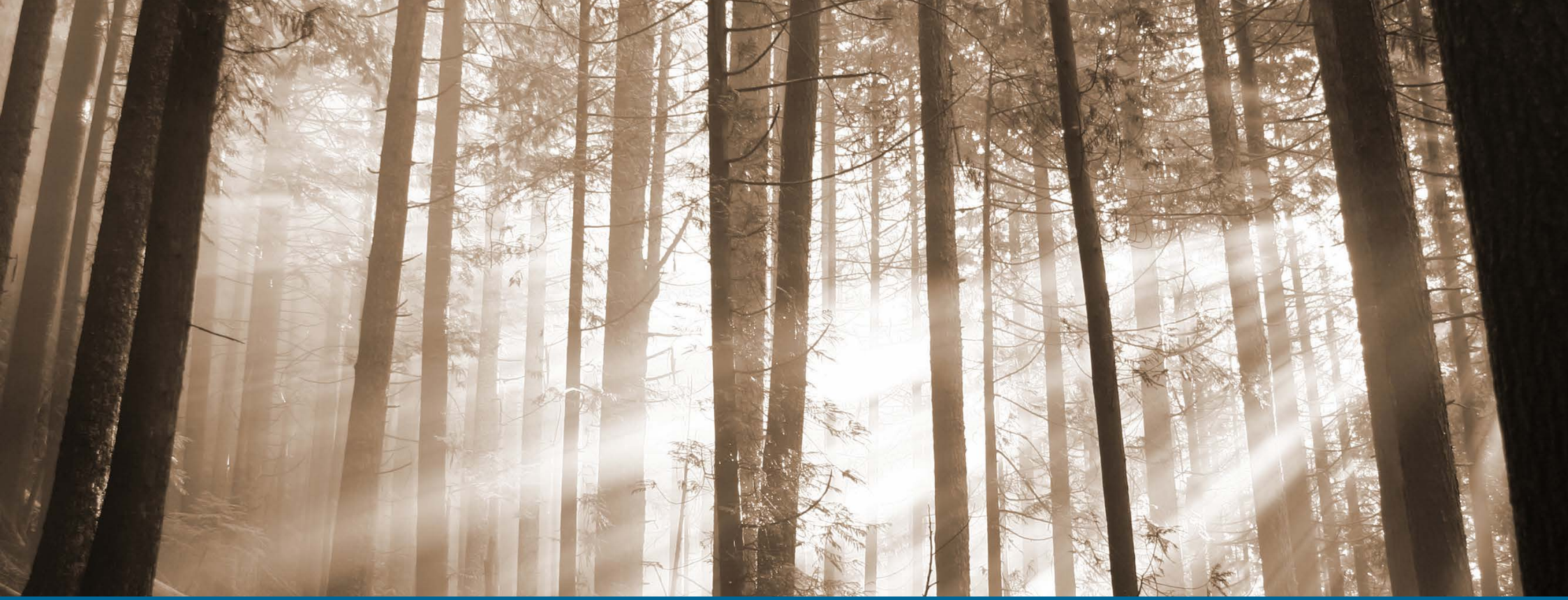

The risks of regulatory intervention in bioenergy feedstock markets

Prepared for USIPA
October 2020

HAWKINS WRIGHT

Introduction

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We offer a wide range of bespoke consulting services for the biomass and bioenergy industries. Our expertise covers the entire biomass supply chain, from forest resources, to logistics, pellet production, contracting and biomass power plant development.

We are entirely independent. We are not involved in the buying, selling, growing, manufacturing or management of timber resources, pulp or paper, wood pellets, lumber, energy or carbon. Our advice is therefore completely objective and untainted by conflicts of interest.

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Executive summary

In this paper we argue that authorities should aim to harness the existing market-based structures of wood fibre supply chains. By focusing on value, as opposed to arbitrary physical criteria, existing market structures will ensure that wood fibre will continue to flow, sustainably, to the highest and best end-use.

The market for forest products involves complex flows of materials through supply chains that comprise a multitude of players. A secondary or waste product for one, becomes the primary raw material for others. These flows have evolved over decades – in some cases over a century – into highly efficient market-based systems that allocate resources to the most appropriate end use.

Industries, technologies, and silvicultural practices have developed to utilize the full quality spectrum of wood and wood fibre. This evolution of material flows ensures the most productive and sustainable use of the land allocated to commercial forestry. It provides incomes to forest owners and employment in rural and forest-based economies.

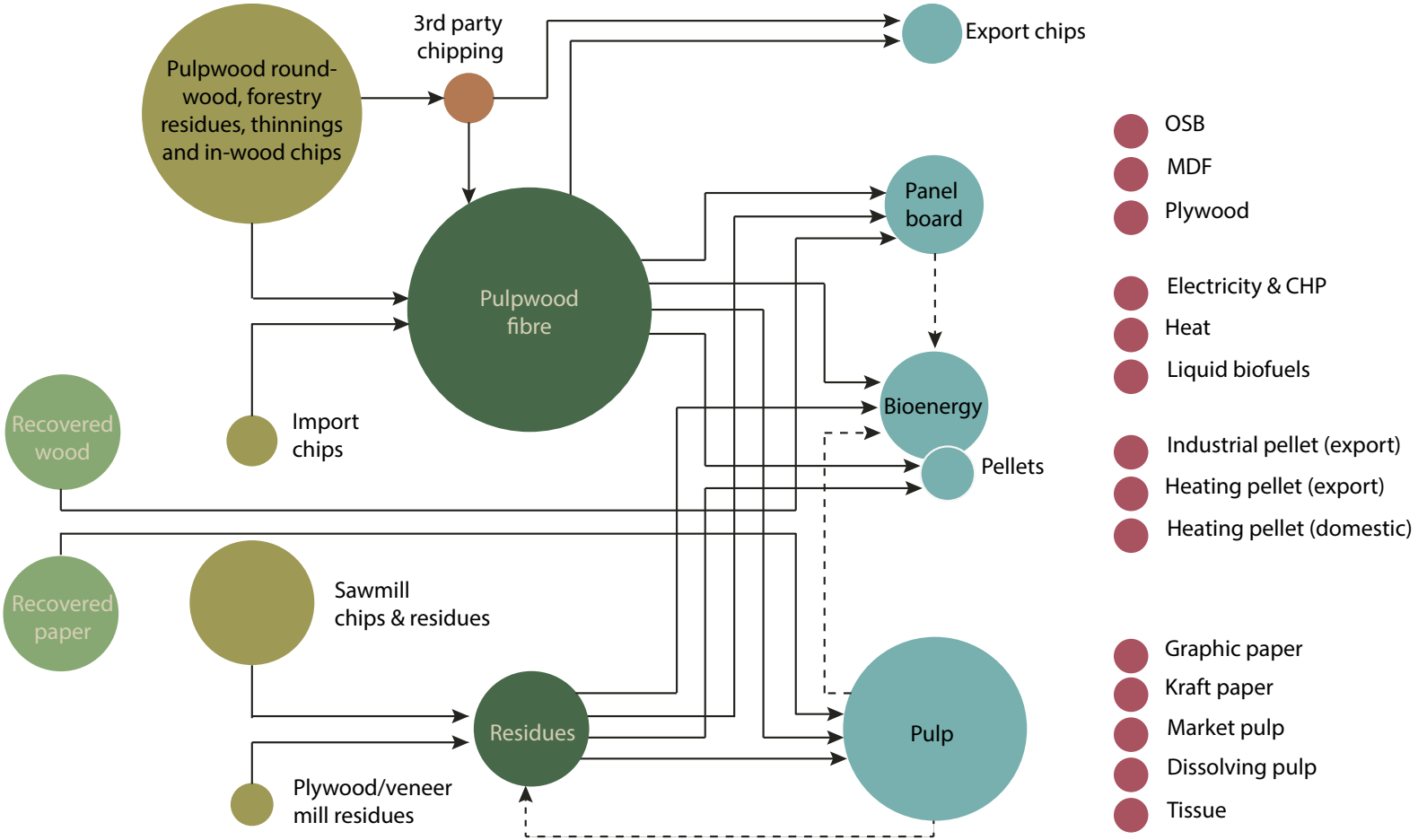
It is right that government agencies are interested in how forests are managed. Forests, after all, provide public goods and services that extend beyond the commercial interests of owners and local communities, not least with regard to biodiversity and climate change mitigation. Yet, when authorities intervene in markets, the effects can reach far beyond the stated purpose of the intervention, with unintended and potentially undesirable results.

- Rules that impose a maximum diameter limit on the roundwood used for biomass will incentivise the earlier than optimal thinning of forest stands and disincentivise later maintenance.
- Such rules will deny an end-use for larger logs that are unmerchantable as saw logs because they are diseased, rotten, twisted or otherwise damaged.
- Likewise, prohibiting “whole trees” (a term that defies definition) from the biomass supply chain, will contribute to other sub-optimal silvicultural practices, with negative implications for the productivity of the forest.
- Such distortions of wood fibre markets will push up costs and will reduce the returns of forest owners, affecting not only biomass and wood pellets but other users of pulpwood too.
- Ultimately this will include producers of panel board and furniture, pulp and paper products, and consumers of biomass power and heat. At the margin this will disincentivise investment in forestry, and forest maintenance, causing forest areas and/or growing stock volumes to be lower than would otherwise be the case.

Wood fibre raw material flows

In all forest economies, wood fibre flows through complex and dynamic supply chains from multiple sources to numerous end-uses. Every forest basin is different to some extent, but interactions between supply sources (pulpwood, residues and recovered wood) and end uses (pulp, panel board and bioenergy) are broadly the same. The important point to note from this diagram is the interconnected nature of the material flows. All sectors are connected, so that changes that affect one sector will be felt in others too.

Complex market-based raw material flows ensure that wood fibre is directed to the highest and best end-use



Note: This is a simplified and hypothetical flow diagram that does not represent flows within a particular region. The size of the "bubbles" are illustrative and not to scale.
Source: Hawkins Wright

Thinnings and maintenance in a sustainable forest management cycle

Forest management involves more than simply planting trees and waiting for them to grow into prime sawlogs. Depending on geography, the management of a commercial forest is a continual cycle of site preparation, planting, thinning, maintenance and final harvest. In a softwood stand in the US South, this is typically a 20-30 year cycle, but it may be longer elsewhere.

With planted forests, thinning and maintenance regimes are vital elements that ensure a healthy forest. This includes removing weaker, twisted, and damaged trees. The additional light, water and space after the thinning, improves the growing conditions of the most viable trees, increasing their growth rate and improving the characteristics of the trunks and their suitability as sawlogs. Maintenance regimes may also include "sanitary" cutting to eliminate storm, fungal, animal and insect damage. These thinning and maintenance treatments have two effects: they maximise the yield of valuable sawlogs as well as maximising carbon sequestration during sequential forest management cycles (i.e. when account is taken of the carbon sequestered in the long-lived wood products manufactured from the sawlogs).

However, for thinning and maintenance to be commercially viable, there needs to be a market for the low-quality wood that is extracted. Absent such a market, and the income that it generates, it is more difficult for forest owners to justify the cost of the treatments. If thinning and maintenance are therefore reduced, growth rates will suffer, sawlog quality will decline and the health of the forest will be impaired. A forest will then sequester less carbon during sequential forestry cycles than it otherwise would.

Historically, the pulp industry has been the principal market for small diameter and damaged wood extracted from forests during thinning and maintenance. It still is, but pulp production has declined in many regions and pulp mills have closed. Across North America, pulp mills' annual consumption of wood has dropped by an estimated ~25Mt over the past decade. Pellet mills have been established partly to fill the vacuum, providing a market for low-grade wood and an income for forest owners. In so doing, they are helping to keep forestlands forested and productive.

The thinning of a coniferous forest

What is a sawlog? Quality requirements for harvested wood

Sawlogs are not defined by their diameter, but by the absence of defects. True, sawmills will often be designed to process logs within a range of diameters: below a minimum diameter the yield of sawn timber is too low to be economic; above a maximum the sawmill will run up against the physical constraints of its machinery.

More important, however, is the quality of the log. As shown in the table below, sawlogs must not display rot and must not be scarred, torn or twisted. Logs with defects unacceptable at a sawmill, may be acceptable to users of pulpwood, mainly pulp mills and panel board mills. A certain amount of rot can be tolerated, as can tears and twists unless these complicate debarking.

Pellet mills using roundwood to make industrial grade pellets tolerate even greater numbers of defects, including those described for firewood in the table. Low quality roundwood (firewood) will sometimes be supplemented by sawmill residues (sawdust, chips and shavings). As the table shows, there is no higher and better use for this low quality roundwood (firewood), a fact that is unrelated to the diameter of the log.

Quality requirements for softwood

	Sawlogs	Pulpwood	Firewood
Diameter (cm)	11-60	6-60	3-75
Forest rot	●	<30% of diameter	<50% of diameter
Storage rot	●	●	<40% of diameter
A steep warp, swelling	●	● if it complicates debarking	●
Mixed species in one shipment	●	●	●
Fresh wood	●	●	○
Scars	●	●	●
Tears	●	● if it complicates debarking	●

Required ● Permitted ● Not permitted ● Not required ○

Source: Graanul Invest Sustainability Report 2019. Graanul reports that 54% of its pellet feedstock in 2019 was "firewood quality" round-wood. The balance of 46% was sawmill residues.

Whole trees – why are they used?

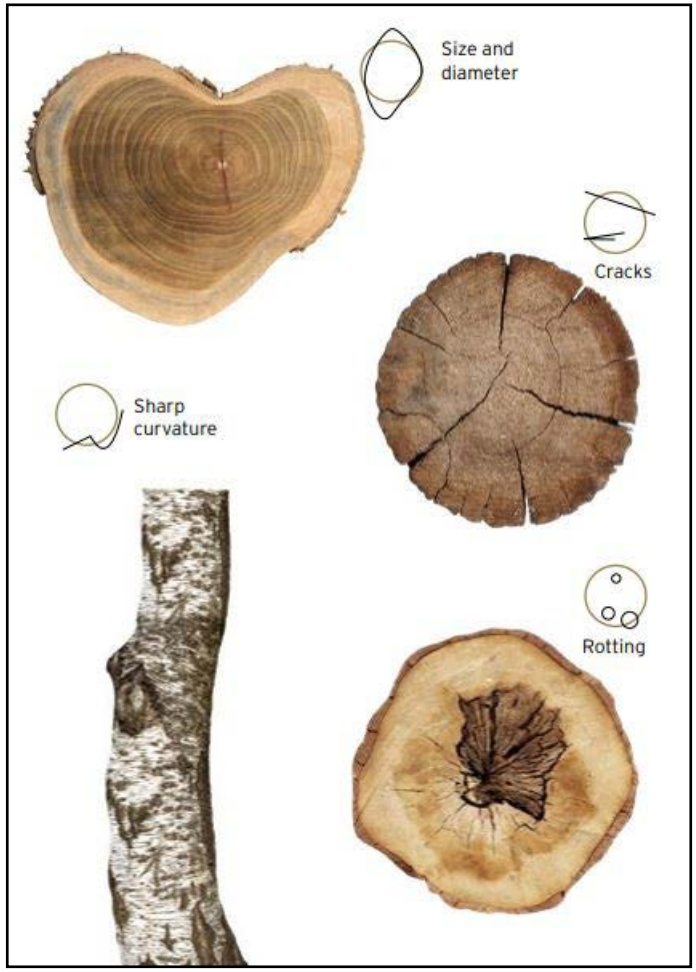
The term "whole tree" is not one that has any meaning in forestry. It defies definition since, biologically, it can be used just as accurately to describe a tiny seedling as a mighty mature tree.

When the term is used, it is usually as shorthand to describe trees of high value. This is based on a common misconception that high-value trees are, by definition, whole trees and vice versa. From this misconception comes the suggestion that to ensure that only low value wood is used for bioenergy, the use of whole trees should be prohibited.

As we set out on the previous page, a sawlog is not defined by its size, but by the absence of defects in the log. The same applies to whole trees. A tree is not more valuable because it is whole from its stump to its highest branch. It is the quality of the tree that matters and the absence of defects such as those illustrated here.

It is also sometimes suggested that the thinning of forests should be discouraged and that this too should be effected by prohibiting the use of whole trees. Proponents of the idea suggest that leaving all trees to grow to maturity and then harvesting selectively will maximise the growing stock of the forest. This too is a misconception; the thinning and ongoing maintenance of planted forests are essential elements of forest management.

As we wrote earlier, without thinning and maintenance, growth rates will suffer, sawlog quality will decline and the health of the forest will be impaired. A forest will then sequester less carbon during sequential forestry cycles than otherwise would be the case.



Source: Graanul Invest Sustainability Report 2019

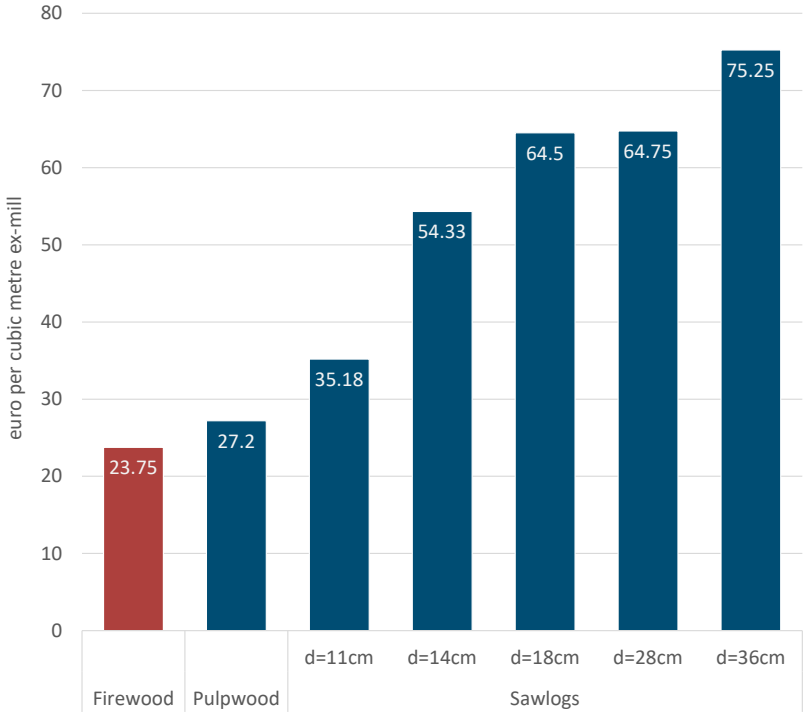
The value of timber reliably reflects the highest and best use of the wood

Timber markets are reliable and efficient mechanisms for allocating wood to the highest and best use that the quality of the log will allow. The charts below depict the prices of assortments of pine roundwood in Latvia and in the US South in the Second Quarter of 2020, showing (in red) the prices of the lowest quality firewood, pulpwood and in-wood chips on the left, rising to the highest quality sawlogs and poles on the right.

This hierarchy of values – which has been seen consistently over the years – ensures that high-quality logs go to high-value end uses, often long-lived construction timber and furniture, while the lowest quality biomass is used for bioenergy. It is a mechanism that works well.

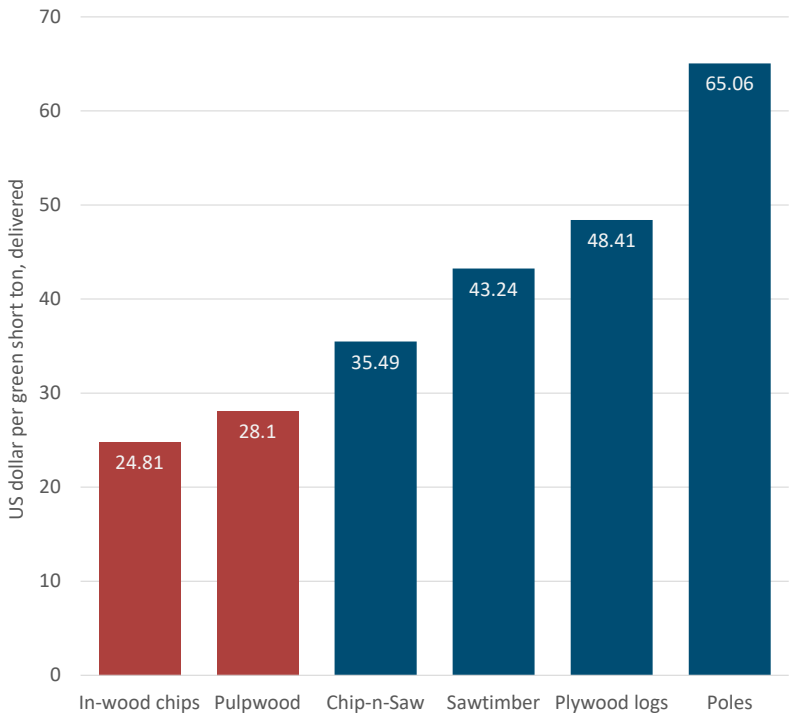
The intervention of authorities in the market could upset this established hierarchy. Placing an arbitrary maximum diameter on pulpwood and firewood, for example, will deny a profitable end-use for larger logs that are otherwise unmerchantable. Likewise prohibiting the use of thinnings ("whole trees") will perversely incentivise sub-optimal silvicultural practices, with negative implications for the productivity of the forest. This will raise costs for forest owners, for downstream producers and consumers of forest products, and for consumers of biomass heat and power too.

Prices of pine roundwood assortments in Latvia, June 2020



Source: Wood Products Research and Development Institute of Latvia

Prices of pine roundwood assortments in US South, Q2 2020



Source: TimberMart South, University of Georgia, USA

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