

The case for new investment in wood processing in New Zealand

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Abstract

Recent strategic analyses and statements have highlighted that the New Zealand forestry sector can increase its contribution to the economy significantly through additional wood processing. A number of industrial processes have been found to be sufficiently profitable to encourage investor interest.

This paper demonstrates that, as an example, the market prospects for Kraft pulp appear to be promising, but a new world-scale pulp mill would exceed the scale of our forests in most regions except the Central North Island. Other promising residue and solid wood processing options need to be evaluated for their suitability in these regions.

The log export market provides an efficient way of selling the proportion of harvest that is excess to domestic requirements, with minimal capital investment. However without significant increases in prices, this option is unlikely to stimulate the expansion of the forest resource, and because we are close to the sustained yield, there is little opportunity to increase harvest. Our current export product mix provides limited opportunity for increased economic contribution from the forestry sector in the future.

It is suggested that for the sector to reach its full economic potential we need:

- A shared view of the processes and products that are most likely to lead to a major increase in the contribution of the sector to export receipts
- A shared view of the significant barriers to achieving the strategy as articulated, and an action plan to remove or mitigate these barriers
- Engagement by the sector with government to provide support for implementation.

The formulation of, and agreement on, an action plan by sector participants is a necessary precursor to engagement with government and other enabling partners.

Introduction

This paper takes as its starting point the major findings of the New Zealand forestry sector's most recent strategic analyses. In brief these stated:

- The forestry sector could double its contribution to the economy, in terms of export receipts, if further

wood processing was carried out in New Zealand (Woodco, 2011). The strategy noted concerns about the scale and profitability of New Zealand wood processing and the WoodScape analysis was commissioned to determine whether, and at what scale, it could be profitable to process wood in this country

- WoodScape (Jack et al., 2013) identified that the best options (from a Return on Capital Employed (ROCE) standpoint) were a Kraft pulp mill (1 million tonnes output per year), a plywood mill (350,000 m³ output) and an oriented strand board (OSB) mill (750,000 m³ output). All three of these options exceeded the benchmark ROCE of 15%. Exchange rate assumptions (the base case assumed a \$US/\$NZ exchange rate of 0.82), and the scale of production (the larger the better), were important determinants of profitability
- Hall (2016) updated the WoodScape analysis and found that in addition to the large-scale processes identified previously, industrial-grade, appearance-grade and structural-grade sawmills were also very profitable, due to a depreciation of the New Zealand exchange rate with respect to the US dollar.

There are two important implications of the need for scale to optimise profitability of processing:

- Market size and prospects will need to be sufficient to maintain full utilisation of capacity if profitability forecasts are to be realised in practice
- The scale of forests must also be sufficient to supply the required feedstock at a competitive price – a significant component of this is minimising logging and transport costs.

The market and resource implications of investing in a large-scale Kraft pulp mill will be explored in more detail in this paper.

Market prospects

Jack et al. (2013) showed that pulp was a very profitable product, but the associated market analysis (Goodison et al., 2013) suggested that global market prospects were not as favourable as some other products: '... For example a Kraft mill at large scale has a high ROCE but a very low market growth rate...' (Jack et al. 2013). The analysis in this paper, which focuses only on the markets in New Zealand's region, provides an alternative view. This analysis examines the current

Table 1: Chemical pulp import market growth and size for NZ's main markets

| | Market growth | | | Market share | Market size |
|-------------------|---------------|----------|----------|--------------|---------------|
| | 5 years | 10 years | 20 years | 2014 | 2014 (tonnes) |
| Australia | 2% | -2% | 1% | 1% | 278,093 |
| China | 5% | 12% | 53% | 57% | 14,891,863 |
| India | 10% | 15% | 29% | 3% | 692,380 |
| Indonesia | 6% | 8% | 2% | 3% | 852,377 |
| Japan | 2% | -3% | -3% | 6% | 1,490,950 |
| Philippines | 6% | 2% | 1% | 0% | 68,967 |
| Republic of Korea | -2% | -2% | 1% | 7% | 1,934,829 |
| Thailand | 7% | 2% | 5% | 2% | 425,576 |
| USA | 6% | -1% | 1% | 20% | 5,304,924 |
| Vietnam | 8% | 4% | 75% | 1% | 143,934 |
| TOTAL: 10 markets | 6% | 4% | 6% | 100% | 26,083,893 |

Source: <http://faostat3.fao.org/download/F/FO/E>

size of these import markets, and the historical pattern of growth in imports. It then looks at the drivers of growth and provides an indication of market potential.

Table 1 shows the growth in imports (in tonnes) of chemical pulp for the last five years, 10 years and 20 years, and the market size and share of individual countries that comprise New Zealand's top markets for 2014. Overall the market is growing at 4–6% per year, and currently 6% growth is equivalent to 1.5 million tonnes of pulp per year, or more than the capacity of a new pulp mill each year. The market is dominated by China, but all markets are currently growing, apart from the Republic of Korea.

This analysis shows that New Zealand forestry markets have been promising markets for pulp over a long period. Pulp imports are required in these markets because the installed paper manufacturing capacity is larger than the availability of suitable feedstock, and analysis of paper consumption in these markets will indicate future prospects for pulp consumption and imports. Paper consumption for communication purposes has declined in many developed markets, due to the rise of electronic means of personal and business communication and the provision of literature and news via various electronic media. How this trend will affect New Zealand's developing country markets is not clear, and depends on the development and uptake of computer and internet technology. However the other two major uses of paper (household and sanitary, and wrapping and packaging) are still likely to increase strongly, or are yet to start increasing in some developing markets that New Zealand serves.

Figure 1 compares per capita consumption of wrapping and packaging paper in the developed world (the average of North America and Europe's consumption is used to indicate developed country consumption) with China, India and Indonesia. The developed country consumption has reached a plateau,

which is probably the origin of the less favourable market assessment in the WoodScape study.

China, India and Indonesia are all large markets, in the Asia Pacific region, which New Zealand already supplies with forestry products. It can be seen that consumption of paper in these markets is well below the developed country average. As a country develops, it consumes more paper on a per capita basis. If China consumed at the current developed country average, it would imply (at current population levels) an additional 51 million tonnes of paper.

The consumption of household and sanitary paper is following a similar trend to packaging paper in China (Figure 2), although the total market potential is likely to be lower. Other markets, such as India, have yet to

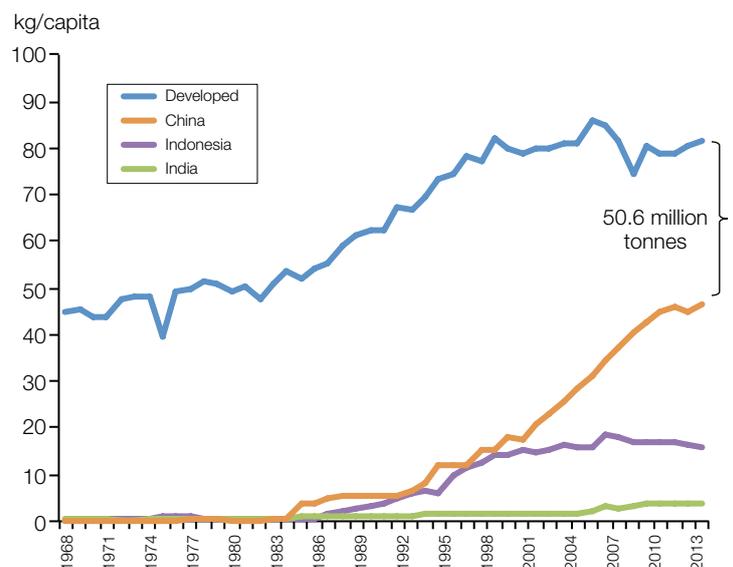


Figure 1: Per capita consumption of wrapping and packaging paper. Source: <http://faostat3.fao.org/download/F/FO/E>

demonstrate a significant growth trend. For household and sanitary paper, another 12 million tonnes would be required if China consumed at the current developed country average. This analysis, which could be repeated for the other developing country markets that New Zealand serves, shows that there should be good longer-term prospects for countries that export pulp to the Asia-Pacific region.

Resource availability

Previous analyses (Edgar et al., 1992; Jack et al., 2013; Hall 2016) indicate that New Zealand can profitably produce pulp, and our current markets are showing significant growth in demand for this product, but it is also important to understand the resource requirements for modern world-scale processing plant. This needs further analysis, because it is important to have a view on what alternative pulpwood and residue-using processes might be most viable for regions too small to contemplate a pulp mill.

Jack et al. (2013) have said the required wood input for a large-scale pulp mill is 4.5 million tonnes. We could assume:

- 20% of harvest from a radiata pine sawlog regime is pulp arisings
- 30% of sawlog is converted to chip suitable for pulping, as part of the sawing process
- a wood density of 1 tonne per m³.

This implies a harvest of around 10 million m³ in total and a sawn output of around 4.4 million m³ (assuming a conversion factor of 55%). Therefore, if a world-scale pulp mill is part of our new investment plans,

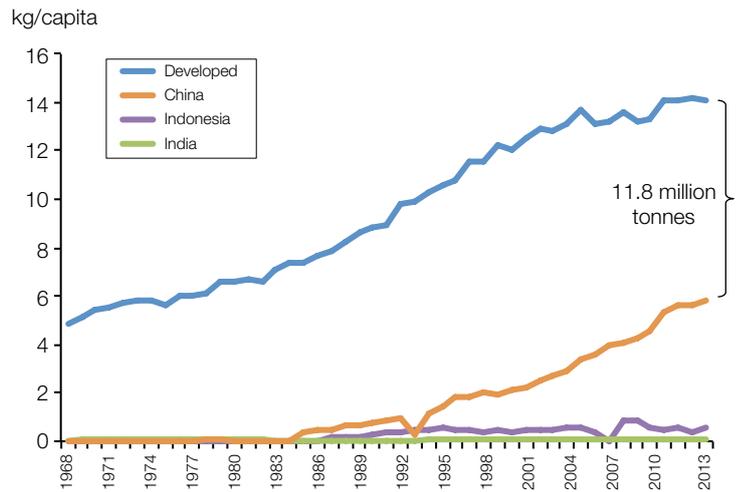


Figure 2: Per capita consumption of household and sanitary paper. Source: <http://faostat3.fao.org/download/F/FO/E>

Figure 3 shows that the Central North Island is the only region with a current or projected harvest large enough to accommodate it. It is surprising this was not noted in the WoodScope report, which recommended for the Central North Island: ‘... large scale integrated solid wood processing facilities ... large scale production of biofuels and chemicals ... [and] ... integration of geothermal energy with wood processing ...’ (Jack et al., 2013).

The resource analysis (Figure 3) also shows that the current harvest is quite close to the long-term sustainable yield in most wood supply regions. There is now little opportunity to increase the sustainable economic contribution of forestry in New Zealand simply by increasing harvest.

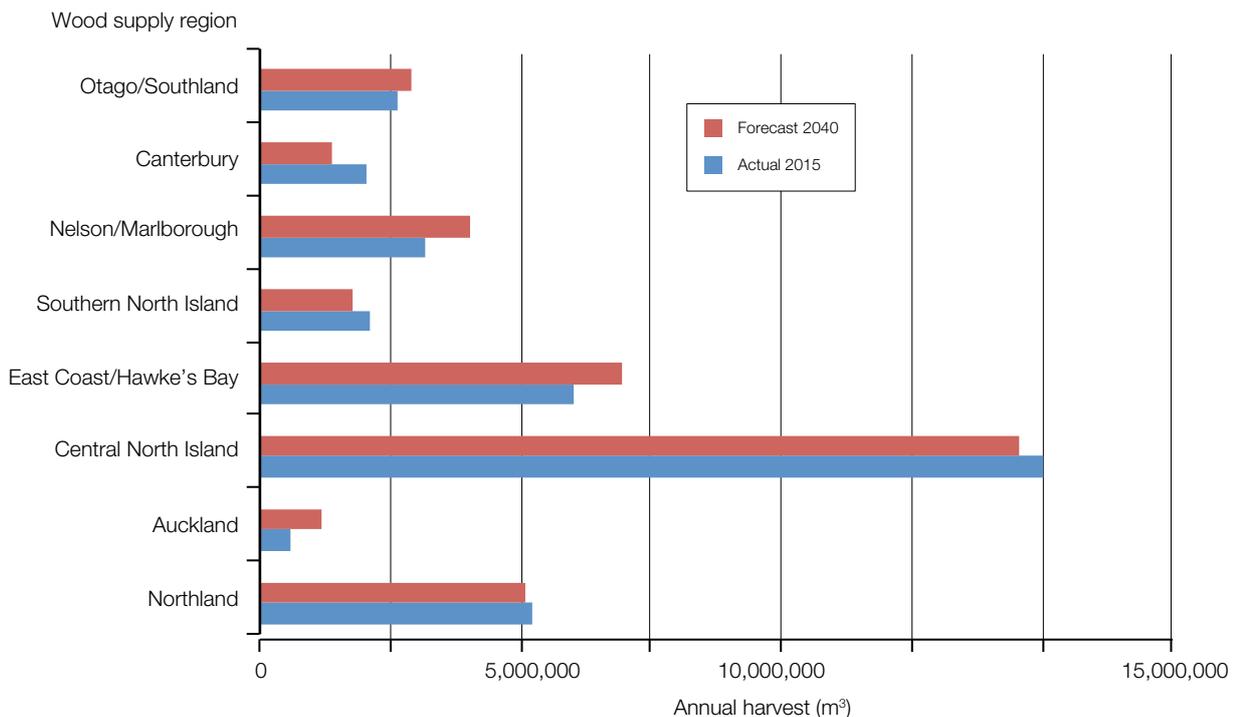


Figure 3: Comparison of actual harvest with estimated sustained yield, by wood supply region. Source: MPI (2016)

Export log market and implications for development of sector

Figure 4 shows the trade unit values for all export logs from New Zealand for all destinations, from 1959 (approximately the start of the log export trade) to the present. Trade unit values provide a proxy for the log price, and are derived by dividing the total value of New Zealand annual log exports by the total volume for each year. It also shows the export A grade log price from the Ministry for Primary Industries (MPI) from 1992 to the present. All data are adjusted for inflation using an appropriate price index. For the period where data from both series are available, we can see that the trade unit value provides a good approximation of the A grade price. These data show the price ‘spike’ of the early 1990s within a longer historical perspective. In fact, from the 1970s to the mid-1990s, the average log price (in real 2015 dollars) was close to \$200/m³ fob. By contrast, from 2000 onwards the price has tended to fluctuate around a mean of about \$125/m³.

In 1992, Edgar et al. said (when the log export trade was 4.5 million m³):

... Ultimately, the increase in New Zealand’s log harvest could be placed in the Pacific Asian region in log form. Provided the market development is on an orderly coordinated basis, current attractive pricing levels should be able to be maintained. But such a development outcome would result in 47% of the New Zealand industry’s total harvest being marketed internationally as logs/chips ... Is this position consistent with the nation’s aspirations? Certainly it is difficult to argue that it represents a sound export product mix strategy ...

(Edgar et al., 1992)

In the year ended June 2015, we exported 16 million m³ of logs (MPI statistics) and in the year ended March 2015 we harvested 29.6 million m³. Now, 54% of total harvest is exported as logs and the ‘current

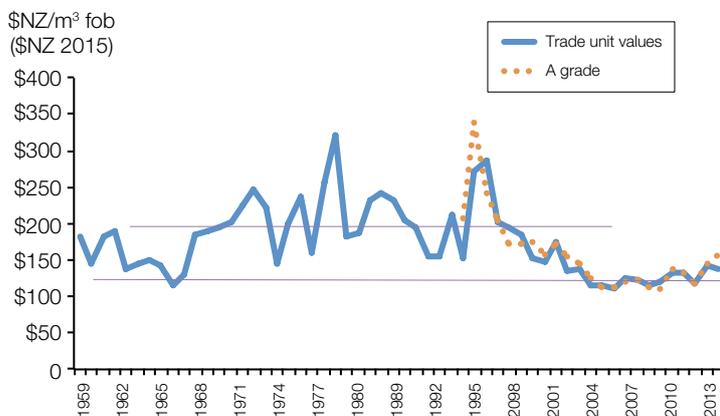


Figure 4: NZ export log trade unit values and A grade export log price (real 2015 \$NZ), 1959 to 2015. Source: www.mpi.govt.nz/news-and-resources/open-data-and-forecasting/forestry/; www.stats.govt.nz

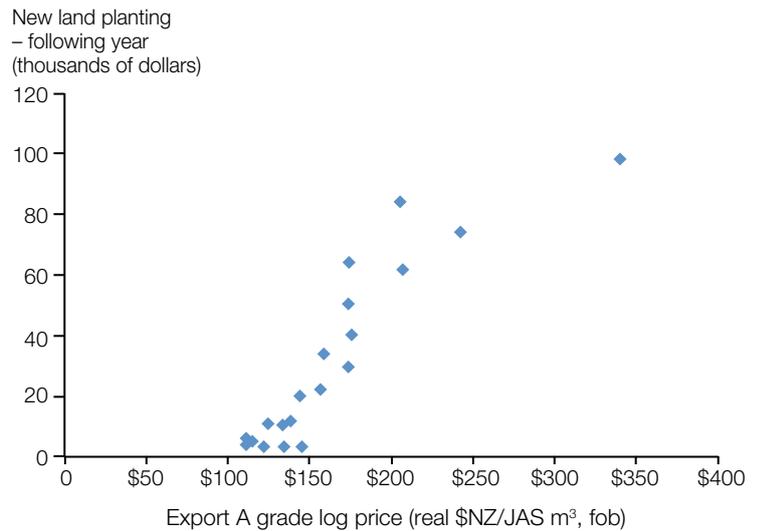


Figure 5: Relationship between real A grade log price and new land planting the following year. Source: www.mpi.govt.nz/news-and-resources/open-data-and-forecasting/forestry/; www.stats.govt.nz

attractive prices’ of the early 1990s are a distant memory. But why does this matter? Figure 5 shows the historical relationship between the A grade export log price (real) in one year and the new land planting rate in the following year. The relationship is quite strong, and if it holds in the future, A grade log prices at \$100 to \$150/m³ (in real 2015 \$NZ) will lead to new land planting of between 0 and 20,000 ha. So at current log prices we are unlikely to see any significant expansion in the planted forest resource from log market signals alone.

Another way to look at this is to ask: ‘What level of log prices would encourage large-scale (say greater than 50,000 ha) new land planting in forestry?’ A discounted cash-flow model was developed for a new land investment in forestry in a Hawke’s Bay forest, pruned regime, with most wood going to export and a discount rate of 9%. A discount rate survey conducted in 2013 (Manley, 2014) stated the implied discount rate for pre-tax cash flows was an average of 8.9%.

If we assume that the current price relativities should be maintained, it was found that for the assumed regime to make 9% pre-tax, pruned, A grade and K grade log prices would need to increase by 37% (\$NZ/JAS m³ fob) from the real (inflation adjusted) 12 quarter average for March 2012 to December 2014. (The export pulp log price was set at the historical maximum price which implied a 30% price increase for this grade.) Figure 6 shows that the prices required to meet the assumed required rate of return have not been attained for some time:

- Pruned logs last reached this price (\$243) in September 2005
- A grade last reached this price (\$183) in December 2000
- K grade last reached this price (\$167) in March 1996
- Pulp logs reached this price (\$147) in June 2011.

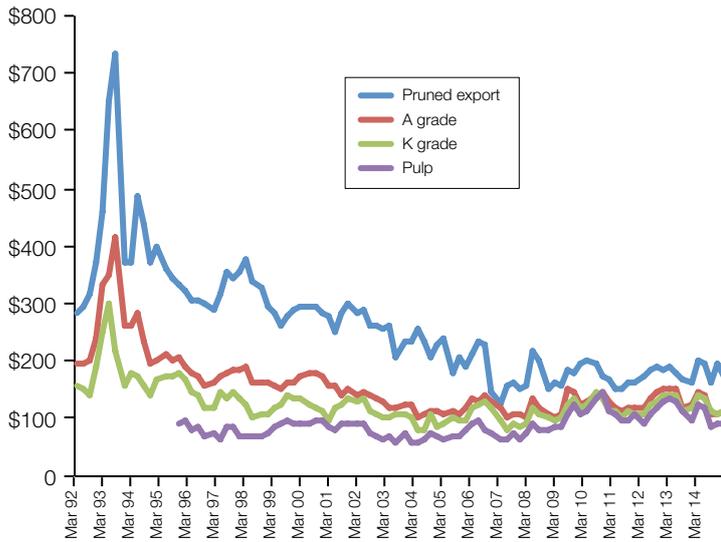


Figure 6: Historical export log prices. Source: www.mpi.govt.nz/news-and-resources/open-data-and-forecasting/forestry/; www.stats.govt.nz

It has been noted that a flourishing log export market is more likely to exist in a developing economy (Evison, 2013). Japan was New Zealand's first export market for radiata pine logs and Figure 7 shows Japan's market has switched from being predominantly a log market to mostly a product market. Similar trends can be seen for the Republic of Korea, indicating that if we wish to maintain our presence in markets as they develop, it is likely we will need to process a larger share of our harvest.

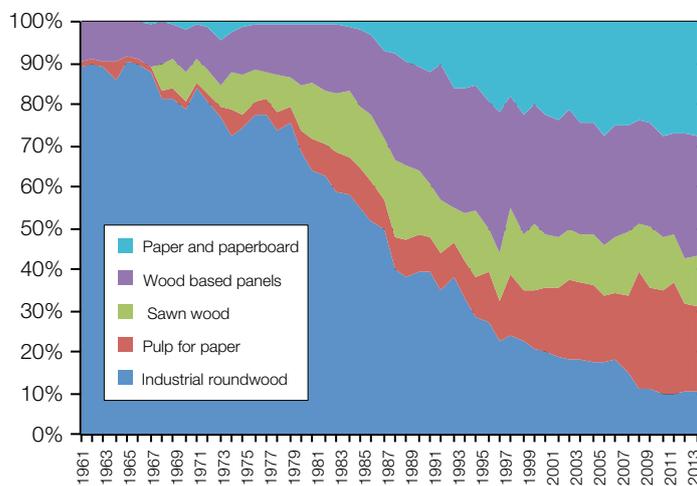


Figure 7: Products imported by share of value, Japan 1961 to 2014. Source: <http://faostat3.fao.org/download/F/FO/E>

Strategic considerations and potential barriers to expansion of wood processing

Lack of integrated thinking and integration in the forestry sector?

Our current regimes jointly produce saw-logs and pulpwood, and one important output of the solid wood

processing industry is a significant proportion of chip residue. This means that forest growing, solid wood processing and processing fibre into pulp or wood panels are mutually dependent and must be developed simultaneously. The extent to which this integrated thinking is discouraged by our current industry structure may be an explanation for New Zealand's lack of new investment in some regions. The WoodScape analysis also showed that the only scale user of residue that was very profitable was pulp (OSB requires a specific strand which is not usually produced by sawmills). From a profitability point of view, this means that to access the superior returns of the chemical pulp business it is necessary to establish what is reputed to be a less profitable solid wood processing business (although Hall (2016) has shown sawmilling also to be profitable, with a sufficiently favourable exchange rate).

The linkage between the solid wood and fibre processing sectors was articulated by Edgar et al. (1992) – the Forest Industry Council strategic study – and also by the recent WoodScape study (Jack et al., 2013). This linkage is a direct result of the current forest management being practised in New Zealand. The linkage between solid wood and pulp processing can easily be broken if a pulpwood regime is practised (as has occurred in many South American forest investments). The lack of discussion of this point in the recent strategic statements is surprising.

One of the findings of WoodScape, and of the 1992 Forest Industry Strategy before it, was that a vibrant and internationally competitive sawmilling industry was a precursor to new investment in pulp and other residue processing:

... Primary solid wood processing is a vital component of the wood processing sector because many other processing options rely on their residues for their input feedstock. To realise the Woodco strategy and benefit the economy from greater wood processing, New Zealand needs to markedly increase the global competitiveness of sawmilling operations ...

(Jack et al., 2013)

For those who still agree with this statement, it should be noted that the update of the WoodScape analysis indicates that sawmilling is now profitable. The logic could also be challenged. If your analysis identifies the most profitable industrial segment, why delay developing it until the less profitable part “comes right”? Perhaps investment in pulp manufacturing should lead in New Zealand regions where this investment is feasible, based on market prospects and strategic considerations.

It also seems very likely that the current lack of vertical integration in the forestry sector in New Zealand makes integrated thinking by key players more difficult. However integrated thinking not only has national benefits, but is also likely to result in higher investment returns. The problem may be more to encourage investment in new assets rather than the

continual exchange of existing assets, which does not significantly increase the output of the sector or its profitability.

Lack of connection and engagement with the Woodco strategy and analysis?

Regional initiatives are not using the Woodco results as a basis for developing their strategies. The Bay of Connections Forestry and Wood Processing Strategy of 2014 (Anon, 2014), for example, identified as its action areas: ‘i. To identify barriers to investment in the industry and work to remove them’; and ‘ii. Identify and promote individual regional growth and investment opportunities.’ It is surprising that this document makes no mention of the Woodco strategy or the WoodScape analysis of processing options. Nor does it identify the most promising wood processing investment options or discuss any barriers to their implementation. In addition, it provides a forecast of future processing and log exports at current levels, which indicates investment is anticipated only to maintain, or at best replace, existing capacity.

Is the size of the investment too large for NZ to manage?

One possible objection to the WoodScape findings may be that a new Kraft pulp mill is simply too difficult for New Zealand. However there are a number of strong reasons to persevere:

- It is the most promising product from a market viewpoint
- It is one of the most promising from a profitability viewpoint
- It provides an expansion path to further value-added products if appropriate in the future
- It provides an access point to new chemicals and value-added products. Breaking wood down to its main components of cellulose fibre and complex organic chemicals is the most effective way to develop new products from wood. Without accessing this opportunity New Zealand forestry risks remaining merely a raw material supplier.

Existing capacity is old and relatively small. Without investment in world-scale plants, New

Zealand’s competitive position in these products is likely to be further eroded. Consider also that pulp and paper used to be the main forestry products exported from this country – up to 1986 these products made up more than 50% of the export value (Table 2). They are now showing about 16%, although newsprint exports are not reported for confidentiality reasons.

Discussion and conclusion

This paper has re-analysed market prospects and resource implications with respect to one of the most profitable processing options presented by the WoodScape analysis – Kraft pulp.

It seems that proposals to increase New Zealand’s chemical pulp capacity would be supported by profitability studies, market potential and strategic considerations; the main technical concern is resource scale. It is feasible with the scale of resource in the Central North Island, but may need to be implemented in conjunction with the retirement of some existing capacity originally installed in the 1950s. Anywhere else in New Zealand, a world-scale pulp mill would require considerable new planting or a significant increase in productivity from existing plantations. Both of these options deserve further study. Any options for smaller-scale pulp facilities should also be explored, although worldwide trends are clearly for larger and larger scale.

Similar analyses need to be performed for the other profitable processing options. The Hawke’s Bay, Southland, Canterbury and Nelson are regions where there is an existing wood residue user (CTMP pulp in Hawke’s Bay and MDF in the other regions). For those regions, expansion could quite easily be sawmilling led, associated with incremental increases in capacity from those existing users of residue.

Northland, East Cape and the Southern North Island wood supply regions have no existing industrial residue user, but the harvest is not of a scale to support a Kraft pulp mill of the size described above without very significant new land planting. In these areas, the exploration of the other promising options identified by WoodScape should be a priority. The most promising option may be OSB, if sawmill slabs were able to be converted to suitable feedstock. In all regions, further work is required to determine the necessary conditions for new investment in sawmilling for export.

Table 2: NZ forestry exports by product, % of total forest product export value, year ending June

| | 1981 | 1986 | 1991 | 1996 | 2001 | 2006 | 2011 | 2015 |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Logs | 9.1% | 5.3% | 19.3% | 26.5% | 19.7% | 15.1% | 36.4% | 45.0% |
| Sawn timber | 16.1% | 14.6% | 13.1% | 14.7% | 21.8% | 23.6% | 18.0% | 15.8% |
| Wood pulp | 28.0% | 28.9% | 22.8% | 18.1% | 17.6% | 15.0% | 14.0% | 13.2% |
| Paper and paper board | 28.3% | 24.6% | 17.8% | 16.8% | 16.3% | 16.8% | 9.3% | 6.4% |
| Panel products | 5.3% | 4.9% | 10.5% | 14.0% | 14.6% | 15.3% | 10.5% | 9.5% |
| Other | 13.3% | 21.7% | 16.5% | 10.0% | 10.0% | 14.2% | 11.8% | 10.2% |

Source: www.mpi.govt.nz/news-and-resources/open-data-and-forecasting/forestry/

Of course the 'business as usual' option of continuing with log exports at the current level also remains, as long as there are developing markets with the capacity to process the wood. There is no question that our log export business is an efficient and effective way of selling the wood that is excess to our domestic requirements with minimal capital investment. However without significant increases in prices, this option is unlikely to stimulate the expansion of the forest resource, and because we are close to the sustained yield, there is little opportunity to increase harvest. Our current export product mix means there will be little likelihood of an increased economic contribution from the forestry sector in the future.

This paper assumes that ambition exists for the forestry sector to expand in scope and significance as a contributor to the New Zealand economy. It seems reasonable to expect that the leaders of the sector share these ambitions, because they have recently promoted a strategy that has created an expectation of a doubling of export value by 2022 and sponsored an economic analysis that identified specific processing options that were profitable.

This paper explores the implications of the Woodco strategy and the findings of the WoodScape analysis. It adds support to the case for new world-scale processing investment in New Zealand. However many of these findings are not new – the Forest Industry Council strategy study in 1992 also identified Kraft pulp as a profitable investment option. Since that time, New Zealand's exports have been limited by processing capacity. By contrast, since 1992, Chile's exports of Kraft pulp have increased by 250%, and Chile now exports 10 times as much chemical pulp as New Zealand. It is not a lack of appropriate analysis of processing options that has prevented New Zealand from increasing processing capacity, so we must look elsewhere for the explanation. What does the sector need to do to enable and encourage this investment? What support or assistance does it need from government or from other sectors? In order for the sector to grow its economic contribution it seems we will need:

- A shared view of the processes and products that are most likely to lead to a major increase in the contribution of the sector to export receipts
- A shared view of the significant barriers to achieving the strategy as articulated, and an action plan to remove or mitigate the effects of these barriers

- Engagement by the sector with government on these next steps.

If new processing investment eventuated, it would provide a much-needed focus to the forest growing sector and a much-increased contribution from the forestry sector. If we are to move the sector forward, the formulation of, and agreement on, an action plan is a necessary precursor to engagement with sector participants, the government, the financial sector and other enabling partners.

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