16.79 | 62.98 | 13.34 | 16.79 |
| 2039 | 1852 | 75.0 | 30.12 | 0.00 | 30.12 | 46.36 | 16.73 | 63.09 | 13.39 | 16.73 |
| 2040 | 2102 | 72.7 | 29.99 | 0.00 | 29.99 | 46.51 | 16.68 | 63.20 | 13.31 | 16.68 |

Table B.2.3 *Pine Large Sawtimber* data for 20% RPS (MT/UWW/LR), in million green tons.

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 96.3 | 6.46 | 6.46 | 0.00 | 0.00 | 6.46 | 6.46 | 0.00 | 0.00 |
| 2007 | 88 | 98.5 | 6.10 | 6.10 | 0.00 | 0.00 | 6.10 | 6.10 | 0.00 | 0.00 |
| 2008 | 77 | 100.8 | 5.76 | 5.76 | 0.00 | 0.00 | 5.76 | 5.76 | 0.00 | 0.00 |
| 2009 | 67 | 103.5 | 5.46 | 5.46 | 0.00 | 0.00 | 5.46 | 5.46 | 0.00 | 0.00 |
| 2010 | 57 | 106.7 | 5.13 | 5.13 | 0.00 | 0.00 | 5.13 | 5.13 | 0.00 | 0.00 |
| 2011 | 60 | 110.3 | 5.47 | 5.47 | 0.00 | 0.00 | 5.47 | 5.47 | 0.00 | 0.00 |
| 2012 | 64 | 114.8 | 5.84 | 5.84 | 0.00 | 0.00 | 5.84 | 5.84 | 0.00 | 0.00 |
| **2013** | 68 | 119.1 | 6.23 | 6.23 | 0.00 | 0.00 | 6.23 | 6.23 | 0.00 | 0.00 |
| 2014 | 73 | 123.3 | 6.64 | 6.64 | 0.00 | 0.00 | 6.64 | 6.64 | 0.00 | 0.00 |
| 2015 | 72 | 127.2 | 6.75 | 6.75 | 0.00 | 0.00 | 6.75 | 6.75 | 0.00 | 0.00 |
| 2016 | 97 | 131.2 | 8.13 | 6.31 | 1.83 | 1.83 | 6.87 | 8.70 | 1.26 | 0.56 |
| 2017 | 99 | 133.7 | 8.30 | 6.41 | 1.89 | 1.89 | 6.94 | 8.83 | 1.35 | 0.53 |
| 2018 | 99 | 135.9 | 8.35 | 6.51 | 1.85 | 1.85 | 7.00 | 8.85 | 1.35 | 0.50 |
| 2019 | 136 | 137.9 | 9.94 | 5.65 | 4.29 | 4.29 | 7.05 | 11.34 | 2.90 | 1.40 |
| 2020 | 144 | 137.6 | 10.05 | 5.62 | 4.43 | 4.43 | 7.10 | 11.53 | 2.95 | 1.48 |
| 2021 | 167 | 136.3 | 10.48 | 5.37 | 5.11 | 5.11 | 7.14 | 12.25 | 3.34 | 1.77 |
| 2022 | 183 | 134.5 | 10.51 | 5.35 | 5.16 | 5.16 | 7.19 | 12.34 | 3.32 | 1.83 |
| 2023 | 201 | 132.2 | 10.46 | 5.24 | 5.23 | 5.23 | 7.24 | 12.46 | 3.22 | 2.00 |
| 2024 | 230 | 128.5 | 10.42 | 5.11 | 5.31 | 5.31 | 7.28 | 12.59 | 3.14 | 2.17 |
| 2025 | 270 | 124.4 | 10.35 | 4.97 | 5.38 | 5.38 | 7.32 | 12.70 | 3.03 | 2.36 |
| 2026 | 322 | 120.1 | 10.31 | 4.86 | 5.45 | 5.45 | 7.36 | 12.82 | 2.95 | 2.51 |
| 2027 | 384 | 115.1 | 10.19 | 4.70 | 5.49 | 5.49 | 7.41 | 12.90 | 2.78 | 2.71 |
| 2028 | 465 | 109.5 | 10.01 | 4.49 | 5.52 | 5.52 | 7.44 | 12.96 | 2.57 | 2.95 |
| 2029 | 568 | 103.5 | 9.85 | 4.28 | 5.56 | 5.56 | 7.49 | 13.06 | 2.35 | 3.21 |
| 2030 | 682 | 97.4 | 9.66 | 4.10 | 5.57 | 5.57 | 7.54 | 13.10 | 2.13 | 3.44 |
| 2031 | 834 | 91.4 | 9.52 | 3.92 | 5.60 | 5.60 | 7.58 | 13.18 | 1.94 | 3.66 |
| 2032 | 1015 | 85.9 | 9.40 | 3.76 | 5.63 | 5.63 | 7.63 | 13.26 | 1.77 | 3.86 |
| 2033 | 1203 | 80.9 | 9.23 | 3.57 | 5.66 | 5.66 | 7.65 | 13.32 | 1.58 | 4.08 |
| 2034 | 1412 | 76.4 | 9.09 | 3.40 | 5.69 | 5.69 | 7.69 | 13.38 | 1.39 | 4.30 |
| 2035 | 1626 | 72.0 | 8.89 | 3.18 | 5.72 | 5.72 | 7.72 | 13.44 | 1.17 | 4.54 |
| 2036 | 1820 | 68.1 | 8.75 | 3.01 | 5.74 | 5.74 | 7.74 | 13.48 | 1.01 | 4.73 |
| 2037 | 1987 | 64.5 | 8.60 | 2.84 | 5.76 | 5.76 | 7.76 | 13.52 | 0.84 | 4.92 |
| 2038 | 2069 | 61.3 | 8.44 | 2.66 | 5.77 | 5.77 | 7.76 | 13.53 | 0.68 | 5.09 |
| 2039 | 2291 | 58.1 | 8.30 | 2.51 | 5.79 | 5.79 | 7.78 | 13.57 | 0.53 | 5.27 |
| 2040 | 2531 | 55.2 | 8.20 | 2.39 | 5.81 | 5.81 | 7.78 | 13.60 | 0.42 | 5.39 |

Table B.2.4 *Hardwood Pulpwood* data for 20% RPS (MT/UWW/LR), in million green tons.

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 115.2 | 2.51 | 2.51 | 0.00 | 0.00 | 2.51 | 2.51 | 0.00 | 0.00 |
| 2007 | 88 | 116.3 | 2.34 | 2.34 | 0.00 | 0.00 | 2.34 | 2.34 | 0.00 | 0.00 |
| 2008 | 78 | 117.5 | 2.19 | 2.19 | 0.00 | 0.00 | 2.19 | 2.19 | 0.00 | 0.00 |
| 2009 | 68 | 118.9 | 2.05 | 2.05 | 0.00 | 0.00 | 2.05 | 2.05 | 0.00 | 0.00 |
| 2010 | 59 | 120.4 | 1.92 | 1.92 | 0.00 | 0.00 | 1.92 | 1.92 | 0.00 | 0.00 |
| 2011 | 65 | 122.0 | 2.04 | 2.04 | 0.00 | 0.00 | 2.04 | 2.04 | 0.00 | 0.00 |
| 2012 | 71 | 123.6 | 2.17 | 2.17 | 0.00 | 0.00 | 2.17 | 2.17 | 0.00 | 0.00 |
| **2013** | 78 | 125.1 | 2.30 | 2.30 | 0.00 | 0.00 | 2.30 | 2.30 | 0.00 | 0.00 |
| 2014 | 86 | 126.5 | 2.44 | 2.44 | 0.00 | 0.00 | 2.44 | 2.44 | 0.00 | 0.00 |
| 2015 | 86 | 127.8 | 2.46 | 2.46 | 0.00 | 0.00 | 2.46 | 2.46 | 0.00 | 0.00 |
| 2016 | 142 | 129.1 | 3.32 | 1.86 | 1.46 | 1.46 | 2.47 | 3.93 | 0.85 | 0.61 |
| 2017 | 146 | 129.8 | 3.38 | 1.87 | 1.51 | 1.51 | 2.48 | 3.99 | 0.90 | 0.61 |
| 2018 | 146 | 130.4 | 3.37 | 1.90 | 1.48 | 1.48 | 2.49 | 3.97 | 0.88 | 0.60 |
| 2019 | 223 | 131.1 | 4.39 | 0.96 | 3.44 | 3.44 | 2.49 | 5.93 | 1.90 | 1.54 |
| 2020 | 234 | 130.8 | 4.46 | 0.92 | 3.55 | 3.55 | 2.49 | 6.04 | 1.97 | 1.58 |
| 2021 | 264 | 130.4 | 4.74 | 0.65 | 4.09 | 4.09 | 2.50 | 6.59 | 2.24 | 1.85 |
| 2022 | 272 | 129.9 | 4.75 | 0.63 | 4.12 | 4.12 | 2.50 | 6.62 | 2.25 | 1.87 |
| 2023 | 278 | 130.2 | 4.80 | 0.62 | 4.18 | 4.18 | 2.51 | 6.69 | 2.29 | 1.89 |
| 2024 | 288 | 129.6 | 4.82 | 0.57 | 4.25 | 4.25 | 2.51 | 6.76 | 2.32 | 1.93 |
| 2025 | 296 | 129.1 | 4.83 | 0.53 | 4.31 | 4.31 | 2.50 | 6.81 | 2.33 | 1.98 |
| 2026 | 306 | 128.5 | 4.85 | 0.48 | 4.36 | 4.36 | 2.50 | 6.87 | 2.34 | 2.02 |
| 2027 | 315 | 127.9 | 4.86 | 0.46 | 4.39 | 4.39 | 2.50 | 6.90 | 2.35 | 2.04 |
| 2028 | 324 | 127.4 | 4.86 | 0.44 | 4.42 | 4.42 | 2.50 | 6.92 | 2.36 | 2.06 |
| 2029 | 342 | 126.0 | 4.87 | 0.42 | 4.45 | 4.45 | 2.50 | 6.95 | 2.37 | 2.08 |
| 2030 | 358 | 124.4 | 4.85 | 0.39 | 4.45 | 4.45 | 2.50 | 6.96 | 2.34 | 2.11 |
| 2031 | 382 | 122.7 | 4.87 | 0.39 | 4.48 | 4.48 | 2.50 | 6.98 | 2.36 | 2.12 |
| 2032 | 408 | 120.9 | 4.88 | 0.37 | 4.51 | 4.51 | 2.50 | 7.01 | 2.37 | 2.13 |
| 2033 | 432 | 119.4 | 4.86 | 0.33 | 4.53 | 4.53 | 2.50 | 7.04 | 2.36 | 2.17 |
| 2034 | 456 | 118.0 | 4.86 | 0.30 | 4.55 | 4.55 | 2.51 | 7.06 | 2.35 | 2.20 |
| 2035 | 482 | 116.5 | 4.84 | 0.27 | 4.57 | 4.57 | 2.51 | 7.08 | 2.33 | 2.24 |
| 2036 | 507 | 115.2 | 4.82 | 0.23 | 4.59 | 4.59 | 2.51 | 7.10 | 2.31 | 2.28 |
| 2037 | 530 | 114.1 | 4.83 | 0.23 | 4.61 | 4.61 | 2.51 | 7.12 | 2.32 | 2.28 |
| 2038 | 554 | 113.0 | 4.82 | 0.20 | 4.62 | 4.62 | 2.51 | 7.13 | 2.31 | 2.31 |
| 2039 | 585 | 111.6 | 4.81 | 0.17 | 4.64 | 4.64 | 2.52 | 7.15 | 2.29 | 2.34 |
| 2040 | 620 | 110.1 | 4.80 | 0.15 | 4.65 | 4.65 | 2.52 | 7.17 | 2.28 | 2.37 |

Table B.2.5 *Hardwood Sawtimber* data for 20% RPS (MT/UWW/LR), in million green tons.

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 110.0 | 2.09 | 2.09 | 0.00 | 0.00 | 2.09 | 2.09 | 0.00 | 0.00 |
| 2007 | 86 | 111.6 | 1.96 | 1.96 | 0.00 | 0.00 | 1.96 | 1.96 | 0.00 | 0.00 |
| 2008 | 73 | 113.2 | 1.84 | 1.84 | 0.00 | 0.00 | 1.84 | 1.84 | 0.00 | 0.00 |
| 2009 | 62 | 115.0 | 1.73 | 1.73 | 0.00 | 0.00 | 1.73 | 1.73 | 0.00 | 0.00 |
| 2010 | 53 | 116.9 | 1.63 | 1.63 | 0.00 | 0.00 | 1.63 | 1.63 | 0.00 | 0.00 |
| 2011 | 59 | 118.9 | 1.73 | 1.73 | 0.00 | 0.00 | 1.73 | 1.73 | 0.00 | 0.00 |
| 2012 | 65 | 120.9 | 1.84 | 1.84 | 0.00 | 0.00 | 1.84 | 1.84 | 0.00 | 0.00 |
| **2013** | 72 | 122.7 | 1.95 | 1.95 | 0.00 | 0.00 | 1.95 | 1.95 | 0.00 | 0.00 |
| 2014 | 80 | 124.5 | 2.07 | 2.07 | 0.00 | 0.00 | 2.07 | 2.07 | 0.00 | 0.00 |
| 2015 | 79 | 126.2 | 2.08 | 2.08 | 0.00 | 0.00 | 2.08 | 2.08 | 0.00 | 0.00 |
| 2016 | 101 | 127.9 | 2.34 | 1.98 | 0.37 | 0.37 | 2.09 | 2.46 | 0.25 | 0.12 |
| 2017 | 101 | 129.2 | 2.36 | 1.98 | 0.38 | 0.38 | 2.11 | 2.48 | 0.25 | 0.13 |
| 2018 | 99 | 130.5 | 2.36 | 1.99 | 0.37 | 0.37 | 2.11 | 2.48 | 0.24 | 0.13 |
| 2019 | 128 | 131.8 | 2.67 | 1.81 | 0.86 | 0.86 | 2.12 | 2.98 | 0.55 | 0.31 |
| 2020 | 131 | 132.5 | 2.69 | 1.80 | 0.89 | 0.89 | 2.12 | 3.01 | 0.57 | 0.32 |
| 2021 | 141 | 133.1 | 2.78 | 1.76 | 1.02 | 1.02 | 2.12 | 3.15 | 0.66 | 0.37 |
| 2022 | 144 | 133.5 | 2.80 | 1.77 | 1.03 | 1.03 | 2.13 | 3.16 | 0.68 | 0.36 |
| 2023 | 144 | 134.3 | 2.81 | 1.76 | 1.05 | 1.05 | 2.14 | 3.18 | 0.67 | 0.38 |
| 2024 | 146 | 134.7 | 2.82 | 1.75 | 1.06 | 1.06 | 2.14 | 3.20 | 0.68 | 0.38 |
| 2025 | 149 | 134.9 | 2.83 | 1.75 | 1.08 | 1.08 | 2.14 | 3.21 | 0.69 | 0.39 |
| 2026 | 153 | 135.1 | 2.84 | 1.75 | 1.09 | 1.09 | 2.14 | 3.23 | 0.70 | 0.39 |
| 2027 | 158 | 135.3 | 2.86 | 1.76 | 1.10 | 1.10 | 2.14 | 3.24 | 0.71 | 0.38 |
| 2028 | 161 | 135.3 | 2.86 | 1.76 | 1.10 | 1.10 | 2.14 | 3.25 | 0.72 | 0.39 |
| 2029 | 168 | 134.4 | 2.86 | 1.74 | 1.11 | 1.11 | 2.15 | 3.26 | 0.71 | 0.40 |
| 2030 | 174 | 133.3 | 2.85 | 1.73 | 1.11 | 1.11 | 2.15 | 3.27 | 0.69 | 0.42 |

* Note: the table is abbreviated to 2030 in order to save space for the graphs below.

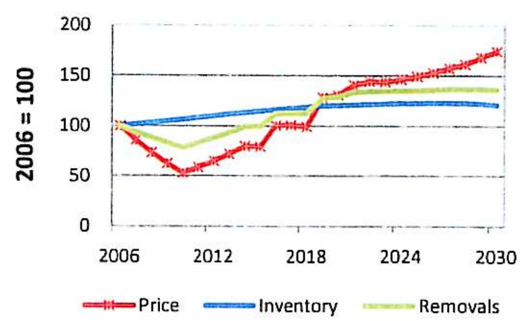


Figure B.2a SRTS output for *Hardwood Sawtimber*, MT/UWW/LR.

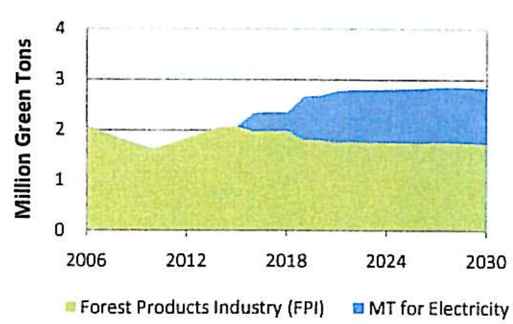


Figure B.2b Allocation of *Hardwood Sawtimber* supply (20% RPS).

**MT/UWW/LR+SREC_low**

Table B.3.1a Aggregated supply of woody biomass used for electricity, in million green tons. 20% RPS (MT/UWW/LR+SREC_low).

| 20% RPS | | | | | |
|---|---|---|---|---|---|
| Year | New Removals | Displaced from FPI | Urban Wood Waste | Logging Residues | SREC (low) |
| 2012 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2013 | 0.00 | 0.00 | 2.39 | 2.62 | 4.24 |
| 2014 | 0.00 | 0.00 | 2.41 | 2.79 | 4.60 |
| 2015 | 0.00 | 0.00 | 2.44 | 2.82 | 4.95 |
| 2016 | 8.21 | 4.90 | 2.48 | 3.78 | 5.31 |
| 2017 | 8.31 | 5.08 | 2.51 | 3.81 | 5.66 |
| 2018 | 7.89 | 4.87 | 2.54 | 3.84 | 6.02 |
| 2019 | 20.68 | 16.21 | 2.58 | 5.07 | 6.38 |
| 2020 | 21.02 | 16.89 | 2.61 | 5.11 | 6.73 |
| 2021 | 24.09 | 20.22 | 2.64 | 5.48 | 7.09 |
| 2022 | 23.55 | 20.69 | 2.67 | 5.44 | 7.44 |
| 2023 | 22.84 | 20.82 | 2.71 | 5.37 | 7.80 |
| 2024 | 22.31 | 20.98 | 2.74 | 5.27 | 8.16 |
| 2025 | 21.57 | 21.13 | 2.77 | 5.19 | 8.51 |
| 2026 | 20.82 | 21.28 | 2.80 | 5.10 | 8.87 |
| 2027 | 20.13 | 21.40 | 2.83 | 5.03 | 9.22 |
| 2028 | 19.36 | 21.51 | 2.86 | 4.94 | 9.58 |
| 2029 | 18.71 | 21.66 | 2.89 | 4.86 | 9.94 |
| 2030 | 17.79 | 21.73 | 2.92 | 4.78 | 10.29 |
| 2031 | 16.96 | 21.90 | 2.95 | 4.70 | 10.65 |
| 2032 | 16.26 | 22.04 | 2.98 | 4.63 | 11.00 |
| 2033 | 15.67 | 22.20 | 3.01 | 4.54 | 11.36 |
| 2034 | 15.23 | 22.40 | 3.03 | 4.52 | 11.36 |
| 2035 | 14.82 | 22.57 | 3.06 | 4.51 | 11.36 |
| 2036 | 14.74 | 22.74 | 3.09 | 4.50 | 11.36 |
| 2037 | 14.61 | 22.88 | 3.12 | 4.51 | 11.36 |
| 2038 | 14.69 | 23.01 | 3.15 | 4.52 | 11.36 |
| 2039 | 14.60 | 23.17 | 3.18 | 4.55 | 11.36 |
| 2040 | 14.55 | 23.27 | 3.21 | 4.53 | 11.36 |

Table B.3.1b Aggregated supply of woody biomass used for electricity, in million green tons. 12% RPS (MT/UWW/LR+SREC_low).

| 12% RPS | | | | | |
|---|---|---|---|---|---|
| Year | New Removals | Displaced from FPI | Urban Wood Waste | Logging Residues | SREC (low) |
| 2012 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **2013** | 0.00 | 0.00 | 2.39 | 2.62 | 4.24 |
| 2014 | 0.00 | 0.00 | 2.41 | 2.79 | 4.60 |
| 2015 | 0.00 | 0.00 | 2.44 | 2.82 | 4.95 |
| 2016 | 0.00 | 0.00 | 2.48 | 2.85 | 5.31 |
| 2017 | 0.00 | 0.00 | 2.51 | 2.87 | 5.66 |
| 2018 | 8.09 | 4.67 | 2.54 | 3.85 | 6.02 |
| 2019 | 8.30 | 4.88 | 2.58 | 3.88 | 6.38 |
| 2020 | 8.63 | 5.09 | 2.61 | 3.92 | 6.73 |
| 2021 | 8.49 | 5.20 | 2.64 | 3.92 | 7.09 |
| 2022 | 8.35 | 5.37 | 2.67 | 3.91 | 7.44 |
| 2023 | 8.38 | 5.50 | 2.71 | 3.91 | 7.80 |
| 2024 | 8.31 | 5.81 | 2.74 | 3.92 | 8.16 |
| 2025 | 8.26 | 5.99 | 2.77 | 3.91 | 8.51 |
| 2026 | 8.16 | 6.29 | 2.80 | 3.90 | 8.87 |
| 2027 | 7.81 | 6.60 | 2.83 | 3.87 | 9.22 |
| 2028 | 7.43 | 6.90 | 2.86 | 3.84 | 9.58 |
| 2029 | 7.25 | 7.08 | 2.89 | 3.81 | 9.94 |
| 2030 | 6.77 | 7.32 | 2.92 | 3.76 | 10.29 |
| 2031 | 6.48 | 7.55 | 2.95 | 3.73 | 10.65 |
| 2032 | 6.12 | 7.85 | 2.98 | 3.69 | 11.00 |
| 2033 | 5.79 | 8.11 | 3.01 | 3.65 | 11.36 |
| 2034 | 5.70 | 8.46 | 3.03 | 3.63 | 11.36 |
| 2035 | 5.68 | 8.73 | 3.06 | 3.60 | 11.36 |
| 2036 | 5.53 | 9.12 | 3.09 | 3.59 | 11.36 |
| 2037 | 5.36 | 9.51 | 3.12 | 3.58 | 11.36 |
| 2038 | 5.22 | 9.86 | 3.15 | 3.57 | 11.36 |
| 2039 | 5.08 | 10.21 | 3.18 | 3.57 | 11.36 |
| 2040 | 4.97 | 10.52 | 3.21 | 3.55 | 11.36 |

Table B.3.2 *Pine Roundwood* data for 20% RPS, in million green tons. MT/UWW/LR+SREC_low

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 231.8 | 16.55 | 16.55 | 0.00 | 0.00 | 16.55 | 16.55 | 0.00 | 0.00 |
| 2007 | 89 | 236.3 | 15.40 | 15.40 | 0.00 | 0.00 | 15.40 | 15.40 | 0.00 | 0.00 |
| 2008 | 78 | 242.1 | 14.39 | 14.39 | 0.00 | 0.00 | 14.39 | 14.39 | 0.00 | 0.00 |
| 2009 | 68 | 248.8 | 13.49 | 13.49 | 0.00 | 0.00 | 13.49 | 13.49 | 0.00 | 0.00 |
| 2010 | 59 | 256.5 | 12.68 | 12.68 | 0.00 | 0.00 | 12.68 | 12.68 | 0.00 | 0.00 |
| 2011 | 63 | 265.3 | 13.60 | 13.60 | 0.00 | 0.00 | 13.60 | 13.60 | 0.00 | 0.00 |
| 2012 | 67 | 272.5 | 14.56 | 14.56 | 0.00 | 0.00 | 14.56 | 14.56 | 0.00 | 0.00 |
| **2013** | 72 | 278.9 | 15.57 | 15.57 | 0.00 | 0.00 | 15.57 | 15.57 | 0.00 | 0.00 |
| 2014 | 77 | 284.3 | 16.63 | 16.63 | 0.00 | 0.00 | 16.63 | 16.63 | 0.00 | 0.00 |
| 2015 | 77 | 288.8 | 16.76 | 16.76 | 0.00 | 0.00 | 16.76 | 16.76 | 0.00 | 0.00 |
| 2016 | 123 | 293.3 | 23.38 | 12.90 | 10.48 | 10.48 | 16.90 | 27.38 | 6.48 | 4.00 |
| 2017 | 127 | 290.6 | 23.57 | 12.86 | 10.71 | 10.71 | 17.05 | 27.76 | 6.52 | 4.19 |
| 2018 | 129 | 287.2 | 23.31 | 13.10 | 10.21 | 10.21 | 17.14 | 27.35 | 6.17 | 4.04 |
| 2019 | 220 | 283.5 | 33.24 | 3.73 | 29.51 | 29.51 | 17.17 | 46.68 | 16.06 | 13.45 |
| 2020 | 250 | 269.8 | 33.50 | 3.17 | 30.33 | 30.33 | 17.21 | 47.54 | 16.29 | 14.04 |
| 2021 | 314 | 255.2 | 35.84 | 0.40 | 35.45 | 35.45 | 17.25 | 52.69 | 18.59 | 16.85 |
| 2022 | 368 | 237.1 | 35.36 | 0.00 | 35.36 | 35.51 | 17.29 | 52.80 | 18.07 | 17.29 |
| 2023 | 464 | 214.2 | 34.71 | 0.00 | 34.71 | 35.78 | 17.26 | 53.03 | 17.45 | 17.26 |
| 2024 | 574 | 195.7 | 34.25 | 0.00 | 34.25 | 36.19 | 17.32 | 53.51 | 16.93 | 17.32 |
| 2025 | 766 | 176.2 | 33.58 | 0.00 | 33.58 | 36.45 | 17.32 | 53.77 | 16.26 | 17.32 |
| 2026 | 1056 | 157.6 | 32.91 | 0.00 | 32.91 | 36.77 | 17.30 | 54.07 | 15.61 | 17.30 |
| 2027 | 1259 | 145.1 | 32.34 | 0.00 | 32.34 | 36.79 | 17.27 | 54.06 | 15.07 | 17.27 |
| 2028 | 1480 | 133.7 | 31.68 | 0.00 | 31.68 | 36.74 | 17.24 | 53.98 | 14.44 | 17.24 |
| 2029 | 1722 | 123.4 | 31.17 | 0.00 | 31.17 | 36.80 | 17.19 | 53.99 | 13.98 | 17.19 |
| 2030 | 1926 | 113.6 | 30.38 | 0.00 | 30.38 | 36.52 | 17.14 | 53.66 | 13.24 | 17.14 |
| 2031 | 2145 | 104.4 | 29.73 | 0.00 | 29.73 | 36.51 | 17.08 | 53.59 | 12.65 | 17.08 |
| 2032 | 2359 | 96.0 | 29.18 | 0.00 | 29.18 | 36.49 | 17.02 | 53.52 | 12.16 | 17.02 |
| 2033 | 2208 | 90.2 | 28.75 | 0.00 | 28.75 | 36.48 | 16.99 | 53.47 | 11.76 | 16.99 |
| 2034 | 2271 | 84.9 | 28.46 | 0.00 | 28.46 | 36.68 | 16.94 | 53.62 | 11.51 | 16.94 |
| 2035 | 2405 | 80.3 | 28.17 | 0.00 | 28.17 | 36.87 | 16.91 | 53.78 | 11.26 | 16.91 |
| 2036 | 2013 | 80.2 | 28.21 | 0.00 | 28.21 | 37.06 | 16.88 | 53.94 | 11.34 | 16.88 |
| 2037 | 1950 | 79.6 | 28.18 | 0.00 | 28.18 | 37.22 | 16.82 | 54.04 | 11.36 | 16.82 |
| 2038 | 1658 | 80.8 | 28.35 | 0.00 | 28.35 | 37.38 | 16.79 | 54.17 | 11.57 | 16.79 |
| 2039 | 1636 | 79.9 | 28.40 | 0.00 | 28.40 | 37.52 | 16.73 | 54.24 | 11.67 | 16.73 |
| 2040 | 1848 | 77.5 | 28.40 | 0.00 | 28.40 | 37.68 | 16.68 | 54.36 | 11.71 | 16.68 |

Table B.3.3 *Pine Large Sawtimber* data for 20% RPS, in million green tons. MT/UWW/LR+SREC_low

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 96.3 | 6.46 | 6.46 | 0.00 | 0.00 | 6.46 | 6.46 | 0.00 | 0.00 |
| 2007 | 88 | 98.5 | 6.10 | 6.10 | 0.00 | 0.00 | 6.10 | 6.10 | 0.00 | 0.00 |
| 2008 | 77 | 100.8 | 5.76 | 5.76 | 0.00 | 0.00 | 5.76 | 5.76 | 0.00 | 0.00 |
| 2009 | 67 | 103.5 | 5.46 | 5.46 | 0.00 | 0.00 | 5.46 | 5.46 | 0.00 | 0.00 |
| 2010 | 57 | 106.7 | 5.13 | 5.13 | 0.00 | 0.00 | 5.13 | 5.13 | 0.00 | 0.00 |
| 2011 | 60 | 110.3 | 5.47 | 5.47 | 0.00 | 0.00 | 5.47 | 5.47 | 0.00 | 0.00 |
| 2012 | 64 | 114.8 | 5.84 | 5.84 | 0.00 | 0.00 | 5.84 | 5.84 | 0.00 | 0.00 |
| 2013 | 68 | 119.1 | 6.23 | 6.23 | 0.00 | 0.00 | 6.23 | 6.23 | 0.00 | 0.00 |
| 2014 | 73 | 123.3 | 6.64 | 6.64 | 0.00 | 0.00 | 6.64 | 6.64 | 0.00 | 0.00 |
| 2015 | 72 | 127.2 | 6.75 | 6.75 | 0.00 | 0.00 | 6.75 | 6.75 | 0.00 | 0.00 |
| 2016 | 89 | 131.2 | 7.77 | 6.46 | 1.31 | 1.31 | 6.87 | 8.18 | 0.90 | 0.41 |
| 2017 | 89 | 134.1 | 7.88 | 6.54 | 1.34 | 1.34 | 6.94 | 8.28 | 0.94 | 0.40 |
| 2018 | 88 | 136.8 | 7.91 | 6.63 | 1.28 | 1.28 | 7.00 | 8.28 | 0.91 | 0.37 |
| 2019 | 122 | 139.5 | 9.54 | 5.86 | 3.69 | 3.69 | 7.05 | 10.74 | 2.50 | 1.19 |
| 2020 | 127 | 140.1 | 9.64 | 5.85 | 3.79 | 3.79 | 7.10 | 10.89 | 2.55 | 1.24 |
| 2021 | 145 | 139.7 | 10.10 | 5.67 | 4.43 | 4.43 | 7.14 | 11.57 | 2.96 | 1.47 |
| 2022 | 155 | 138.8 | 10.14 | 5.70 | 4.44 | 4.44 | 7.19 | 11.63 | 2.95 | 1.48 |
| 2023 | 168 | 136.9 | 10.12 | 5.65 | 4.47 | 4.47 | 7.24 | 11.71 | 2.88 | 1.59 |
| 2024 | 186 | 134.6 | 10.13 | 5.61 | 4.52 | 4.52 | 7.28 | 11.80 | 2.85 | 1.67 |
| 2025 | 210 | 131.1 | 10.07 | 5.51 | 4.56 | 4.56 | 7.32 | 11.88 | 2.74 | 1.81 |
| 2026 | 242 | 127.3 | 9.98 | 5.38 | 4.60 | 4.60 | 7.36 | 11.96 | 2.62 | 1.98 |
| 2027 | 279 | 123.1 | 9.89 | 5.29 | 4.60 | 4.60 | 7.41 | 12.01 | 2.48 | 2.12 |
| 2028 | 324 | 118.4 | 9.76 | 5.17 | 4.59 | 4.59 | 7.44 | 12.03 | 2.32 | 2.27 |
| 2029 | 385 | 113.0 | 9.62 | 5.02 | 4.60 | 4.60 | 7.49 | 12.09 | 2.13 | 2.47 |
| 2030 | 462 | 107.3 | 9.49 | 4.93 | 4.57 | 4.57 | 7.54 | 12.10 | 1.96 | 2.61 |
| 2031 | 546 | 101.4 | 9.33 | 4.76 | 4.56 | 4.56 | 7.58 | 12.14 | 1.75 | 2.82 |
| 2032 | 650 | 95.7 | 9.19 | 4.63 | 4.56 | 4.56 | 7.63 | 12.19 | 1.56 | 3.00 |
| 2033 | 780 | 90.1 | 9.04 | 4.48 | 4.56 | 4.56 | 7.65 | 12.21 | 1.39 | 3.17 |
| 2034 | 914 | 85.2 | 8.88 | 4.29 | 4.58 | 4.58 | 7.69 | 12.28 | 1.18 | 3.40 |
| 2035 | 1066 | 80.6 | 8.77 | 4.16 | 4.61 | 4.61 | 7.72 | 12.33 | 1.05 | 3.56 |
| 2036 | 1207 | 76.6 | 8.66 | 4.03 | 4.63 | 4.63 | 7.74 | 12.37 | 0.92 | 3.71 |
| 2037 | 1370 | 72.7 | 8.55 | 3.90 | 4.65 | 4.65 | 7.76 | 12.41 | 0.79 | 3.87 |
| 2038 | 1485 | 69.1 | 8.42 | 3.75 | 4.67 | 4.67 | 7.76 | 12.43 | 0.66 | 4.01 |
| 2039 | 1605 | 65.8 | 8.27 | 3.58 | 4.69 | 4.69 | 7.78 | 12.47 | 0.49 | 4.20 |
| 2040 | 1760 | 62.8 | 8.17 | 3.46 | 4.71 | 4.71 | 7.78 | 12.49 | 0.39 | 4.32 |

Table B.3.4 *Hardwood Pulpwood* data for 20% RPS, in million green tons.
MT/UWW/LR+SREC_low

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 115.2 | 2.51 | 2.51 | 0.00 | 0.00 | 2.51 | 2.51 | 0.00 | 0.00 |
| 2007 | 88 | 116.3 | 2.34 | 2.34 | 0.00 | 0.00 | 2.34 | 2.34 | 0.00 | 0.00 |
| 2008 | 78 | 117.5 | 2.19 | 2.19 | 0.00 | 0.00 | 2.19 | 2.19 | 0.00 | 0.00 |
| 2009 | 68 | 118.9 | 2.05 | 2.05 | 0.00 | 0.00 | 2.05 | 2.05 | 0.00 | 0.00 |
| 2010 | 59 | 120.4 | 1.92 | 1.92 | 0.00 | 0.00 | 1.92 | 1.92 | 0.00 | 0.00 |
| 2011 | 65 | 122.0 | 2.04 | 2.04 | 0.00 | 0.00 | 2.04 | 2.04 | 0.00 | 0.00 |
| 2012 | 71 | 123.6 | 2.17 | 2.17 | 0.00 | 0.00 | 2.17 | 2.17 | 0.00 | 0.00 |
| **2013** | 78 | 125.1 | 2.30 | 2.30 | 0.00 | 0.00 | 2.30 | 2.30 | 0.00 | 0.00 |
| 2014 | 86 | 126.5 | 2.44 | 2.44 | 0.00 | 0.00 | 2.44 | 2.44 | 0.00 | 0.00 |
| 2015 | 86 | 127.8 | 2.46 | 2.46 | 0.00 | 0.00 | 2.46 | 2.46 | 0.00 | 0.00 |
| 2016 | 128 | 129.1 | 3.11 | 2.07 | 1.05 | 1.05 | 2.47 | 3.52 | 0.65 | 0.40 |
| 2017 | 130 | 130.0 | 3.16 | 2.08 | 1.07 | 1.07 | 2.48 | 3.55 | 0.67 | 0.40 |
| 2018 | 129 | 130.9 | 3.14 | 2.12 | 1.02 | 1.02 | 2.49 | 3.51 | 0.65 | 0.37 |
| 2019 | 202 | 131.8 | 4.15 | 1.20 | 2.95 | 2.95 | 2.49 | 5.44 | 1.66 | 1.29 |
| 2020 | 209 | 131.7 | 4.20 | 1.17 | 3.03 | 3.03 | 2.49 | 5.53 | 1.71 | 1.33 |
| 2021 | 236 | 131.6 | 4.48 | 0.93 | 3.54 | 3.54 | 2.50 | 6.04 | 1.98 | 1.56 |
| 2022 | 241 | 131.5 | 4.49 | 0.93 | 3.55 | 3.55 | 2.50 | 6.05 | 1.99 | 1.56 |
| 2023 | 241 | 131.9 | 4.48 | 0.90 | 3.58 | 3.58 | 2.51 | 6.09 | 1.97 | 1.60 |
| 2024 | 249 | 131.6 | 4.51 | 0.89 | 3.62 | 3.62 | 2.51 | 6.12 | 2.00 | 1.62 |
| 2025 | 254 | 131.3 | 4.51 | 0.87 | 3.64 | 3.64 | 2.50 | 6.15 | 2.01 | 1.64 |
| 2026 | 261 | 131.0 | 4.53 | 0.85 | 3.68 | 3.68 | 2.50 | 6.18 | 2.03 | 1.65 |
| 2027 | 266 | 130.7 | 4.52 | 0.84 | 3.68 | 3.68 | 2.50 | 6.18 | 2.02 | 1.66 |
| 2028 | 271 | 130.4 | 4.53 | 0.85 | 3.67 | 3.67 | 2.50 | 6.18 | 2.02 | 1.65 |
| 2029 | 277 | 130.0 | 4.53 | 0.85 | 3.68 | 3.68 | 2.50 | 6.18 | 2.03 | 1.65 |
| 2030 | 287 | 129.0 | 4.52 | 0.86 | 3.65 | 3.65 | 2.50 | 6.16 | 2.01 | 1.64 |
| 2031 | 297 | 127.8 | 4.50 | 0.84 | 3.65 | 3.65 | 2.50 | 6.16 | 1.99 | 1.66 |
| 2032 | 307 | 126.6 | 4.47 | 0.82 | 3.65 | 3.65 | 2.50 | 6.15 | 1.97 | 1.68 |
| 2033 | 321 | 125.0 | 4.46 | 0.81 | 3.65 | 3.65 | 2.50 | 6.15 | 1.96 | 1.69 |
| 2034 | 337 | 123.8 | 4.47 | 0.80 | 3.67 | 3.67 | 2.51 | 6.17 | 1.97 | 1.70 |
| 2035 | 352 | 122.7 | 4.47 | 0.78 | 3.69 | 3.69 | 2.51 | 6.20 | 1.96 | 1.73 |
| 2036 | 367 | 121.7 | 4.46 | 0.75 | 3.71 | 3.71 | 2.51 | 6.22 | 1.95 | 1.76 |
| 2037 | 381 | 120.8 | 4.45 | 0.73 | 3.72 | 3.72 | 2.51 | 6.23 | 1.94 | 1.78 |
| 2038 | 391 | 120.2 | 4.45 | 0.71 | 3.74 | 3.74 | 2.51 | 6.25 | 1.94 | 1.80 |
| 2039 | 405 | 119.4 | 4.45 | 0.70 | 3.75 | 3.75 | 2.52 | 6.27 | 1.93 | 1.82 |
| 2040 | 422 | 118.4 | 4.45 | 0.69 | 3.77 | 3.77 | 2.52 | 6.29 | 1.94 | 1.83 |

Table B.3.5 *Hardwood Sawtimber* data for 20% RPS, in million green tons. MT/UWW/LR+SREC_low

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 110.0 | 2.09 | 2.09 | 0.00 | 0.00 | 2.09 | 2.09 | 0.00 | 0.00 |
| 2007 | 86 | 111.6 | 1.96 | 1.96 | 0.00 | 0.00 | 1.96 | 1.96 | 0.00 | 0.00 |
| 2008 | 73 | 113.2 | 1.84 | 1.84 | 0.00 | 0.00 | 1.84 | 1.84 | 0.00 | 0.00 |
| 2009 | 62 | 115.0 | 1.73 | 1.73 | 0.00 | 0.00 | 1.73 | 1.73 | 0.00 | 0.00 |
| 2010 | 53 | 116.9 | 1.63 | 1.63 | 0.00 | 0.00 | 1.63 | 1.63 | 0.00 | 0.00 |
| 2011 | 59 | 118.9 | 1.73 | 1.73 | 0.00 | 0.00 | 1.73 | 1.73 | 0.00 | 0.00 |
| 2012 | 65 | 120.9 | 1.84 | 1.84 | 0.00 | 0.00 | 1.84 | 1.84 | 0.00 | 0.00 |
| **2013** | 72 | 122.7 | 1.95 | 1.95 | 0.00 | 0.00 | 1.95 | 1.95 | 0.00 | 0.00 |
| 2014 | 80 | 124.5 | 2.07 | 2.07 | 0.00 | 0.00 | 2.07 | 2.07 | 0.00 | 0.00 |
| 2015 | 79 | 126.2 | 2.08 | 2.08 | 0.00 | 0.00 | 2.08 | 2.08 | 0.00 | 0.00 |
| 2016 | 94 | 127.9 | 2.27 | 2.01 | 0.26 | 0.26 | 2.09 | 2.35 | 0.18 | 0.08 |
| 2017 | 94 | 129.3 | 2.29 | 2.02 | 0.27 | 0.27 | 2.11 | 2.37 | 0.18 | 0.09 |
| 2018 | 92 | 130.7 | 2.28 | 2.03 | 0.26 | 0.26 | 2.11 | 2.37 | 0.17 | 0.09 |
| 2019 | 118 | 132.2 | 2.58 | 1.84 | 0.74 | 0.74 | 2.12 | 2.86 | 0.46 | 0.28 |
| 2020 | 120 | 133.0 | 2.60 | 1.84 | 0.76 | 0.76 | 2.12 | 2.88 | 0.48 | 0.28 |
| 2021 | 127 | 133.8 | 2.67 | 1.78 | 0.89 | 0.89 | 2.12 | 3.01 | 0.54 | 0.34 |
| 2022 | 126 | 134.6 | 2.66 | 1.77 | 0.89 | 0.89 | 2.13 | 3.02 | 0.53 | 0.35 |
| 2023 | 125 | 135.5 | 2.66 | 1.77 | 0.89 | 0.89 | 2.14 | 3.03 | 0.53 | 0.37 |
| 2024 | 127 | 136.2 | 2.67 | 1.77 | 0.90 | 0.90 | 2.14 | 3.04 | 0.54 | 0.37 |
| 2025 | 129 | 136.7 | 2.69 | 1.78 | 0.91 | 0.91 | 2.14 | 3.05 | 0.56 | 0.36 |
| 2026 | 132 | 137.1 | 2.71 | 1.79 | 0.92 | 0.92 | 2.14 | 3.06 | 0.57 | 0.35 |
| 2027 | 133 | 137.5 | 2.71 | 1.79 | 0.92 | 0.92 | 2.14 | 3.06 | 0.57 | 0.35 |
| 2028 | 135 | 137.9 | 2.72 | 1.80 | 0.92 | 0.92 | 2.14 | 3.06 | 0.58 | 0.34 |
| 2029 | 137 | 138.1 | 2.72 | 1.80 | 0.92 | 0.92 | 2.15 | 3.07 | 0.57 | 0.35 |
| 2030 | 142 | 137.6 | 2.72 | 1.81 | 0.91 | 0.91 | 2.15 | 3.07 | 0.57 | 0.34 |

* Note: the table is abbreviated to 2030 in order to save space for the graphs below.

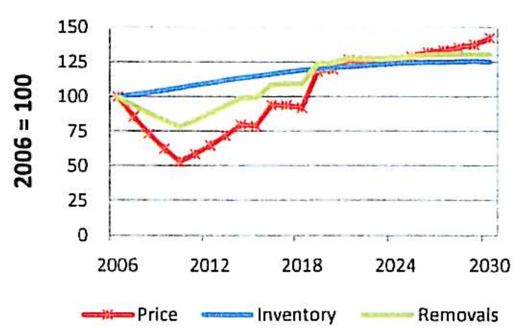


Figure B.3a SRTS output for *Hardwood Sawtimber*, MT/UWW/LR+ SREC_low.

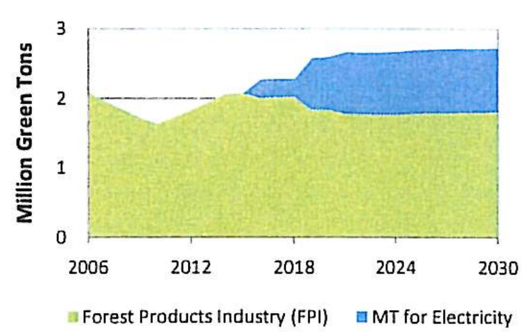


Figure B.3b Allocation of *Hardwood Sawtimber* supply (20% RPS).

**MT/UWW/LR+SREC_high**

Table B.4.1 Aggregated supply of woody biomass used for electricity, in million green tons. 20% RPS (MT/UWW/LR+SREC_high).

| Year | New Removals | Displaced from FPI | Urban Wood Waste | Logging Residues | SREC (high) |
|---|---|---|---|---|---|
| 2012 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **2013** | 0.00 | 0.00 | 2.39 | 2.62 | 13.31 |
| 2014 | 0.00 | 0.00 | 2.41 | 2.79 | 17.99 |
| 2015 | 0.00 | 0.00 | 2.44 | 2.82 | 22.68 |
| 2016 | 0.00 | 0.00 | 2.48 | 2.85 | 27.37 |
| 2017 | 0.00 | 0.00 | 2.51 | 2.87 | 32.05 |
| 2018 | 0.00 | 0.00 | 2.54 | 2.89 | 36.74 |
| 2019 | 2.13 | 0.69 | 2.58 | 3.28 | 41.43 |
| 2020 | 0.00 | 0.13 | 2.61 | 3.04 | 46.11 |
| 2021 | 4.90 | 2.29 | 2.64 | 3.58 | 46.11 |
| 2022 | 5.00 | 2.54 | 2.67 | 3.61 | 46.11 |
| 2023 | 5.23 | 2.90 | 2.71 | 3.65 | 46.11 |
| 2024 | 5.58 | 3.28 | 2.74 | 3.69 | 46.11 |
| 2025 | 5.89 | 3.53 | 2.77 | 3.72 | 46.11 |
| 2026 | 6.23 | 3.84 | 2.80 | 3.75 | 46.11 |
| 2027 | 6.36 | 4.00 | 2.83 | 3.77 | 46.11 |
| 2028 | 6.47 | 4.09 | 2.86 | 3.76 | 46.11 |
| 2029 | 6.62 | 4.30 | 2.89 | 3.77 | 46.11 |
| 2030 | 6.42 | 4.46 | 2.92 | 3.73 | 46.11 |
| 2031 | 6.52 | 4.64 | 2.95 | 3.73 | 46.11 |
| 2032 | 6.56 | 4.86 | 2.98 | 3.71 | 46.11 |
| 2033 | 6.56 | 5.10 | 3.01 | 3.72 | 46.11 |
| 2034 | 6.52 | 5.39 | 3.03 | 3.70 | 46.11 |
| 2035 | 6.41 | 5.76 | 3.06 | 3.68 | 46.11 |
| 2036 | 6.22 | 6.18 | 3.09 | 3.66 | 46.11 |
| 2037 | 6.15 | 6.48 | 3.12 | 3.65 | 46.11 |
| 2038 | 5.98 | 6.88 | 3.15 | 3.63 | 46.11 |
| 2039 | 5.98 | 7.10 | 3.18 | 3.61 | 46.11 |
| 2040 | 5.96 | 7.33 | 3.21 | 3.59 | 46.11 |

Table B.4.2 *Pine Roundwood* data for 20% RPS, in million green tons.
MT/UWW/LR+SREC_high

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 231.8 | 16.55 | 16.55 | 0.00 | 0.00 | 16.55 | 16.55 | 0.00 | 0.00 |
| 2007 | 89 | 236.3 | 15.40 | 15.40 | 0.00 | 0.00 | 15.40 | 15.40 | 0.00 | 0.00 |
| 2008 | 78 | 242.1 | 14.39 | 14.39 | 0.00 | 0.00 | 14.39 | 14.39 | 0.00 | 0.00 |
| 2009 | 68 | 248.8 | 13.49 | 13.49 | 0.00 | 0.00 | 13.49 | 13.49 | 0.00 | 0.00 |
| 2010 | 59 | 256.5 | 12.68 | 12.68 | 0.00 | 0.00 | 12.68 | 12.68 | 0.00 | 0.00 |
| 2011 | 63 | 265.3 | 13.60 | 13.60 | 0.00 | 0.00 | 13.60 | 13.60 | 0.00 | 0.00 |
| 2012 | 67 | 272.5 | 14.56 | 14.56 | 0.00 | 0.00 | 14.56 | 14.56 | 0.00 | 0.00 |
| **2013** | 72 | 278.9 | 15.57 | 15.57 | 0.00 | 0.00 | 15.57 | 15.57 | 0.00 | 0.00 |
| 2014 | 77 | 284.3 | 16.63 | 16.63 | 0.00 | 0.00 | 16.63 | 16.63 | 0.00 | 0.00 |
| 2015 | 77 | 288.8 | 16.76 | 16.76 | 0.00 | 0.00 | 16.76 | 16.76 | 0.00 | 0.00 |
| 2016 | 76 | 293.3 | 16.90 | 16.90 | 0.00 | 0.00 | 16.90 | 16.90 | 0.00 | 0.00 |
| 2017 | 76 | 296.9 | 17.05 | 17.05 | 0.00 | 0.00 | 17.05 | 17.05 | 0.00 | 0.00 |
| 2018 | 75 | 300.1 | 17.14 | 17.14 | 0.00 | 0.00 | 17.14 | 17.14 | 0.00 | 0.00 |
| 2019 | 86 | 302.9 | 18.88 | 16.63 | 2.25 | 2.25 | 17.17 | 19.43 | 1.70 | 0.55 |
| 2020 | 73 | 303.7 | 17.09 | 17.09 | 0.00 | 0.00 | 17.21 | 17.21 | 0.00 | 0.12 |
| 2021 | 100 | 306.2 | 21.10 | 15.35 | 5.75 | 5.75 | 17.25 | 22.99 | 3.85 | 1.90 |
| 2022 | 102 | 304.4 | 21.22 | 15.18 | 6.04 | 6.04 | 17.29 | 23.33 | 3.93 | 2.11 |
| 2023 | 107 | 298.3 | 21.36 | 14.86 | 6.50 | 6.50 | 17.26 | 23.76 | 4.10 | 2.40 |
| 2024 | 111 | 295.1 | 21.71 | 14.62 | 7.09 | 7.09 | 17.32 | 24.41 | 4.39 | 2.70 |
| 2025 | 117 | 290.3 | 21.98 | 14.44 | 7.54 | 7.54 | 17.32 | 24.86 | 4.66 | 2.88 |
| 2026 | 124 | 284.0 | 22.25 | 14.20 | 8.05 | 8.05 | 17.30 | 25.35 | 4.95 | 3.10 |
| 2027 | 131 | 277.6 | 22.37 | 14.08 | 8.29 | 8.29 | 17.27 | 25.56 | 5.10 | 3.19 |
| 2028 | 139 | 270.2 | 22.40 | 13.95 | 8.45 | 8.45 | 17.24 | 25.69 | 5.16 | 3.29 |
| 2029 | 149 | 261.9 | 22.51 | 13.78 | 8.73 | 8.73 | 17.19 | 25.92 | 5.32 | 3.41 |
| 2030 | 158 | 253.0 | 22.30 | 13.59 | 8.71 | 8.71 | 17.14 | 25.84 | 5.16 | 3.54 |
| 2031 | 170 | 244.4 | 22.32 | 13.39 | 8.92 | 8.92 | 17.08 | 26.00 | 5.23 | 3.69 |
| 2032 | 183 | 236.0 | 22.31 | 13.17 | 9.14 | 9.14 | 17.02 | 26.16 | 5.29 | 3.85 |
| 2033 | 196 | 227.9 | 22.28 | 12.95 | 9.33 | 9.33 | 16.99 | 26.32 | 5.29 | 4.04 |
| 2034 | 213 | 219.2 | 22.20 | 12.67 | 9.53 | 9.53 | 16.94 | 26.47 | 5.26 | 4.27 |
| 2035 | 231 | 210.6 | 22.03 | 12.30 | 9.73 | 9.73 | 16.91 | 26.64 | 5.12 | 4.61 |
| 2036 | 250 | 202.4 | 21.85 | 11.93 | 9.92 | 9.92 | 16.88 | 26.80 | 4.98 | 4.95 |
| 2037 | 277 | 193.6 | 21.76 | 11.66 | 10.11 | 10.11 | 16.82 | 26.93 | 4.94 | 5.17 |
| 2038 | 300 | 186.0 | 21.57 | 11.29 | 10.29 | 10.29 | 16.79 | 27.07 | 4.79 | 5.50 |
| 2039 | 329 | 178.8 | 21.55 | 11.08 | 10.46 | 10.46 | 16.73 | 27.19 | 4.82 | 5.64 |
| 2040 | 363 | 171.5 | 21.50 | 10.87 | 10.63 | 10.63 | 16.68 | 27.31 | 4.82 | 5.81 |

Table B.4.3 *Pine Large Sawtimber* data for 20% RPS, in million green tons. MT/UWW/LR+SREC_high

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 96.3 | 6.46 | 6.46 | 0.00 | 0.00 | 6.46 | 6.46 | 0.00 | 0.00 |
| 2007 | 88 | 98.5 | 6.10 | 6.10 | 0.00 | 0.00 | 6.10 | 6.10 | 0.00 | 0.00 |
| 2008 | 77 | 100.8 | 5.76 | 5.76 | 0.00 | 0.00 | 5.76 | 5.76 | 0.00 | 0.00 |
| 2009 | 67 | 103.5 | 5.46 | 5.46 | 0.00 | 0.00 | 5.46 | 5.46 | 0.00 | 0.00 |
| 2010 | 57 | 106.7 | 5.13 | 5.13 | 0.00 | 0.00 | 5.13 | 5.13 | 0.00 | 0.00 |
| 2011 | 60 | 110.3 | 5.47 | 5.47 | 0.00 | 0.00 | 5.47 | 5.47 | 0.00 | 0.00 |
| 2012 | 64 | 114.8 | 5.84 | 5.84 | 0.00 | 0.00 | 5.84 | 5.84 | 0.00 | 0.00 |
| **2013** | 68 | 119.1 | 6.23 | 6.23 | 0.00 | 0.00 | 6.23 | 6.23 | 0.00 | 0.00 |
| 2014 | 73 | 123.3 | 6.64 | 6.64 | 0.00 | 0.00 | 6.64 | 6.64 | 0.00 | 0.00 |
| 2015 | 72 | 127.2 | 6.75 | 6.75 | 0.00 | 0.00 | 6.75 | 6.75 | 0.00 | 0.00 |
| 2016 | 71 | 131.2 | 6.87 | 6.87 | 0.00 | 0.00 | 6.87 | 6.87 | 0.00 | 0.00 |
| 2017 | 69 | 135.1 | 6.94 | 6.94 | 0.00 | 0.00 | 6.94 | 6.94 | 0.00 | 0.00 |
| 2018 | 66 | 139.2 | 7.00 | 7.00 | 0.00 | 0.00 | 7.00 | 7.00 | 0.00 | 0.00 |
| 2019 | 67 | 143.4 | 7.27 | 6.99 | 0.28 | 0.28 | 7.05 | 7.33 | 0.22 | 0.06 |
| 2020 | 61 | 147.5 | 7.09 | 7.09 | 0.00 | 0.00 | 7.10 | 7.10 | 0.00 | 0.01 |
| 2021 | 68 | 151.6 | 7.70 | 6.99 | 0.72 | 0.72 | 7.14 | 7.86 | 0.56 | 0.15 |
| 2022 | 66 | 155.4 | 7.76 | 7.00 | 0.75 | 0.75 | 7.19 | 7.94 | 0.57 | 0.18 |
| 2023 | 65 | 159.1 | 7.83 | 7.01 | 0.81 | 0.81 | 7.24 | 8.05 | 0.59 | 0.22 |
| 2024 | 64 | 162.6 | 7.90 | 7.01 | 0.89 | 0.89 | 7.28 | 8.17 | 0.62 | 0.27 |
| 2025 | 63 | 165.9 | 7.95 | 7.00 | 0.94 | 0.94 | 7.32 | 8.26 | 0.63 | 0.32 |
| 2026 | 62 | 169.0 | 8.00 | 6.99 | 1.01 | 1.01 | 7.36 | 8.37 | 0.64 | 0.37 |
| 2027 | 61 | 171.3 | 8.02 | 6.98 | 1.04 | 1.04 | 7.41 | 8.44 | 0.61 | 0.42 |
| 2028 | 62 | 173.1 | 8.10 | 7.04 | 1.06 | 1.06 | 7.44 | 8.50 | 0.66 | 0.40 |
| 2029 | 61 | 175.0 | 8.11 | 7.02 | 1.09 | 1.09 | 7.49 | 8.58 | 0.62 | 0.47 |
| 2030 | 61 | 176.4 | 8.13 | 7.05 | 1.09 | 1.09 | 7.54 | 8.62 | 0.60 | 0.49 |
| 2031 | 62 | 177.4 | 8.19 | 7.08 | 1.12 | 1.12 | 7.58 | 8.69 | 0.61 | 0.50 |
| 2032 | 63 | 177.5 | 8.22 | 7.08 | 1.14 | 1.14 | 7.63 | 8.77 | 0.60 | 0.55 |
| 2033 | 65 | 176.8 | 8.24 | 7.08 | 1.17 | 1.17 | 7.65 | 8.82 | 0.59 | 0.58 |
| 2034 | 68 | 176.0 | 8.27 | 7.08 | 1.19 | 1.19 | 7.69 | 8.88 | 0.57 | 0.62 |
| 2035 | 71 | 174.8 | 8.31 | 7.09 | 1.22 | 1.22 | 7.72 | 8.94 | 0.59 | 0.63 |
| 2036 | 73 | 173.2 | 8.29 | 7.04 | 1.24 | 1.24 | 7.74 | 8.98 | 0.54 | 0.70 |
| 2037 | 76 | 171.2 | 8.27 | 7.01 | 1.26 | 1.26 | 7.76 | 9.03 | 0.51 | 0.76 |
| 2038 | 81 | 168.6 | 8.24 | 6.96 | 1.29 | 1.29 | 7.76 | 9.04 | 0.49 | 0.80 |
| 2039 | 86 | 165.5 | 8.22 | 6.91 | 1.31 | 1.31 | 7.78 | 9.08 | 0.44 | 0.86 |
| 2040 | 92 | 162.1 | 8.20 | 6.87 | 1.33 | 1.33 | 7.78 | 9.11 | 0.42 | 0.91 |

Table B.4.4 *Hardwood Pulpwood* data for 20% RPS, in million green tons.
MT/UWW/LR+SREC_high

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 115.2 | 2.51 | 2.51 | 0.00 | 0.00 | 2.51 | 2.51 | 0.00 | 0.00 |
| 2007 | 88 | 116.3 | 2.34 | 2.34 | 0.00 | 0.00 | 2.34 | 2.34 | 0.00 | 0.00 |
| 2008 | 78 | 117.5 | 2.19 | 2.19 | 0.00 | 0.00 | 2.19 | 2.19 | 0.00 | 0.00 |
| 2009 | 68 | 118.9 | 2.05 | 2.05 | 0.00 | 0.00 | 2.05 | 2.05 | 0.00 | 0.00 |
| 2010 | 59 | 120.4 | 1.92 | 1.92 | 0.00 | 0.00 | 1.92 | 1.92 | 0.00 | 0.00 |
| 2011 | 65 | 122.0 | 2.04 | 2.04 | 0.00 | 0.00 | 2.04 | 2.04 | 0.00 | 0.00 |
| 2012 | 71 | 123.6 | 2.17 | 2.17 | 0.00 | 0.00 | 2.17 | 2.17 | 0.00 | 0.00 |
| 2013 | 78 | 125.1 | 2.30 | 2.30 | 0.00 | 0.00 | 2.30 | 2.30 | 0.00 | 0.00 |
| 2014 | 86 | 126.5 | 2.44 | 2.44 | 0.00 | 0.00 | 2.44 | 2.44 | 0.00 | 0.00 |
| 2015 | 86 | 127.8 | 2.46 | 2.46 | 0.00 | 0.00 | 2.46 | 2.46 | 0.00 | 0.00 |
| 2016 | 86 | 129.1 | 2.47 | 2.47 | 0.00 | 0.00 | 2.47 | 2.47 | 0.00 | 0.00 |
| 2017 | 85 | 130.6 | 2.48 | 2.48 | 0.00 | 0.00 | 2.48 | 2.48 | 0.00 | 0.00 |
| 2018 | 84 | 132.1 | 2.49 | 2.49 | 0.00 | 0.00 | 2.49 | 2.49 | 0.00 | 0.00 |
| 2019 | 93 | 133.7 | 2.65 | 2.43 | 0.23 | 0.23 | 2.49 | 2.72 | 0.16 | 0.06 |
| 2020 | 82 | 135.1 | 2.49 | 2.49 | 0.00 | 0.00 | 2.49 | 2.49 | 0.00 | 0.00 |
| 2021 | 104 | 136.7 | 2.88 | 2.31 | 0.57 | 0.57 | 2.50 | 3.07 | 0.39 | 0.19 |
| 2022 | 104 | 138.0 | 2.90 | 2.29 | 0.60 | 0.60 | 2.50 | 3.10 | 0.40 | 0.20 |
| 2023 | 104 | 139.7 | 2.94 | 2.29 | 0.65 | 0.65 | 2.51 | 3.16 | 0.43 | 0.22 |
| 2024 | 106 | 140.7 | 2.97 | 2.26 | 0.71 | 0.71 | 2.51 | 3.21 | 0.46 | 0.25 |
| 2025 | 107 | 141.7 | 2.99 | 2.24 | 0.75 | 0.75 | 2.50 | 3.26 | 0.49 | 0.27 |
| 2026 | 108 | 142.6 | 3.02 | 2.21 | 0.81 | 0.81 | 2.50 | 3.31 | 0.51 | 0.29 |
| 2027 | 108 | 143.5 | 3.02 | 2.19 | 0.83 | 0.83 | 2.50 | 3.33 | 0.52 | 0.31 |
| 2028 | 107 | 144.7 | 3.03 | 2.18 | 0.85 | 0.85 | 2.50 | 3.35 | 0.52 | 0.32 |
| 2029 | 108 | 145.7 | 3.04 | 2.17 | 0.87 | 0.87 | 2.50 | 3.38 | 0.54 | 0.34 |
| 2030 | 107 | 146.8 | 3.03 | 2.16 | 0.87 | 0.87 | 2.50 | 3.37 | 0.53 | 0.34 |
| 2031 | 106 | 147.9 | 3.04 | 2.15 | 0.89 | 0.89 | 2.50 | 3.40 | 0.54 | 0.35 |
| 2032 | 106 | 149.0 | 3.05 | 2.14 | 0.91 | 0.91 | 2.50 | 3.42 | 0.55 | 0.37 |
| 2033 | 106 | 149.9 | 3.06 | 2.12 | 0.93 | 0.93 | 2.50 | 3.44 | 0.55 | 0.38 |
| 2034 | 106 | 150.9 | 3.06 | 2.11 | 0.95 | 0.95 | 2.51 | 3.46 | 0.56 | 0.40 |
| 2035 | 106 | 151.9 | 3.07 | 2.10 | 0.97 | 0.97 | 2.51 | 3.48 | 0.56 | 0.41 |
| 2036 | 106 | 152.8 | 3.08 | 2.09 | 0.99 | 0.99 | 2.51 | 3.50 | 0.57 | 0.42 |
| 2037 | 106 | 153.7 | 3.08 | 2.07 | 1.01 | 1.01 | 2.51 | 3.52 | 0.57 | 0.44 |
| 2038 | 106 | 154.6 | 3.09 | 2.06 | 1.03 | 1.03 | 2.51 | 3.54 | 0.58 | 0.45 |
| 2039 | 105 | 155.5 | 3.10 | 2.05 | 1.05 | 1.05 | 2.52 | 3.56 | 0.58 | 0.46 |
| 2040 | 105 | 156.4 | 3.10 | 2.04 | 1.06 | 1.06 | 2.52 | 3.58 | 0.59 | 0.48 |

Table B.4.5 *Hardwood Sawtimber* data for 20% RPS, in million green tons. MT/UWW/LR+SREC_high

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 110.0 | 2.09 | 2.09 | 0.00 | 0.00 | 2.09 | 2.09 | 0.00 | 0.00 |
| 2007 | 86 | 111.6 | 1.96 | 1.96 | 0.00 | 0.00 | 1.96 | 1.96 | 0.00 | 0.00 |
| 2008 | 73 | 113.2 | 1.84 | 1.84 | 0.00 | 0.00 | 1.84 | 1.84 | 0.00 | 0.00 |
| 2009 | 62 | 115.0 | 1.73 | 1.73 | 0.00 | 0.00 | 1.73 | 1.73 | 0.00 | 0.00 |
| 2010 | 53 | 116.9 | 1.63 | 1.63 | 0.00 | 0.00 | 1.63 | 1.63 | 0.00 | 0.00 |
| 2011 | 59 | 118.9 | 1.73 | 1.73 | 0.00 | 0.00 | 1.73 | 1.73 | 0.00 | 0.00 |
| 2012 | 65 | 120.9 | 1.84 | 1.84 | 0.00 | 0.00 | 1.84 | 1.84 | 0.00 | 0.00 |
| **2013** | 72 | 122.7 | 1.95 | 1.95 | 0.00 | 0.00 | 1.95 | 1.95 | 0.00 | 0.00 |
| 2014 | 80 | 124.5 | 2.07 | 2.07 | 0.00 | 0.00 | 2.07 | 2.07 | 0.00 | 0.00 |
| 2015 | 79 | 126.2 | 2.08 | 2.08 | 0.00 | 0.00 | 2.08 | 2.08 | 0.00 | 0.00 |
| 2016 | 79 | 127.9 | 2.09 | 2.09 | 0.00 | 0.00 | 2.09 | 2.09 | 0.00 | 0.00 |
| 2017 | 78 | 129.6 | 2.11 | 2.11 | 0.00 | 0.00 | 2.11 | 2.11 | 0.00 | 0.00 |
| 2018 | 77 | 131.3 | 2.11 | 2.11 | 0.00 | 0.00 | 2.11 | 2.11 | 0.00 | 0.00 |
| 2019 | 78 | 133.1 | 2.16 | 2.10 | 0.06 | 0.06 | 2.12 | 2.17 | 0.04 | 0.02 |
| 2020 | 74 | 134.8 | 2.12 | 2.12 | 0.00 | 0.00 | 2.12 | 2.12 | 0.00 | 0.00 |
| 2021 | 80 | 136.6 | 2.22 | 2.08 | 0.14 | 0.14 | 2.12 | 2.27 | 0.10 | 0.05 |
| 2022 | 79 | 138.2 | 2.23 | 2.08 | 0.15 | 0.15 | 2.13 | 2.28 | 0.10 | 0.05 |
| 2023 | 78 | 139.9 | 2.24 | 2.08 | 0.16 | 0.16 | 2.14 | 2.30 | 0.11 | 0.05 |
| 2024 | 78 | 141.3 | 2.25 | 2.08 | 0.18 | 0.18 | 2.14 | 2.31 | 0.12 | 0.06 |
| 2025 | 77 | 142.7 | 2.26 | 2.07 | 0.19 | 0.19 | 2.14 | 2.33 | 0.12 | 0.07 |
| 2026 | 77 | 144.1 | 2.27 | 2.07 | 0.20 | 0.20 | 2.14 | 2.34 | 0.13 | 0.07 |
| 2027 | 76 | 145.5 | 2.27 | 2.06 | 0.21 | 0.21 | 2.14 | 2.35 | 0.13 | 0.08 |
| 2028 | 75 | 147.0 | 2.28 | 2.06 | 0.21 | 0.21 | 2.14 | 2.36 | 0.13 | 0.08 |
| 2029 | 74 | 148.5 | 2.28 | 2.06 | 0.22 | 0.22 | 2.15 | 2.37 | 0.13 | 0.09 |
| 2030 | 73 | 150.0 | 2.28 | 2.06 | 0.22 | 0.22 | 2.15 | 2.37 | 0.13 | 0.09 |

* Note: the table is abbreviated to 2030 in order to save space for the graphs below.

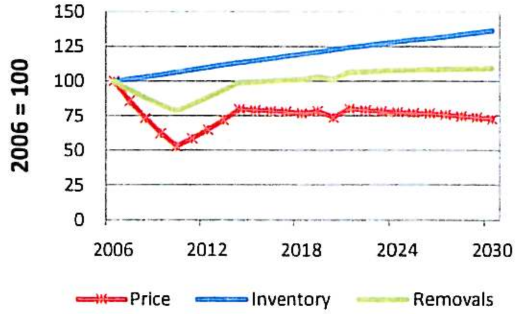


Figure B.4a SRTS output for *Hardwood Sawtimber*, MT/UWW/LR+ SREC_high.

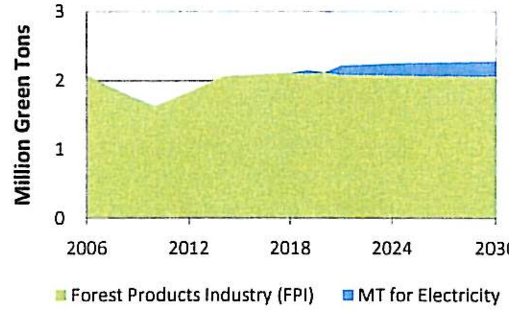


Figure B.4b Allocation of *Hardwood Sawtimber* supply (20% RPS).

APPENDIX C

## Supporting Data for the *High ORES* RPS Projections of Section 5

### MT Scenario (*High ORES*)

Table C.1.1 Aggregated supply of merchantable timber (MT, *High ORES*) used for electricity, in million green tons.

| | 12% RPS (*High ORES*) | | 20% RPS (*High ORES*) | |
|---|---|---|---|---|
| Year | New Removals | Displaced from FPI | New Removals | Displaced from FPI |
| 2012 | 0.00 | 0.00 | 0.00 | 0.00 |
| **2013** | 2.75 | 1.22 | 2.75 | 1.22 |
| 2014 | 2.78 | 1.45 | 2.78 | 1.45 |
| 2015 | 3.07 | 1.46 | 3.07 | 1.46 |
| 2016 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2017 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2018 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2019 | 0.00 | 0.00 | 9.70 | 7.96 |
| 2020 | 0.00 | 0.00 | 10.51 | 8.61 |
| 2021 | 0.00 | 0.00 | 15.59 | 12.51 |
| 2022 | 0.00 | 0.00 | 15.96 | 13.18 |
| 2023 | 0.00 | 0.00 | 16.45 | 13.91 |
| 2024 | 0.00 | 0.00 | 16.76 | 14.97 |
| 2025 | 0.00 | 0.01 | 17.07 | 15.82 |
| 2026 | 0.57 | 0.83 | 17.39 | 16.73 |
| 2027 | 1.21 | 1.02 | 17.40 | 17.55 |
| 2028 | 1.76 | 1.22 | 17.00 | 18.68 |
| 2029 | 2.34 | 1.47 | 16.86 | 19.67 |
| 2030 | 2.70 | 1.66 | 16.17 | 20.39 |
| 2031 | 3.21 | 1.88 | 15.99 | 20.52 |
| 2032 | 3.67 | 2.12 | 15.69 | 20.70 |
| 2033 | 4.03 | 2.45 | 15.46 | 20.91 |
| 2034 | 4.51 | 2.64 | 15.27 | 21.10 |
| 2035 | 4.92 | 2.87 | 14.91 | 21.32 |
| 2036 | 5.28 | 3.13 | 14.58 | 21.51 |
| 2037 | 5.57 | 3.44 | 14.30 | 21.69 |
| 2038 | 5.80 | 3.80 | 14.18 | 21.83 |
| 2039 | 5.96 | 4.21 | 14.00 | 21.98 |
| 2040 | 6.12 | 4.60 | 14.05 | 22.15 |

Table C.1.2 *Pine Roundwood* data for 20% RPS (MT, *High ORES* ), in million green tons.

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 231.8 | 16.55 | 16.55 | 0.00 | 0.00 | 16.55 | 16.55 | 0.00 | 0.00 |
| 2007 | 89 | 236.3 | 15.40 | 15.40 | 0.00 | 0.00 | 15.40 | 15.40 | 0.00 | 0.00 |
| 2008 | 78 | 242.1 | 14.39 | 14.39 | 0.00 | 0.00 | 14.39 | 14.39 | 0.00 | 0.00 |
| 2009 | 68 | 248.8 | 13.49 | 13.49 | 0.00 | 0.00 | 13.49 | 13.49 | 0.00 | 0.00 |
| 2010 | 59 | 256.5 | 12.68 | 12.68 | 0.00 | 0.00 | 12.68 | 12.68 | 0.00 | 0.00 |
| 2011 | 63 | 265.3 | 13.60 | 13.60 | 0.00 | 0.00 | 13.60 | 13.60 | 0.00 | 0.00 |
| 2012 | 67 | 272.5 | 14.56 | 14.56 | 0.00 | 0.00 | 14.56 | 14.56 | 0.00 | 0.00 |
| **2013** | 87 | 278.9 | 17.73 | 14.56 | 3.18 | 3.18 | 15.57 | 18.75 | 2.16 | 1.01 |
| 2014 | 94 | 282.2 | 18.81 | 15.43 | 3.38 | 3.38 | 16.63 | 20.01 | 2.18 | 1.20 |
| 2015 | 97 | 284.5 | 19.19 | 15.57 | 3.62 | 3.62 | 16.76 | 20.38 | 2.43 | 1.19 |
| 2016 | 75 | 286.4 | 16.32 | 16.90 | 0.00 | 0.00 | 16.90 | 16.90 | 0.00 | 0.00 |
| 2017 | 75 | 290.3 | 16.48 | 17.05 | 0.00 | 0.00 | 17.05 | 17.05 | 0.00 | 0.00 |
| 2018 | 74 | 293.8 | 16.57 | 17.14 | 0.00 | 0.00 | 17.14 | 17.14 | 0.00 | 0.00 |
| 2019 | 131 | 297.0 | 24.59 | 10.46 | 14.13 | 14.13 | 17.17 | 31.30 | 7.41 | 6.72 |
| 2020 | 141 | 292.4 | 25.24 | 9.94 | 15.29 | 15.29 | 17.21 | 32.50 | 8.03 | 7.27 |
| 2021 | 181 | 287.0 | 29.18 | 6.70 | 22.48 | 22.48 | 17.25 | 39.73 | 11.93 | 10.55 |
| 2022 | 199 | 276.9 | 29.48 | 6.18 | 23.31 | 23.31 | 17.29 | 40.59 | 12.19 | 11.11 |
| 2023 | 227 | 262.0 | 29.81 | 5.52 | 24.29 | 24.29 | 17.26 | 41.55 | 12.55 | 11.74 |
| 2024 | 255 | 249.4 | 30.06 | 4.68 | 25.38 | 25.38 | 17.32 | 42.70 | 12.74 | 12.64 |
| 2025 | 294 | 235.1 | 30.26 | 3.94 | 26.31 | 26.31 | 17.32 | 43.64 | 12.93 | 13.38 |
| 2026 | 353 | 218.8 | 30.40 | 3.11 | 27.29 | 27.29 | 17.30 | 44.59 | 13.10 | 14.19 |
| 2027 | 433 | 202.3 | 30.38 | 2.42 | 27.96 | 27.96 | 17.27 | 45.24 | 13.10 | 14.86 |
| 2028 | 542 | 185.2 | 29.97 | 1.44 | 28.54 | 28.54 | 17.24 | 45.78 | 12.74 | 15.80 |
| 2029 | 717 | 168.3 | 29.77 | 0.54 | 29.22 | 29.22 | 17.19 | 46.41 | 12.58 | 16.65 |
| 2030 | 918 | 153.0 | 29.17 | 0.00 | 29.17 | 29.55 | 17.14 | 46.69 | 12.03 | 17.14 |
| 2031 | 1038 | 143.5 | 28.97 | 0.00 | 28.97 | 30.14 | 17.08 | 47.22 | 11.89 | 17.08 |
| 2032 | 1156 | 134.8 | 28.72 | 0.00 | 28.72 | 30.70 | 17.02 | 47.73 | 11.69 | 17.02 |
| 2033 | 1369 | 125.4 | 28.55 | 0.00 | 28.55 | 31.25 | 16.99 | 48.24 | 11.56 | 16.99 |
| 2034 | 1589 | 116.2 | 28.42 | 0.00 | 28.42 | 31.78 | 16.94 | 48.72 | 11.48 | 16.94 |
| 2035 | 1818 | 107.8 | 28.16 | 0.00 | 28.16 | 32.29 | 16.91 | 49.20 | 11.25 | 16.91 |
| 2036 | 1724 | 102.1 | 27.89 | 0.00 | 27.89 | 32.79 | 16.88 | 49.67 | 11.02 | 16.88 |
| 2037 | 1755 | 97.2 | 27.67 | 0.00 | 27.67 | 33.28 | 16.82 | 50.10 | 10.84 | 16.82 |
| 2038 | 1719 | 94.2 | 27.58 | 0.00 | 27.58 | 33.75 | 16.79 | 50.53 | 10.79 | 16.79 |
| 2039 | 1762 | 91.0 | 27.43 | 0.00 | 27.43 | 34.20 | 16.73 | 50.93 | 10.70 | 16.73 |
| 2040 | 1731 | 88.6 | 27.54 | 0.00 | 27.54 | 34.64 | 16.68 | 51.33 | 10.86 | 16.68 |

Table C.1.3 *Pine Large Sawtimber* data for 20% RPS (MT, *High ORES*), in million green tons.

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 0.00 | 6.46 | 6.46 | 0.00 | 0.00 | 0.00 | 6.46 | 6.46 | 0.00 | 0.00 |
| 2007 | 0.00 | 6.10 | 6.10 | 0.00 | 0.00 | 0.00 | 6.10 | 6.10 | 0.00 | 0.00 |
| 2008 | 0.00 | 5.76 | 5.76 | 0.00 | 0.00 | 0.00 | 5.76 | 5.76 | 0.00 | 0.00 |
| 2009 | 0.00 | 5.46 | 5.46 | 0.00 | 0.00 | 0.00 | 5.46 | 5.46 | 0.00 | 0.00 |
| 2010 | 0.00 | 5.13 | 5.13 | 0.00 | 0.00 | 0.00 | 5.13 | 5.13 | 0.00 | 0.00 |
| 2011 | 0.00 | 5.47 | 5.47 | 0.00 | 0.00 | 0.00 | 5.47 | 5.47 | 0.00 | 0.00 |
| 2012 | 0.00 | 5.84 | 5.84 | 0.00 | 0.00 | 0.00 | 5.84 | 5.84 | 0.00 | 0.00 |
| **2013** | 0.40 | 6.23 | 6.63 | 0.32 | 0.08 | 0.40 | 6.23 | 6.63 | 0.32 | 0.08 |
| 2014 | 0.42 | 6.64 | 7.06 | 0.32 | 0.11 | 0.42 | 6.64 | 7.06 | 0.32 | 0.11 |
| 2015 | 0.45 | 6.75 | 7.21 | 0.35 | 0.10 | 0.45 | 6.75 | 7.21 | 0.35 | 0.10 |
| 2016 | 0.00 | 6.87 | 6.87 | 0.00 | 0.00 | 0.00 | 6.87 | 6.87 | 0.00 | 0.00 |
| 2017 | 0.00 | 6.94 | 6.94 | 0.00 | 0.00 | 0.00 | 6.94 | 6.94 | 0.00 | 0.00 |
| 2018 | 0.00 | 7.00 | 7.00 | 0.00 | 0.00 | 0.00 | 7.00 | 7.00 | 0.00 | 0.00 |
| 2019 | 1.77 | 7.05 | 8.81 | 1.25 | 0.51 | 1.77 | 7.05 | 8.81 | 1.25 | 0.51 |
| 2020 | 1.91 | 7.10 | 9.01 | 1.35 | 0.56 | 1.91 | 7.10 | 9.01 | 1.35 | 0.56 |
| 2021 | 2.81 | 7.14 | 9.95 | 1.99 | 0.82 | 2.81 | 7.14 | 9.95 | 1.99 | 0.82 |
| 2022 | 2.91 | 7.19 | 10.10 | 2.02 | 0.89 | 2.91 | 7.19 | 10.10 | 2.02 | 0.89 |
| 2023 | 3.04 | 7.24 | 10.27 | 2.12 | 0.92 | 3.04 | 7.24 | 10.27 | 2.12 | 0.92 |
| 2024 | 3.17 | 7.28 | 10.45 | 2.17 | 1.00 | 3.17 | 7.28 | 10.45 | 2.17 | 1.00 |
| 2025 | 3.29 | 7.32 | 10.61 | 2.21 | 1.08 | 3.29 | 7.32 | 10.61 | 2.21 | 1.08 |
| 2026 | 3.41 | 7.36 | 10.78 | 2.27 | 1.14 | 3.41 | 7.36 | 10.78 | 2.27 | 1.14 |
| 2027 | 3.50 | 7.41 | 10.90 | 2.24 | 1.26 | 3.50 | 7.41 | 10.90 | 2.24 | 1.26 |
| 2028 | 3.57 | 7.44 | 11.01 | 2.17 | 1.40 | 3.57 | 7.44 | 11.01 | 2.17 | 1.40 |
| 2029 | 3.65 | 7.49 | 11.14 | 2.13 | 1.52 | 3.65 | 7.49 | 11.14 | 2.13 | 1.52 |
| 2030 | 3.69 | 7.54 | 11.23 | 1.96 | 1.74 | 3.69 | 7.54 | 11.23 | 1.96 | 1.74 |
| 2031 | 3.77 | 7.58 | 11.35 | 1.88 | 1.88 | 3.77 | 7.58 | 11.35 | 1.88 | 1.88 |
| 2032 | 3.84 | 7.63 | 11.46 | 1.74 | 2.10 | 3.84 | 7.63 | 11.46 | 1.74 | 2.10 |
| 2033 | 3.91 | 7.65 | 11.56 | 1.61 | 2.30 | 3.91 | 7.65 | 11.56 | 1.61 | 2.30 |
| 2034 | 3.97 | 7.69 | 11.67 | 1.49 | 2.48 | 3.97 | 7.69 | 11.67 | 1.49 | 2.48 |
| 2035 | 4.04 | 7.72 | 11.76 | 1.34 | 2.70 | 4.04 | 7.72 | 11.76 | 1.34 | 2.70 |
| 2036 | 4.10 | 7.74 | 11.84 | 1.23 | 2.87 | 4.10 | 7.74 | 11.84 | 1.23 | 2.87 |
| 2037 | 4.16 | 7.76 | 11.92 | 1.11 | 3.05 | 4.16 | 7.76 | 11.92 | 1.11 | 3.05 |
| 2038 | 4.22 | 7.76 | 11.98 | 1.04 | 3.18 | 4.22 | 7.76 | 11.98 | 1.04 | 3.18 |
| 2039 | 4.28 | 7.78 | 12.05 | 0.91 | 3.36 | 4.28 | 7.78 | 12.05 | 0.91 | 3.36 |
| 2040 | 4.33 | 7.78 | 12.11 | 0.80 | 3.53 | 4.33 | 7.78 | 12.11 | 0.80 | 3.53 |

Table C.1.4 *Hardwood Pulpwood* data for 20% RPS (MT, *High ORES* ), in million green tons.

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 115.2 | 2.51 | 2.51 | 0.00 | 0.00 | 2.51 | 2.51 | 0.00 | 0.00 |
| 2007 | 88 | 116.3 | 2.34 | 2.34 | 0.00 | 0.00 | 2.34 | 2.34 | 0.00 | 0.00 |
| 2008 | 78 | 117.5 | 2.19 | 2.19 | 0.00 | 0.00 | 2.19 | 2.19 | 0.00 | 0.00 |
| 2009 | 68 | 118.9 | 2.05 | 2.05 | 0.00 | 0.00 | 2.05 | 2.05 | 0.00 | 0.00 |
| 2010 | 59 | 120.4 | 1.92 | 1.92 | 0.00 | 0.00 | 1.92 | 1.92 | 0.00 | 0.00 |
| 2011 | 65 | 122.0 | 2.04 | 2.04 | 0.00 | 0.00 | 2.04 | 2.04 | 0.00 | 0.00 |
| 2012 | 71 | 123.6 | 2.17 | 2.17 | 0.00 | 0.00 | 2.17 | 2.17 | 0.00 | 0.00 |
| **2013** | 92 | 125.1 | 2.52 | 2.20 | 0.32 | 0.32 | 2.30 | 2.62 | 0.21 | 0.10 |
| 2014 | 100 | 126.3 | 2.66 | 2.33 | 0.34 | 0.34 | 2.44 | 2.78 | 0.22 | 0.12 |
| 2015 | 101 | 127.4 | 2.69 | 2.33 | 0.36 | 0.36 | 2.46 | 2.82 | 0.23 | 0.13 |
| 2016 | 85 | 128.5 | 2.44 | 2.47 | 0.00 | 0.00 | 2.47 | 2.47 | 0.00 | 0.00 |
| 2017 | 85 | 130.0 | 2.46 | 2.48 | 0.00 | 0.00 | 2.48 | 2.48 | 0.00 | 0.00 |
| 2018 | 84 | 131.5 | 2.47 | 2.49 | 0.00 | 0.00 | 2.49 | 2.49 | 0.00 | 0.00 |
| 2019 | 135 | 133.1 | 3.29 | 1.88 | 1.41 | 1.41 | 2.49 | 3.91 | 0.80 | 0.62 |
| 2020 | 141 | 133.9 | 3.38 | 1.85 | 1.53 | 1.53 | 2.49 | 4.02 | 0.88 | 0.65 |
| 2021 | 171 | 134.6 | 3.80 | 1.55 | 2.25 | 2.25 | 2.50 | 4.74 | 1.31 | 0.94 |
| 2022 | 177 | 135.0 | 3.86 | 1.53 | 2.33 | 2.33 | 2.50 | 4.83 | 1.37 | 0.97 |
| 2023 | 180 | 135.7 | 3.91 | 1.48 | 2.43 | 2.43 | 2.51 | 4.94 | 1.40 | 1.03 |
| 2024 | 187 | 135.9 | 3.97 | 1.43 | 2.54 | 2.54 | 2.51 | 5.04 | 1.46 | 1.07 |
| 2025 | 195 | 136.1 | 4.04 | 1.41 | 2.63 | 2.63 | 2.50 | 5.14 | 1.54 | 1.09 |
| 2026 | 204 | 136.1 | 4.12 | 1.39 | 2.73 | 2.73 | 2.50 | 5.23 | 1.61 | 1.11 |
| 2027 | 209 | 136.3 | 4.16 | 1.36 | 2.80 | 2.80 | 2.50 | 5.30 | 1.66 | 1.14 |
| 2028 | 214 | 136.5 | 4.19 | 1.34 | 2.85 | 2.85 | 2.50 | 5.36 | 1.69 | 1.16 |
| 2029 | 220 | 136.6 | 4.24 | 1.31 | 2.92 | 2.92 | 2.50 | 5.42 | 1.73 | 1.19 |
| 2030 | 225 | 136.6 | 4.26 | 1.30 | 2.96 | 2.96 | 2.50 | 5.46 | 1.76 | 1.20 |
| 2031 | 231 | 136.6 | 4.30 | 1.28 | 3.01 | 3.01 | 2.50 | 5.52 | 1.79 | 1.22 |
| 2032 | 237 | 136.6 | 4.33 | 1.26 | 3.07 | 3.07 | 2.50 | 5.58 | 1.82 | 1.25 |
| 2033 | 244 | 136.1 | 4.35 | 1.22 | 3.13 | 3.13 | 2.50 | 5.63 | 1.84 | 1.28 |
| 2034 | 252 | 135.5 | 4.36 | 1.18 | 3.18 | 3.18 | 2.51 | 5.68 | 1.85 | 1.32 |
| 2035 | 263 | 134.5 | 4.37 | 1.14 | 3.23 | 3.23 | 2.51 | 5.74 | 1.87 | 1.36 |
| 2036 | 273 | 133.5 | 4.38 | 1.10 | 3.28 | 3.28 | 2.51 | 5.79 | 1.87 | 1.41 |
| 2037 | 285 | 132.3 | 4.39 | 1.07 | 3.33 | 3.33 | 2.51 | 5.84 | 1.88 | 1.45 |
| 2038 | 297 | 131.2 | 4.40 | 1.02 | 3.37 | 3.37 | 2.51 | 5.89 | 1.88 | 1.49 |
| 2039 | 311 | 130.5 | 4.44 | 1.01 | 3.42 | 3.42 | 2.52 | 5.94 | 1.92 | 1.50 |
| 2040 | 322 | 129.6 | 4.44 | 0.97 | 3.46 | 3.46 | 2.52 | 5.98 | 1.92 | 1.55 |

Table C.1.5 *Hardwood Sawtimber* data for 20% RPS (MT, *High ORES* ), in million green tons.

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 110.0 | 2.09 | 2.09 | 0.00 | 0.00 | 2.09 | 2.09 | 0.00 | 0.00 |
| 2007 | 86 | 111.6 | 1.96 | 1.96 | 0.00 | 0.00 | 1.96 | 1.96 | 0.00 | 0.00 |
| 2008 | 73 | 113.2 | 1.84 | 1.84 | 0.00 | 0.00 | 1.84 | 1.84 | 0.00 | 0.00 |
| 2009 | 62 | 115.0 | 1.73 | 1.73 | 0.00 | 0.00 | 1.73 | 1.73 | 0.00 | 0.00 |
| 2010 | 53 | 116.9 | 1.63 | 1.63 | 0.00 | 0.00 | 1.63 | 1.63 | 0.00 | 0.00 |
| 2011 | 59 | 118.9 | 1.73 | 1.73 | 0.00 | 0.00 | 1.73 | 1.73 | 0.00 | 0.00 |
| 2012 | 65 | 120.9 | 1.84 | 1.84 | 0.00 | 0.00 | 1.84 | 1.84 | 0.00 | 0.00 |
| **2013** | 77 | 122.7 | 2.01 | 1.93 | 0.08 | 0.08 | 1.95 | 2.03 | 0.06 | 0.02 |
| 2014 | 85 | 124.4 | 2.12 | 2.04 | 0.08 | 0.08 | 2.07 | 2.15 | 0.06 | 0.03 |
| 2015 | 85 | 126.1 | 2.14 | 2.05 | 0.09 | 0.09 | 2.08 | 2.17 | 0.06 | 0.03 |
| 2016 | 79 | 127.6 | 2.09 | 2.09 | 0.00 | 0.00 | 2.09 | 2.09 | 0.00 | 0.00 |
| 2017 | 78 | 129.3 | 2.10 | 2.11 | 0.00 | 0.00 | 2.11 | 2.11 | 0.00 | 0.00 |
| 2018 | 77 | 131.0 | 2.11 | 2.11 | 0.00 | 0.00 | 2.11 | 2.11 | 0.00 | 0.00 |
| 2019 | 96 | 132.8 | 2.36 | 2.00 | 0.35 | 0.35 | 2.12 | 2.47 | 0.24 | 0.12 |
| 2020 | 96 | 134.2 | 2.37 | 1.99 | 0.38 | 0.38 | 2.12 | 2.50 | 0.25 | 0.13 |
| 2021 | 105 | 135.5 | 2.49 | 1.93 | 0.56 | 0.56 | 2.12 | 2.69 | 0.37 | 0.20 |
| 2022 | 105 | 136.5 | 2.50 | 1.92 | 0.58 | 0.58 | 2.13 | 2.71 | 0.37 | 0.21 |
| 2023 | 105 | 137.7 | 2.51 | 1.91 | 0.61 | 0.61 | 2.14 | 2.74 | 0.38 | 0.23 |
| 2024 | 106 | 138.7 | 2.53 | 1.89 | 0.63 | 0.63 | 2.14 | 2.77 | 0.39 | 0.25 |
| 2025 | 106 | 139.7 | 2.53 | 1.88 | 0.66 | 0.66 | 2.14 | 2.80 | 0.40 | 0.26 |
| 2026 | 106 | 140.5 | 2.54 | 1.86 | 0.68 | 0.68 | 2.14 | 2.82 | 0.40 | 0.28 |
| 2027 | 106 | 141.4 | 2.55 | 1.85 | 0.70 | 0.70 | 2.14 | 2.84 | 0.40 | 0.30 |
| 2028 | 106 | 142.3 | 2.55 | 1.83 | 0.71 | 0.71 | 2.14 | 2.86 | 0.40 | 0.31 |
| 2029 | 108 | 143.1 | 2.57 | 1.84 | 0.73 | 0.73 | 2.15 | 2.88 | 0.42 | 0.31 |
| 2030 | 109 | 143.8 | 2.58 | 1.84 | 0.74 | 0.74 | 2.15 | 2.89 | 0.43 | 0.31 |

* Note: the table is abbreviated to 2030 in order to save space for the graphs below.

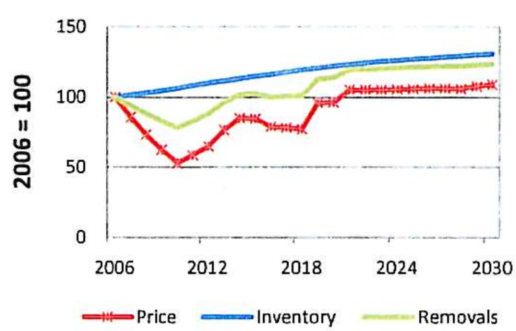


Figure C.1a SRTS output for *Hardwood Sawtimber* (MT, *High ORES*).

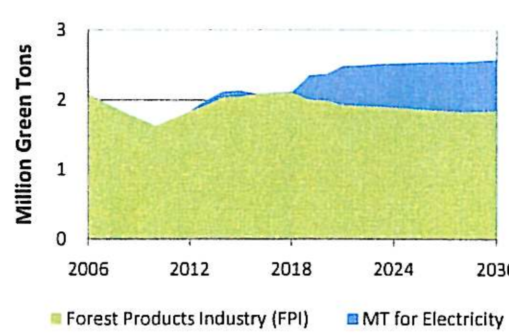


Figure C.1b Allocation of *Hardwood Sawtimber* supply (20% RPS).

**MT/UWW/LR (*High ORES*)**

Table C.2.1 Aggregated supply of woody biomass used for electricity, in million green tons, for the 12% and 20% RPS (*High ORES*) MT/UWW/LR.

| Year | 12% RPS (*High ORES*) | | | | 20% RPS (*High ORES*) | | | |
|---|---|---|---|---|---|---|---|---|
| | New Removals | Displaced from FPI | UWW | Logging Residues | New Removals | Displaced from FPI | UWW | Logging Residues |
| 2012 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2013 | 0.00 | 0.00 | 2.39 | 2.73 | 0.00 | 0.00 | 2.39 | 2.73 |
| 2014 | 0.00 | 0.00 | 2.41 | 2.92 | 0.00 | 0.00 | 2.41 | 2.92 |
| 2015 | 0.00 | 0.00 | 2.44 | 2.96 | 0.00 | 0.00 | 2.44 | 2.96 |
| 2016 | 0.00 | 0.00 | 2.48 | 2.83 | 0.00 | 0.00 | 2.48 | 2.83 |
| 2017 | 0.00 | 0.00 | 2.51 | 2.85 | 0.00 | 0.00 | 2.51 | 2.85 |
| 2018 | 0.00 | 0.00 | 2.54 | 2.87 | 0.00 | 0.00 | 2.54 | 2.87 |
| 2019 | 0.00 | 0.00 | 2.58 | 2.87 | 7.78 | 4.43 | 2.58 | 3.76 |
| 2020 | 0.00 | 0.00 | 2.61 | 2.88 | 8.69 | 4.94 | 2.61 | 3.85 |
| 2021 | 0.00 | 0.00 | 2.64 | 2.89 | 13.33 | 7.74 | 2.64 | 4.38 |
| 2022 | 0.00 | 0.00 | 2.67 | 2.90 | 13.88 | 8.14 | 2.67 | 4.43 |
| 2023 | 0.00 | 0.00 | 2.71 | 2.90 | 14.33 | 8.84 | 2.71 | 4.49 |
| 2024 | 0.00 | 0.00 | 2.74 | 2.91 | 14.70 | 9.75 | 2.74 | 4.54 |
| 2025 | 0.00 | 0.00 | 2.77 | 2.92 | 15.02 | 10.54 | 2.77 | 4.56 |
| 2026 | 0.00 | 0.00 | 2.80 | 2.92 | 15.41 | 11.30 | 2.80 | 4.61 |
| 2027 | 0.00 | 0.00 | 2.83 | 2.92 | 15.42 | 12.10 | 2.83 | 4.61 |
| 2028 | 0.00 | 0.00 | 2.86 | 2.93 | 15.33 | 12.90 | 2.86 | 4.58 |
| 2029 | 0.00 | 0.00 | 2.89 | 2.99 | 15.38 | 13.71 | 2.89 | 4.54 |
| 2030 | 0.00 | 0.00 | 2.92 | 3.03 | 15.03 | 14.52 | 2.92 | 4.47 |
| 2031 | 0.00 | 0.00 | 2.95 | 3.09 | 14.81 | 15.45 | 2.95 | 4.46 |
| 2032 | 0.00 | 0.00 | 2.98 | 3.13 | 14.68 | 16.29 | 2.98 | 4.43 |
| 2033 | 0.24 | 0.06 | 3.01 | 3.18 | 14.55 | 17.10 | 3.01 | 4.40 |
| 2034 | 0.70 | 0.19 | 3.03 | 3.22 | 14.37 | 17.93 | 3.03 | 4.39 |
| 2035 | 1.14 | 0.33 | 3.06 | 3.25 | 14.24 | 18.68 | 3.06 | 4.38 |
| 2036 | 1.55 | 0.49 | 3.09 | 3.28 | 13.97 | 19.57 | 3.09 | 4.35 |
| 2037 | 1.91 | 0.66 | 3.12 | 3.32 | 13.86 | 20.28 | 3.12 | 4.34 |
| 2038 | 2.24 | 0.85 | 3.15 | 3.36 | 13.78 | 20.70 | 3.15 | 4.35 |
| 2039 | 2.54 | 1.07 | 3.18 | 3.38 | 13.79 | 20.83 | 3.18 | 4.34 |
| 2040 | 2.80 | 1.30 | 3.21 | 3.41 | 13.66 | 20.95 | 3.21 | 4.35 |

Table C.2.2 *Pine Roundwood* data for a 20% RPS (*High ORES* ), in million green tons. MT/UWW/LR

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 231.8 | 16.55 | 16.55 | 0.00 | 0.00 | 16.55 | 16.55 | 0.00 | 0.00 |
| 2007 | 89 | 236.3 | 15.40 | 15.40 | 0.00 | 0.00 | 15.40 | 15.40 | 0.00 | 0.00 |
| 2008 | 78 | 242.1 | 14.39 | 14.39 | 0.00 | 0.00 | 14.39 | 14.39 | 0.00 | 0.00 |
| 2009 | 68 | 248.8 | 13.49 | 13.49 | 0.00 | 0.00 | 13.49 | 13.49 | 0.00 | 0.00 |
| 2010 | 59 | 256.5 | 12.68 | 12.68 | 0.00 | 0.00 | 12.68 | 12.68 | 0.00 | 0.00 |
| 2011 | 63 | 265.3 | 13.60 | 13.60 | 0.00 | 0.00 | 13.60 | 13.60 | 0.00 | 0.00 |
| 2012 | 67 | 272.5 | 14.56 | 14.56 | 0.00 | 0.00 | 14.56 | 14.56 | 0.00 | 0.00 |
| **2013** | 72 | 278.9 | 15.57 | 15.57 | 0.00 | 0.00 | 15.57 | 15.57 | 0.00 | 0.00 |
| 2014 | 77 | 284.3 | 16.63 | 16.63 | 0.00 | 0.00 | 16.63 | 16.63 | 0.00 | 0.00 |
| 2015 | 77 | 288.8 | 16.76 | 16.76 | 0.00 | 0.00 | 16.76 | 16.76 | 0.00 | 0.00 |
| 2016 | 76 | 293.3 | 16.90 | 16.90 | 0.00 | 0.00 | 16.90 | 16.90 | 0.00 | 0.00 |
| 2017 | 76 | 296.9 | 17.05 | 17.05 | 0.00 | 0.00 | 17.05 | 17.05 | 0.00 | 0.00 |
| 2018 | 75 | 300.1 | 17.14 | 17.14 | 0.00 | 0.00 | 17.14 | 17.14 | 0.00 | 0.00 |
| 2019 | 117 | 302.9 | 23.28 | 13.51 | 9.77 | 9.77 | 17.17 | 26.94 | 6.10 | 3.67 |
| 2020 | 126 | 299.4 | 24.06 | 13.16 | 10.90 | 10.90 | 17.21 | 28.11 | 6.86 | 4.04 |
| 2021 | 160 | 295.0 | 27.77 | 10.91 | 16.86 | 16.86 | 17.25 | 34.11 | 10.52 | 6.34 |
| 2022 | 174 | 286.2 | 28.20 | 10.58 | 17.62 | 17.62 | 17.29 | 34.91 | 10.91 | 6.71 |
| 2023 | 195 | 272.5 | 28.49 | 9.95 | 18.54 | 18.54 | 17.26 | 35.79 | 11.23 | 7.30 |
| 2024 | 216 | 261.0 | 28.74 | 9.18 | 19.56 | 19.56 | 17.32 | 36.88 | 11.42 | 8.14 |
| 2025 | 245 | 247.8 | 28.97 | 8.52 | 20.45 | 20.45 | 17.32 | 37.77 | 11.65 | 8.80 |
| 2026 | 285 | 233.1 | 29.22 | 7.86 | 21.37 | 21.37 | 17.30 | 38.66 | 11.92 | 9.44 |
| 2027 | 336 | 217.7 | 29.16 | 7.14 | 22.01 | 22.01 | 17.27 | 39.29 | 11.88 | 10.13 |
| 2028 | 407 | 201.6 | 29.03 | 6.44 | 22.59 | 22.59 | 17.24 | 39.83 | 11.79 | 10.80 |
| 2029 | 509 | 185.4 | 29.00 | 5.72 | 23.27 | 23.27 | 17.19 | 40.46 | 11.81 | 11.47 |
| 2030 | 646 | 169.4 | 28.64 | 5.00 | 23.64 | 23.64 | 17.14 | 40.78 | 11.50 | 12.14 |
| 2031 | 816 | 155.0 | 28.39 | 4.18 | 24.21 | 24.21 | 17.08 | 41.30 | 11.31 | 12.91 |
| 2032 | 950 | 144.9 | 28.25 | 3.48 | 24.78 | 24.78 | 17.02 | 41.80 | 11.23 | 13.54 |
| 2033 | 1056 | 136.4 | 28.13 | 2.81 | 25.32 | 25.32 | 16.99 | 42.31 | 11.14 | 14.19 |
| 2034 | 1191 | 128.0 | 27.95 | 2.11 | 25.84 | 25.84 | 16.94 | 42.79 | 11.00 | 14.84 |
| 2035 | 1355 | 120.1 | 27.84 | 1.50 | 26.34 | 26.34 | 16.91 | 43.25 | 10.93 | 15.41 |
| 2036 | 1381 | 114.0 | 27.64 | 0.80 | 26.84 | 26.84 | 16.88 | 43.71 | 10.76 | 16.07 |
| 2037 | 1486 | 108.0 | 27.59 | 0.28 | 27.31 | 27.31 | 16.82 | 44.13 | 10.77 | 16.54 |
| 2038 | 1454 | 104.6 | 27.55 | 0.00 | 27.55 | 27.75 | 16.79 | 44.54 | 10.76 | 16.79 |
| 2039 | 1515 | 100.6 | 27.57 | 0.00 | 27.57 | 28.19 | 16.73 | 44.91 | 10.84 | 16.73 |
| 2040 | 1558 | 96.7 | 27.46 | 0.00 | 27.46 | 28.60 | 16.68 | 45.28 | 10.78 | 16.68 |

Table C.2.3 *Pine Large Sawtimber* data for 20% RPS (*High ORES* ), in million green tons. MT/UWW/LR

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 96.3 | 6.46 | 6.46 | 0.00 | 0.00 | 6.46 | 6.46 | 0.00 | 0.00 |
| 2007 | 88 | 98.5 | 6.10 | 6.10 | 0.00 | 0.00 | 6.10 | 6.10 | 0.00 | 0.00 |
| 2008 | 77 | 100.8 | 5.76 | 5.76 | 0.00 | 0.00 | 5.76 | 5.76 | 0.00 | 0.00 |
| 2009 | 67 | 103.5 | 5.46 | 5.46 | 0.00 | 0.00 | 5.46 | 5.46 | 0.00 | 0.00 |
| 2010 | 57 | 106.7 | 5.13 | 5.13 | 0.00 | 0.00 | 5.13 | 5.13 | 0.00 | 0.00 |
| 2011 | 60 | 110.3 | 5.47 | 5.47 | 0.00 | 0.00 | 5.47 | 5.47 | 0.00 | 0.00 |
| 2012 | 64 | 114.8 | 5.84 | 5.84 | 0.00 | 0.00 | 5.84 | 5.84 | 0.00 | 0.00 |
| **2013** | 68 | 119.1 | 6.23 | 6.23 | 0.00 | 0.00 | 6.23 | 6.23 | 0.00 | 0.00 |
| 2014 | 73 | 123.3 | 6.64 | 6.64 | 0.00 | 0.00 | 6.64 | 6.64 | 0.00 | 0.00 |
| 2015 | 72 | 127.2 | 6.75 | 6.75 | 0.00 | 0.00 | 6.75 | 6.75 | 0.00 | 0.00 |
| 2016 | 71 | 131.2 | 6.87 | 6.87 | 0.00 | 0.00 | 6.87 | 6.87 | 0.00 | 0.00 |
| 2017 | 69 | 135.1 | 6.94 | 6.94 | 0.00 | 0.00 | 6.94 | 6.94 | 0.00 | 0.00 |
| 2018 | 66 | 139.2 | 7.00 | 7.00 | 0.00 | 0.00 | 7.00 | 7.00 | 0.00 | 0.00 |
| 2019 | 80 | 143.4 | 7.96 | 6.74 | 1.22 | 1.22 | 7.05 | 8.27 | 0.91 | 0.31 |
| 2020 | 80 | 146.6 | 8.08 | 6.71 | 1.36 | 1.36 | 7.10 | 8.46 | 0.98 | 0.38 |
| 2021 | 88 | 149.4 | 8.63 | 6.52 | 2.11 | 2.11 | 7.14 | 9.25 | 1.49 | 0.62 |
| 2022 | 90 | 151.8 | 8.77 | 6.57 | 2.20 | 2.20 | 7.19 | 9.39 | 1.59 | 0.62 |
| 2023 | 92 | 153.8 | 8.90 | 6.58 | 2.32 | 2.32 | 7.24 | 9.55 | 1.66 | 0.65 |
| 2024 | 95 | 155.2 | 9.05 | 6.60 | 2.45 | 2.45 | 7.28 | 9.73 | 1.77 | 0.68 |
| 2025 | 99 | 155.8 | 9.12 | 6.56 | 2.56 | 2.56 | 7.32 | 9.88 | 1.80 | 0.76 |
| 2026 | 104 | 156.0 | 9.21 | 6.54 | 2.67 | 2.67 | 7.36 | 10.03 | 1.84 | 0.83 |
| 2027 | 110 | 154.7 | 9.25 | 6.50 | 2.75 | 2.75 | 7.41 | 10.16 | 1.84 | 0.91 |
| 2028 | 118 | 152.7 | 9.25 | 6.43 | 2.82 | 2.82 | 7.44 | 10.27 | 1.81 | 1.01 |
| 2029 | 132 | 149.5 | 9.28 | 6.37 | 2.91 | 2.91 | 7.49 | 10.40 | 1.79 | 1.12 |
| 2030 | 143 | 146.7 | 9.25 | 6.30 | 2.95 | 2.95 | 7.54 | 10.49 | 1.72 | 1.24 |
| 2031 | 171 | 140.8 | 9.23 | 6.21 | 3.03 | 3.03 | 7.58 | 10.61 | 1.66 | 1.37 |
| 2032 | 196 | 136.1 | 9.19 | 6.09 | 3.10 | 3.10 | 7.63 | 10.72 | 1.56 | 1.53 |
| 2033 | 223 | 131.2 | 9.15 | 5.98 | 3.17 | 3.17 | 7.65 | 10.82 | 1.50 | 1.67 |
| 2034 | 256 | 126.0 | 9.10 | 5.87 | 3.23 | 3.23 | 7.69 | 10.92 | 1.41 | 1.82 |
| 2035 | 299 | 120.4 | 9.04 | 5.75 | 3.29 | 3.29 | 7.72 | 11.01 | 1.32 | 1.97 |
| 2036 | 345 | 114.7 | 8.93 | 5.57 | 3.35 | 3.35 | 7.74 | 11.10 | 1.19 | 2.17 |
| 2037 | 399 | 109.3 | 8.81 | 5.40 | 3.41 | 3.41 | 7.76 | 11.18 | 1.05 | 2.37 |
| 2038 | 461 | 104.1 | 8.72 | 5.25 | 3.47 | 3.47 | 7.76 | 11.23 | 0.96 | 2.51 |
| 2039 | 531 | 99.3 | 8.64 | 5.12 | 3.52 | 3.52 | 7.78 | 11.30 | 0.86 | 2.66 |
| 2040 | 615 | 94.6 | 8.56 | 4.99 | 3.58 | 3.58 | 7.78 | 11.36 | 0.78 | 2.79 |

Table C.2.4 *Hardwood Pulpwood* data for 20% RPS (*High ORES* ), in million green tons. MT/UWW/LR

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 115.2 | 2.51 | 2.51 | 0.00 | 0.00 | 2.51 | 2.51 | 0.00 | 0.00 |
| 2007 | 88 | 116.3 | 2.34 | 2.34 | 0.00 | 0.00 | 2.34 | 2.34 | 0.00 | 0.00 |
| 2008 | 78 | 117.5 | 2.19 | 2.19 | 0.00 | 0.00 | 2.19 | 2.19 | 0.00 | 0.00 |
| 2009 | 68 | 118.9 | 2.05 | 2.05 | 0.00 | 0.00 | 2.05 | 2.05 | 0.00 | 0.00 |
| 2010 | 59 | 120.4 | 1.92 | 1.92 | 0.00 | 0.00 | 1.92 | 1.92 | 0.00 | 0.00 |
| 2011 | 65 | 122.0 | 2.04 | 2.04 | 0.00 | 0.00 | 2.04 | 2.04 | 0.00 | 0.00 |
| 2012 | 71 | 123.6 | 2.17 | 2.17 | 0.00 | 0.00 | 2.17 | 2.17 | 0.00 | 0.00 |
| **2013** | 78 | 125.1 | 2.30 | 2.30 | 0.00 | 0.00 | 2.30 | 2.30 | 0.00 | 0.00 |
| 2014 | 86 | 126.5 | 2.44 | 2.44 | 0.00 | 0.00 | 2.44 | 2.44 | 0.00 | 0.00 |
| 2015 | 86 | 127.8 | 2.46 | 2.46 | 0.00 | 0.00 | 2.46 | 2.46 | 0.00 | 0.00 |
| 2016 | 86 | 129.1 | 2.47 | 2.47 | 0.00 | 0.00 | 2.47 | 2.47 | 0.00 | 0.00 |
| 2017 | 85 | 130.6 | 2.48 | 2.48 | 0.00 | 0.00 | 2.48 | 2.48 | 0.00 | 0.00 |
| 2018 | 84 | 132.1 | 2.49 | 2.49 | 0.00 | 0.00 | 2.49 | 2.49 | 0.00 | 0.00 |
| 2019 | 121 | 133.7 | 3.10 | 2.12 | 0.98 | 0.98 | 2.49 | 3.47 | 0.60 | 0.37 |
| 2020 | 125 | 134.7 | 3.16 | 2.07 | 1.09 | 1.09 | 2.49 | 3.58 | 0.67 | 0.42 |
| 2021 | 149 | 135.6 | 3.54 | 1.85 | 1.69 | 1.69 | 2.50 | 4.18 | 1.04 | 0.65 |
| 2022 | 154 | 136.3 | 3.60 | 1.84 | 1.76 | 1.76 | 2.50 | 4.26 | 1.10 | 0.66 |
| 2023 | 157 | 137.2 | 3.65 | 1.80 | 1.85 | 1.85 | 2.51 | 4.36 | 1.14 | 0.71 |
| 2024 | 163 | 137.5 | 3.71 | 1.76 | 1.96 | 1.96 | 2.51 | 4.46 | 1.21 | 0.75 |
| 2025 | 168 | 137.9 | 3.77 | 1.72 | 2.04 | 2.04 | 2.50 | 4.55 | 1.26 | 0.78 |
| 2026 | 173 | 138.2 | 3.82 | 1.69 | 2.14 | 2.14 | 2.50 | 4.64 | 1.32 | 0.82 |
| 2027 | 179 | 138.5 | 3.87 | 1.67 | 2.20 | 2.20 | 2.50 | 4.70 | 1.37 | 0.84 |
| 2028 | 183 | 138.9 | 3.91 | 1.65 | 2.26 | 2.26 | 2.50 | 4.76 | 1.40 | 0.85 |
| 2029 | 188 | 139.2 | 3.96 | 1.63 | 2.33 | 2.33 | 2.50 | 4.83 | 1.46 | 0.87 |
| 2030 | 192 | 139.5 | 3.99 | 1.63 | 2.36 | 2.36 | 2.50 | 4.87 | 1.49 | 0.88 |
| 2031 | 197 | 139.6 | 4.03 | 1.61 | 2.42 | 2.42 | 2.50 | 4.93 | 1.53 | 0.89 |
| 2032 | 202 | 139.7 | 4.07 | 1.59 | 2.48 | 2.48 | 2.50 | 4.98 | 1.57 | 0.91 |
| 2033 | 207 | 139.8 | 4.11 | 1.57 | 2.53 | 2.53 | 2.50 | 5.04 | 1.60 | 0.93 |
| 2034 | 213 | 139.6 | 4.13 | 1.55 | 2.58 | 2.58 | 2.51 | 5.09 | 1.63 | 0.96 |
| 2035 | 219 | 139.3 | 4.15 | 1.52 | 2.63 | 2.63 | 2.51 | 5.14 | 1.64 | 0.99 |
| 2036 | 226 | 138.9 | 4.17 | 1.49 | 2.68 | 2.68 | 2.51 | 5.19 | 1.66 | 1.02 |
| 2037 | 234 | 138.2 | 4.19 | 1.46 | 2.73 | 2.73 | 2.51 | 5.24 | 1.68 | 1.05 |
| 2038 | 242 | 137.4 | 4.20 | 1.43 | 2.77 | 2.77 | 2.51 | 5.29 | 1.69 | 1.09 |
| 2039 | 251 | 136.5 | 4.22 | 1.40 | 2.82 | 2.82 | 2.52 | 5.33 | 1.70 | 1.12 |
| 2040 | 260 | 135.6 | 4.23 | 1.37 | 2.86 | 2.86 | 2.52 | 5.38 | 1.71 | 1.15 |

Table C.2.5 *Hardwood Sawtimber* data for 20% RPS (*High ORES* ), in million green tons. MT/UWW/LR

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 110.0 | 2.09 | 2.09 | 0.00 | 0.00 | 2.09 | 2.09 | 0.00 | 0.00 |
| 2007 | 86 | 111.6 | 1.96 | 1.96 | 0.00 | 0.00 | 1.96 | 1.96 | 0.00 | 0.00 |
| 2008 | 73 | 113.2 | 1.84 | 1.84 | 0.00 | 0.00 | 1.84 | 1.84 | 0.00 | 0.00 |
| 2009 | 62 | 115.0 | 1.73 | 1.73 | 0.00 | 0.00 | 1.73 | 1.73 | 0.00 | 0.00 |
| 2010 | 53 | 116.9 | 1.63 | 1.63 | 0.00 | 0.00 | 1.63 | 1.63 | 0.00 | 0.00 |
| 2011 | 59 | 118.9 | 1.73 | 1.73 | 0.00 | 0.00 | 1.73 | 1.73 | 0.00 | 0.00 |
| 2012 | 65 | 120.9 | 1.84 | 1.84 | 0.00 | 0.00 | 1.84 | 1.84 | 0.00 | 0.00 |
| **2013** | 72 | 122.7 | 1.95 | 1.95 | 0.00 | 0.00 | 1.95 | 1.95 | 0.00 | 0.00 |
| 2014 | 80 | 124.5 | 2.07 | 2.07 | 0.00 | 0.00 | 2.07 | 2.07 | 0.00 | 0.00 |
| 2015 | 79 | 126.2 | 2.08 | 2.08 | 0.00 | 0.00 | 2.08 | 2.08 | 0.00 | 0.00 |
| 2016 | 79 | 127.9 | 2.09 | 2.09 | 0.00 | 0.00 | 2.09 | 2.09 | 0.00 | 0.00 |
| 2017 | 78 | 129.6 | 2.11 | 2.11 | 0.00 | 0.00 | 2.11 | 2.11 | 0.00 | 0.00 |
| 2018 | 77 | 131.3 | 2.11 | 2.11 | 0.00 | 0.00 | 2.11 | 2.11 | 0.00 | 0.00 |
| 2019 | 89 | 133.1 | 2.28 | 2.04 | 0.24 | 0.24 | 2.12 | 2.36 | 0.17 | 0.08 |
| 2020 | 89 | 134.6 | 2.30 | 2.03 | 0.27 | 0.27 | 2.12 | 2.39 | 0.18 | 0.09 |
| 2021 | 96 | 136.1 | 2.40 | 1.98 | 0.42 | 0.42 | 2.12 | 2.55 | 0.28 | 0.14 |
| 2022 | 96 | 137.3 | 2.41 | 1.97 | 0.44 | 0.44 | 2.13 | 2.57 | 0.29 | 0.15 |
| 2023 | 96 | 138.7 | 2.43 | 1.97 | 0.46 | 0.46 | 2.14 | 2.60 | 0.30 | 0.17 |
| 2024 | 96 | 139.7 | 2.44 | 1.95 | 0.49 | 0.49 | 2.14 | 2.63 | 0.31 | 0.18 |
| 2025 | 96 | 140.8 | 2.45 | 1.94 | 0.51 | 0.51 | 2.14 | 2.65 | 0.32 | 0.20 |
| 2026 | 96 | 141.8 | 2.46 | 1.93 | 0.53 | 0.53 | 2.14 | 2.67 | 0.32 | 0.21 |
| 2027 | 96 | 142.8 | 2.47 | 1.92 | 0.55 | 0.55 | 2.14 | 2.69 | 0.33 | 0.22 |
| 2028 | 96 | 143.9 | 2.47 | 1.91 | 0.56 | 0.56 | 2.14 | 2.71 | 0.33 | 0.24 |
| 2029 | 96 | 144.9 | 2.48 | 1.90 | 0.58 | 0.58 | 2.15 | 2.73 | 0.33 | 0.25 |
| 2030 | 96 | 145.8 | 2.48 | 1.89 | 0.59 | 0.59 | 2.15 | 2.74 | 0.33 | 0.27 |

* Note: the table is abbreviated to 2030 in order to save space for the graphs below.

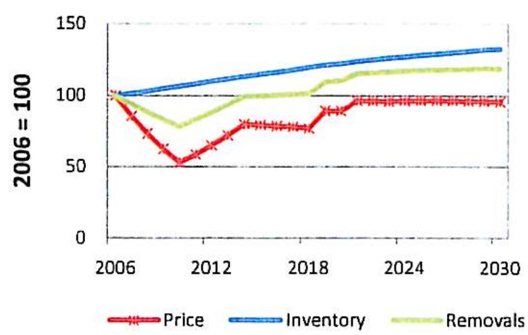


Figure C.2a SRTS output for *Hardwood Sawtimber,* MT/UWW/LR (*High ORES* ).

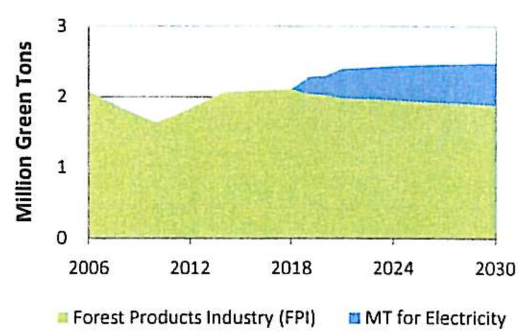


Figure C.2b Allocation of *Hardwood Sawtimber* supply (20% RPS).

## MT/UWW/LR+SREC_low (*High ORES*)

Table C.3.1 Aggregated supply of woody biomass used for electricity, in million green tons. 20% RPS (*High ORES*) MT/UWW/LR+SREC_low.

| 20% RPS (*High ORES*) | | | | | |
|---|---|---|---|---|---|
| Year | New Removals | Displaced from FPI | Urban Wood Waste | Logging Residues | SREC (low) |
| 2012 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **2013** | 0.00 | 0.00 | 2.39 | 2.62 | 4.24 |
| 2014 | 0.00 | 0.00 | 2.41 | 2.79 | 4.60 |
| 2015 | 0.00 | 0.00 | 2.44 | 2.82 | 4.95 |
| 2016 | 0.00 | 0.00 | 2.48 | 2.85 | 5.31 |
| 2017 | 0.00 | 0.00 | 2.51 | 2.87 | 5.66 |
| 2018 | 0.00 | 0.00 | 2.54 | 2.89 | 6.02 |
| 2019 | 4.10 | 1.72 | 2.58 | 3.47 | 6.38 |
| 2020 | 4.75 | 2.12 | 2.61 | 3.55 | 6.73 |
| 2021 | 9.67 | 4.61 | 2.64 | 4.09 | 7.09 |
| 2022 | 10.09 | 4.80 | 2.67 | 4.13 | 7.44 |
| 2023 | 10.44 | 5.24 | 2.71 | 4.17 | 7.80 |
| 2024 | 10.91 | 5.70 | 2.74 | 4.22 | 8.16 |
| 2025 | 11.19 | 6.17 | 2.77 | 4.25 | 8.51 |
| 2026 | 11.59 | 6.59 | 2.80 | 4.27 | 8.87 |
| 2027 | 11.52 | 7.11 | 2.83 | 4.27 | 9.22 |
| 2028 | 11.43 | 7.55 | 2.86 | 4.25 | 9.58 |
| 2029 | 11.49 | 7.97 | 2.89 | 4.24 | 9.94 |
| 2030 | 11.00 | 8.55 | 2.92 | 4.18 | 10.29 |
| 2031 | 10.83 | 9.11 | 2.95 | 4.14 | 10.65 |
| 2032 | 10.69 | 9.61 | 2.98 | 4.10 | 11.00 |
| 2033 | 10.43 | 10.22 | 3.01 | 4.05 | 11.36 |
| 2034 | 10.29 | 10.98 | 3.03 | 4.06 | 11.36 |
| 2035 | 10.23 | 11.66 | 3.06 | 4.06 | 11.36 |
| 2036 | 10.21 | 12.27 | 3.09 | 4.06 | 11.36 |
| 2037 | 10.18 | 12.88 | 3.12 | 4.06 | 11.36 |
| 2038 | 10.17 | 13.45 | 3.15 | 4.05 | 11.36 |
| 2039 | 10.23 | 13.94 | 3.18 | 4.05 | 11.36 |
| 2040 | 10.31 | 14.38 | 3.21 | 4.05 | 11.36 |

Table C.3.2 *Pine Roundwood* data for 20% RPS (*High ORES* ), in million green tons. MT/UWW/LR+SREC_low

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 231.8 | 16.55 | 16.55 | 0.00 | 0.00 | 16.55 | 16.55 | 0.00 | 0.00 |
| 2007 | 89 | 236.3 | 15.40 | 15.40 | 0.00 | 0.00 | 15.40 | 15.40 | 0.00 | 0.00 |
| 2008 | 78 | 242.1 | 14.39 | 14.39 | 0.00 | 0.00 | 14.39 | 14.39 | 0.00 | 0.00 |
| 2009 | 68 | 248.8 | 13.49 | 13.49 | 0.00 | 0.00 | 13.49 | 13.49 | 0.00 | 0.00 |
| 2010 | 59 | 256.5 | 12.68 | 12.68 | 0.00 | 0.00 | 12.68 | 12.68 | 0.00 | 0.00 |
| 2011 | 63 | 265.3 | 13.60 | 13.60 | 0.00 | 0.00 | 13.60 | 13.60 | 0.00 | 0.00 |
| 2012 | 67 | 272.5 | 14.56 | 14.56 | 0.00 | 0.00 | 14.56 | 14.56 | 0.00 | 0.00 |
| **2013** | 72 | 278.9 | 15.57 | 15.57 | 0.00 | 0.00 | 15.57 | 15.57 | 0.00 | 0.00 |
| 2014 | 77 | 284.3 | 16.63 | 16.63 | 0.00 | 0.00 | 16.63 | 16.63 | 0.00 | 0.00 |
| 2015 | 77 | 288.8 | 16.76 | 16.76 | 0.00 | 0.00 | 16.76 | 16.76 | 0.00 | 0.00 |
| 2016 | 76 | 293.3 | 16.90 | 16.90 | 0.00 | 0.00 | 16.90 | 16.90 | 0.00 | 0.00 |
| 2017 | 76 | 296.9 | 17.05 | 17.05 | 0.00 | 0.00 | 17.05 | 17.05 | 0.00 | 0.00 |
| 2018 | 75 | 300.1 | 17.14 | 17.14 | 0.00 | 0.00 | 17.14 | 17.14 | 0.00 | 0.00 |
| 2019 | 96 | 302.9 | 20.42 | 15.76 | 4.65 | 4.65 | 17.17 | 21.83 | 3.24 | 1.41 |
| 2020 | 101 | 302.2 | 20.97 | 15.47 | 5.50 | 5.50 | 17.21 | 22.71 | 3.76 | 1.74 |
| 2021 | 131 | 300.9 | 24.91 | 13.49 | 11.43 | 11.43 | 17.25 | 28.67 | 7.66 | 3.76 |
| 2022 | 140 | 295.2 | 25.25 | 13.34 | 11.91 | 11.91 | 17.29 | 29.19 | 7.96 | 3.94 |
| 2023 | 151 | 284.9 | 25.45 | 12.90 | 12.55 | 12.55 | 17.26 | 29.80 | 8.19 | 4.35 |
| 2024 | 163 | 277.1 | 25.83 | 12.54 | 13.29 | 13.29 | 17.32 | 30.61 | 8.51 | 4.78 |
| 2025 | 177 | 267.5 | 26.03 | 12.14 | 13.89 | 13.89 | 17.32 | 31.21 | 8.70 | 5.19 |
| 2026 | 197 | 256.3 | 26.31 | 11.77 | 14.54 | 14.54 | 17.30 | 31.84 | 9.01 | 5.53 |
| 2027 | 217 | 244.8 | 26.20 | 11.30 | 14.90 | 14.90 | 17.27 | 32.18 | 8.93 | 5.97 |
| 2028 | 242 | 232.5 | 26.10 | 10.91 | 15.19 | 15.19 | 17.24 | 32.43 | 8.86 | 6.33 |
| 2029 | 278 | 219.3 | 26.10 | 10.53 | 15.57 | 15.57 | 17.19 | 32.76 | 8.92 | 6.66 |
| 2030 | 316 | 205.8 | 25.65 | 10.01 | 15.64 | 15.64 | 17.14 | 32.77 | 8.51 | 7.12 |
| 2031 | 365 | 193.1 | 25.43 | 9.48 | 15.95 | 15.95 | 17.08 | 33.03 | 8.35 | 7.60 |
| 2032 | 429 | 180.5 | 25.25 | 9.01 | 16.24 | 16.24 | 17.02 | 33.26 | 8.23 | 8.01 |
| 2033 | 507 | 168.4 | 24.98 | 8.46 | 16.52 | 16.52 | 16.99 | 33.51 | 7.98 | 8.53 |
| 2034 | 596 | 157.7 | 24.80 | 7.78 | 17.02 | 17.02 | 16.94 | 33.96 | 7.86 | 9.16 |
| 2035 | 702 | 148.4 | 24.75 | 7.24 | 17.51 | 17.51 | 16.91 | 34.42 | 7.85 | 9.66 |
| 2036 | 767 | 141.5 | 24.74 | 6.75 | 17.99 | 17.99 | 16.88 | 34.86 | 7.86 | 10.13 |
| 2037 | 836 | 135.2 | 24.69 | 6.24 | 18.45 | 18.45 | 16.82 | 35.27 | 7.87 | 10.58 |
| 2038 | 860 | 130.6 | 24.66 | 5.76 | 18.90 | 18.90 | 16.79 | 35.68 | 7.87 | 11.02 |
| 2039 | 910 | 125.9 | 24.72 | 5.39 | 19.33 | 19.33 | 16.73 | 36.06 | 7.99 | 11.34 |
| 2040 | 984 | 120.6 | 24.82 | 5.06 | 19.75 | 19.75 | 16.68 | 36.44 | 8.13 | 11.62 |

Table C.3.3 *Pine Large Sawtimber* data for 20% RPS (*High ORES*), in million green tons. MT/UWW/LR+SREC_low

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 96.3 | 6.46 | 6.46 | 0.00 | 0.00 | 6.46 | 6.46 | 0.00 | 0.00 |
| 2007 | 88 | 98.5 | 6.10 | 6.10 | 0.00 | 0.00 | 6.10 | 6.10 | 0.00 | 0.00 |
| 2008 | 77 | 100.8 | 5.76 | 5.76 | 0.00 | 0.00 | 5.76 | 5.76 | 0.00 | 0.00 |
| 2009 | 67 | 103.5 | 5.46 | 5.46 | 0.00 | 0.00 | 5.46 | 5.46 | 0.00 | 0.00 |
| 2010 | 57 | 106.7 | 5.13 | 5.13 | 0.00 | 0.00 | 5.13 | 5.13 | 0.00 | 0.00 |
| 2011 | 60 | 110.3 | 5.47 | 5.47 | 0.00 | 0.00 | 5.47 | 5.47 | 0.00 | 0.00 |
| 2012 | 64 | 114.8 | 5.84 | 5.84 | 0.00 | 0.00 | 5.84 | 5.84 | 0.00 | 0.00 |
| **2013** | 68 | 119.1 | 6.23 | 6.23 | 0.00 | 0.00 | 6.23 | 6.23 | 0.00 | 0.00 |
| 2014 | 73 | 123.3 | 6.64 | 6.64 | 0.00 | 0.00 | 6.64 | 6.64 | 0.00 | 0.00 |
| 2015 | 72 | 127.2 | 6.75 | 6.75 | 0.00 | 0.00 | 6.75 | 6.75 | 0.00 | 0.00 |
| 2016 | 71 | 131.2 | 6.87 | 6.87 | 0.00 | 0.00 | 6.87 | 6.87 | 0.00 | 0.00 |
| 2017 | 69 | 135.1 | 6.94 | 6.94 | 0.00 | 0.00 | 6.94 | 6.94 | 0.00 | 0.00 |
| 2018 | 66 | 139.2 | 7.00 | 7.00 | 0.00 | 0.00 | 7.00 | 7.00 | 0.00 | 0.00 |
| 2019 | 72 | 143.4 | 7.51 | 6.93 | 0.58 | 0.58 | 7.05 | 7.63 | 0.46 | 0.12 |
| 2020 | 71 | 147.2 | 7.62 | 6.94 | 0.69 | 0.69 | 7.10 | 7.78 | 0.53 | 0.16 |
| 2021 | 79 | 150.6 | 8.22 | 6.79 | 1.43 | 1.43 | 7.14 | 8.57 | 1.08 | 0.35 |
| 2022 | 79 | 153.6 | 8.33 | 6.84 | 1.49 | 1.49 | 7.19 | 8.68 | 1.14 | 0.35 |
| 2023 | 79 | 156.3 | 8.46 | 6.89 | 1.57 | 1.57 | 7.24 | 8.80 | 1.22 | 0.35 |
| 2024 | 80 | 158.7 | 8.58 | 6.92 | 1.66 | 1.66 | 7.28 | 8.94 | 1.30 | 0.36 |
| 2025 | 81 | 160.6 | 8.65 | 6.92 | 1.74 | 1.74 | 7.32 | 9.06 | 1.33 | 0.41 |
| 2026 | 83 | 162.1 | 8.72 | 6.90 | 1.82 | 1.82 | 7.36 | 9.18 | 1.36 | 0.46 |
| 2027 | 85 | 162.4 | 8.74 | 6.88 | 1.86 | 1.86 | 7.41 | 9.27 | 1.34 | 0.53 |
| 2028 | 88 | 161.9 | 8.73 | 6.83 | 1.90 | 1.90 | 7.44 | 9.34 | 1.29 | 0.61 |
| 2029 | 91 | 161.4 | 8.75 | 6.80 | 1.95 | 1.95 | 7.49 | 9.44 | 1.26 | 0.69 |
| 2030 | 94 | 160.4 | 8.70 | 6.74 | 1.95 | 1.95 | 7.54 | 9.49 | 1.16 | 0.79 |
| 2031 | 100 | 158.9 | 8.73 | 6.74 | 1.99 | 1.99 | 7.58 | 9.57 | 1.15 | 0.84 |
| 2032 | 109 | 155.8 | 8.72 | 6.69 | 2.03 | 2.03 | 7.63 | 9.66 | 1.10 | 0.93 |
| 2033 | 121 | 151.9 | 8.70 | 6.63 | 2.06 | 2.06 | 7.65 | 9.72 | 1.05 | 1.02 |
| 2034 | 131 | 148.7 | 8.69 | 6.56 | 2.13 | 2.13 | 7.69 | 9.82 | 1.00 | 1.13 |
| 2035 | 147 | 144.3 | 8.65 | 6.46 | 2.19 | 2.19 | 7.72 | 9.91 | 0.93 | 1.26 |
| 2036 | 161 | 140.0 | 8.61 | 6.36 | 2.25 | 2.25 | 7.74 | 9.99 | 0.86 | 1.38 |
| 2037 | 179 | 135.3 | 8.56 | 6.25 | 2.31 | 2.31 | 7.76 | 10.07 | 0.80 | 1.51 |
| 2038 | 201 | 130.3 | 8.50 | 6.14 | 2.36 | 2.36 | 7.76 | 10.12 | 0.74 | 1.62 |
| 2039 | 226 | 125.5 | 8.43 | 6.01 | 2.42 | 2.42 | 7.78 | 10.19 | 0.65 | 1.76 |
| 2040 | 255 | 120.7 | 8.36 | 5.89 | 2.47 | 2.47 | 7.78 | 10.25 | 0.58 | 1.89 |

Table C.3.4 *Hardwood Pulpwood* data for 20% RPS (*High ORES* ), in million green tons. MT/UWW/LR+SREC_low

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 115.2 | 2.51 | 2.51 | 0.00 | 0.00 | 2.51 | 2.51 | 0.00 | 0.00 |
| 2007 | 88 | 116.3 | 2.34 | 2.34 | 0.00 | 0.00 | 2.34 | 2.34 | 0.00 | 0.00 |
| 2008 | 78 | 117.5 | 2.19 | 2.19 | 0.00 | 0.00 | 2.19 | 2.19 | 0.00 | 0.00 |
| 2009 | 68 | 118.9 | 2.05 | 2.05 | 0.00 | 0.00 | 2.05 | 2.05 | 0.00 | 0.00 |
| 2010 | 59 | 120.4 | 1.92 | 1.92 | 0.00 | 0.00 | 1.92 | 1.92 | 0.00 | 0.00 |
| 2011 | 65 | 122.0 | 2.04 | 2.04 | 0.00 | 0.00 | 2.04 | 2.04 | 0.00 | 0.00 |
| 2012 | 71 | 123.6 | 2.17 | 2.17 | 0.00 | 0.00 | 2.17 | 2.17 | 0.00 | 0.00 |
| 2013 | 78 | 125.1 | 2.30 | 2.30 | 0.00 | 0.00 | 2.30 | 2.30 | 0.00 | 0.00 |
| 2014 | 86 | 126.5 | 2.44 | 2.44 | 0.00 | 0.00 | 2.44 | 2.44 | 0.00 | 0.00 |
| 2015 | 86 | 127.8 | 2.46 | 2.46 | 0.00 | 0.00 | 2.46 | 2.46 | 0.00 | 0.00 |
| 2016 | 86 | 129.1 | 2.47 | 2.47 | 0.00 | 0.00 | 2.47 | 2.47 | 0.00 | 0.00 |
| 2017 | 85 | 130.6 | 2.48 | 2.48 | 0.00 | 0.00 | 2.48 | 2.48 | 0.00 | 0.00 |
| 2018 | 84 | 132.1 | 2.49 | 2.49 | 0.00 | 0.00 | 2.49 | 2.49 | 0.00 | 0.00 |
| 2019 | 102 | 133.7 | 2.81 | 2.34 | 0.47 | 0.47 | 2.49 | 2.96 | 0.31 | 0.15 |
| 2020 | 105 | 135.0 | 2.86 | 2.31 | 0.55 | 0.55 | 2.49 | 3.04 | 0.37 | 0.18 |
| 2021 | 128 | 136.2 | 3.24 | 2.09 | 1.14 | 1.14 | 2.50 | 3.64 | 0.74 | 0.40 |
| 2022 | 130 | 137.2 | 3.29 | 2.10 | 1.19 | 1.19 | 2.50 | 3.69 | 0.79 | 0.40 |
| 2023 | 132 | 138.5 | 3.33 | 2.07 | 1.25 | 1.25 | 2.51 | 3.76 | 0.82 | 0.43 |
| 2024 | 137 | 139.0 | 3.40 | 2.07 | 1.33 | 1.33 | 2.51 | 3.84 | 0.89 | 0.44 |
| 2025 | 141 | 139.6 | 3.45 | 2.06 | 1.39 | 1.39 | 2.50 | 3.89 | 0.94 | 0.45 |
| 2026 | 145 | 140.3 | 3.50 | 2.05 | 1.45 | 1.45 | 2.50 | 3.96 | 1.00 | 0.46 |
| 2027 | 147 | 140.9 | 3.53 | 2.04 | 1.49 | 1.49 | 2.50 | 3.99 | 1.03 | 0.46 |
| 2028 | 149 | 141.5 | 3.56 | 2.04 | 1.52 | 1.52 | 2.50 | 4.02 | 1.06 | 0.46 |
| 2029 | 152 | 142.1 | 3.60 | 2.04 | 1.56 | 1.56 | 2.50 | 4.06 | 1.09 | 0.46 |
| 2030 | 154 | 142.7 | 3.61 | 2.05 | 1.56 | 1.56 | 2.50 | 4.07 | 1.11 | 0.46 |
| 2031 | 154 | 143.3 | 3.62 | 2.02 | 1.59 | 1.59 | 2.50 | 4.10 | 1.11 | 0.48 |
| 2032 | 157 | 143.9 | 3.65 | 2.03 | 1.62 | 1.62 | 2.50 | 4.13 | 1.15 | 0.48 |
| 2033 | 161 | 144.3 | 3.69 | 2.04 | 1.65 | 1.65 | 2.50 | 4.16 | 1.19 | 0.47 |
| 2034 | 165 | 144.7 | 3.73 | 2.03 | 1.70 | 1.70 | 2.51 | 4.21 | 1.23 | 0.48 |
| 2035 | 167 | 145.0 | 3.75 | 2.00 | 1.75 | 1.75 | 2.51 | 4.26 | 1.24 | 0.51 |
| 2036 | 170 | 145.4 | 3.78 | 1.98 | 1.80 | 1.80 | 2.51 | 4.31 | 1.27 | 0.52 |
| 2037 | 174 | 145.7 | 3.82 | 1.97 | 1.84 | 1.84 | 2.51 | 4.36 | 1.31 | 0.54 |
| 2038 | 178 | 145.6 | 3.85 | 1.96 | 1.89 | 1.89 | 2.51 | 4.40 | 1.33 | 0.56 |
| 2039 | 182 | 145.7 | 3.87 | 1.94 | 1.93 | 1.93 | 2.52 | 4.45 | 1.36 | 0.58 |
| 2040 | 187 | 145.6 | 3.90 | 1.92 | 1.98 | 1.98 | 2.52 | 4.49 | 1.38 | 0.60 |

Table C.3.5 *Hardwood Sawtimber* data for 20% RPS (*High ORES* ), in million green tons. MT/UWW/LR+SREC_low

| Year | Price Index | Inventory | SRTS Removals | FPI | MT to Electricity | RPS Demand | Base Harvest | Input Demand | New Removals | Displaced from FPI |
|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 100 | 110.0 | 2.09 | 2.09 | 0.00 | 0.00 | 2.09 | 2.09 | 0.00 | 0.00 |
| 2007 | 86 | 111.6 | 1.96 | 1.96 | 0.00 | 0.00 | 1.96 | 1.96 | 0.00 | 0.00 |
| 2008 | 73 | 113.2 | 1.84 | 1.84 | 0.00 | 0.00 | 1.84 | 1.84 | 0.00 | 0.00 |
| 2009 | 62 | 115.0 | 1.73 | 1.73 | 0.00 | 0.00 | 1.73 | 1.73 | 0.00 | 0.00 |
| 2010 | 53 | 116.9 | 1.63 | 1.63 | 0.00 | 0.00 | 1.63 | 1.63 | 0.00 | 0.00 |
| 2011 | 59 | 118.9 | 1.73 | 1.73 | 0.00 | 0.00 | 1.73 | 1.73 | 0.00 | 0.00 |
| 2012 | 65 | 120.9 | 1.84 | 1.84 | 0.00 | 0.00 | 1.84 | 1.84 | 0.00 | 0.00 |
| **2013** | 72 | 122.7 | 1.95 | 1.95 | 0.00 | 0.00 | 1.95 | 1.95 | 0.00 | 0.00 |
| 2014 | 80 | 124.5 | 2.07 | 2.07 | 0.00 | 0.00 | 2.07 | 2.07 | 0.00 | 0.00 |
| 2015 | 79 | 126.2 | 2.08 | 2.08 | 0.00 | 0.00 | 2.08 | 2.08 | 0.00 | 0.00 |
| 2016 | 79 | 127.9 | 2.09 | 2.09 | 0.00 | 0.00 | 2.09 | 2.09 | 0.00 | 0.00 |
| 2017 | 78 | 129.6 | 2.11 | 2.11 | 0.00 | 0.00 | 2.11 | 2.11 | 0.00 | 0.00 |
| 2018 | 77 | 131.3 | 2.11 | 2.11 | 0.00 | 0.00 | 2.11 | 2.11 | 0.00 | 0.00 |
| 2019 | 82 | 133.1 | 2.20 | 2.08 | 0.12 | 0.12 | 2.12 | 2.23 | 0.08 | 0.04 |
| 2020 | 81 | 134.7 | 2.21 | 2.08 | 0.14 | 0.14 | 2.12 | 2.26 | 0.09 | 0.04 |
| 2021 | 88 | 136.3 | 2.32 | 2.03 | 0.29 | 0.29 | 2.12 | 2.41 | 0.19 | 0.09 |
| 2022 | 87 | 137.8 | 2.32 | 2.03 | 0.30 | 0.30 | 2.13 | 2.43 | 0.20 | 0.10 |
| 2023 | 87 | 139.3 | 2.34 | 2.03 | 0.31 | 0.31 | 2.14 | 2.45 | 0.20 | 0.11 |
| 2024 | 87 | 140.5 | 2.35 | 2.02 | 0.33 | 0.33 | 2.14 | 2.47 | 0.21 | 0.12 |
| 2025 | 86 | 141.7 | 2.36 | 2.01 | 0.35 | 0.35 | 2.14 | 2.49 | 0.22 | 0.13 |
| 2026 | 86 | 142.9 | 2.36 | 2.00 | 0.36 | 0.36 | 2.14 | 2.50 | 0.22 | 0.14 |
| 2027 | 85 | 144.2 | 2.37 | 2.00 | 0.37 | 0.37 | 2.14 | 2.51 | 0.23 | 0.15 |
| 2028 | 85 | 145.4 | 2.37 | 1.99 | 0.38 | 0.38 | 2.14 | 2.52 | 0.23 | 0.15 |
| 2029 | 84 | 146.7 | 2.37 | 1.99 | 0.39 | 0.39 | 2.15 | 2.54 | 0.23 | 0.16 |
| 2030 | 83 | 147.9 | 2.37 | 1.98 | 0.39 | 0.39 | 2.15 | 2.54 | 0.22 | 0.17 |

* Note: the table is abbreviated to 2030 in order to save space for the graphs below.

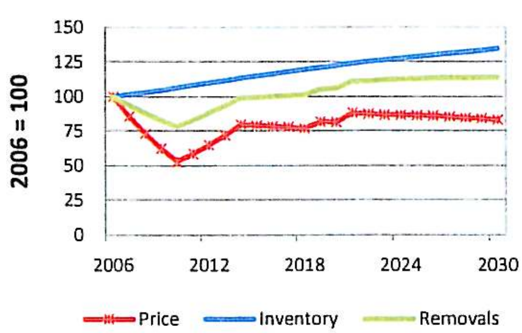


Figure C.3a SRTS output for *Hardwood Sawtimber*, MT/UWW/LR+ SREC_low (*High ORES* ).

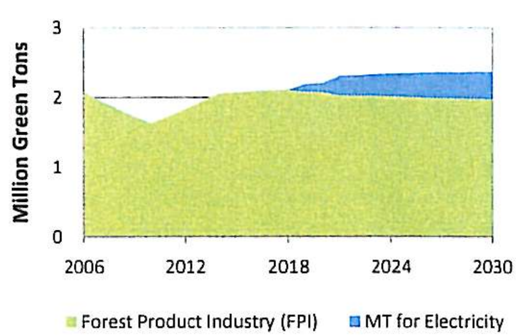


Figure C.3b Allocation of *Hardwood Saw-timber* supply (20% RPS).

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